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Role of Prosodic Reading in Listening Comprehension

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ABSTRACT

This study aims to determine how listening comprehension levels of students are affected by listening to prosodic and non-prosodic readings vocalized by a computer and human. Third-grade students of four different classes at a primary school were randomly selected in a city center in the Western Black Sea Region of Turkey to participate in the study (*n=91*). Four equivalent classes formed the listening groups of the research in listening comprehension. The groups were (1) the group listening to the model prosodic reading, (2) the group listening to the computer prosodic reading, (3) the group listening to the model non-prosodic reading, and (4) the group listening to the computer non-prosodic reading. Two stories were used in the measurement of listening comprehension, and comprehension skills were measured with open-ended questions. The data obtained were analyzed with the Kruskal Wallis and Conover–Iman tests. Logistic Regression Analysis (LRA) was performed to reinforce the results and increase distinctiveness. According to the results, inferential comprehension scores of the students who listened to the prosodically-vocalized texts differed from other groups significantly. Meanwhile, literal comprehension scores of all students in the listening groups did not differ. The LRA results indicated that the inferential comprehension scores were a significant predictor of the listening groups. Consequently, the relationship between prosody and inferential comprehension was found to be significant in this study. The results also showed that it is necessary to attach particular importance to prosody in listening activities and to use prosodic models suitable for students in reading activities in the early grades of the primary school.

Key words: Listening Comprehension, Prosody, Non-prosody, Oral Reading, Literal, Inferential, Literacy

INTRODUCTION

Listening is the process of decoding the audial input with the use of language. Listening is a complex process in which the listener reconstructs and makes sense of an audial stimulus (Poelmans, 2003). Anderson (2009) states that listening comprehension is composed of three stages: perceiving, parsing, and utilizing. While decoding the spoken language by perceiving it, the listener transforms the words within discourse into a mental representation to get the meaning via parsing. In the last stage, the listener reconstructs the meaning of the sentence by utilizing the mental representation. Purdy (1997) states that listening is an active process in which listeners participate, perceive, interpret, recall, and provide feedback. Then, the listener utilizes different tips and makes sense of audial input by benefiting from preliminary knowledge and context. In this sense, it is argued that listening is a conscious process (O'Malley, Chamot, & Küpper, 1989).

Listening comprehension skill is more advanced than reading comprehension skill in the first years of primary school (Duke & Carlisle, 2011). Reading skill becomes more effective than listening skill particularly in acquiring academic knowledge and developing the vocabulary later, but listening skill positively contributes to the development of reading skill, which is another recipient linguistic skill (Hawkins, Marsicano, Schmitt, McCallum, & Musti-Rao, 2015).

It is thought that fluency and fluency elements in reading as well as fluency and fluency elements in speech are similar. Prosodic aspect of fluency plays a significant role both in speech and oral reading processes. Due to this role, prosody is a determinant of the communicational quality in an environment in which the activities of mutual listening and speaking are performed (Veenendaal, Groen, & Verhoeven, 2014). This is because the listener must consider what and how the speaker expresses to comprehend the message completely.

Literature Review

Previous research studies drew attention to the fact that prosodic awareness has a positive impact on foreign language

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learners' listening comprehension and interpretation (Kang, 2007; Kraljic & Brennan, 2005; Schafer, 1997; Schafer, Speer, & Warren, 2005; Snedeker & Trueswell, 2003; Warren, Schafer, Speer, & White, 2000). According to Buck (2001), listeners utilize the stress in the listened text as an important tip in the process of perceiving the message about what they listen to. Stress provides listeners with an important tip and help them to comprehend what they listen to. According to the study performed by Derwing, Munro, and Wiebe (1998), as students' prosodic awareness increases, the more advanced students' comprehension skills become. Gordon, Darcy, and Ewert (2013) noted the importance of contributions of prosody education in learning phonological attributes. They argue that if the speaker provides an incorrect stress, the listener may confuse the place and order of the words in the listening content. John (2005) pointed the fact that incorrectly-stressed elements in speech would cause listeners to make incorrect meanings and inferences. Hence, it was argued that listeners may incorrectly comprehend what they listen to due to incorrect stress.

The simplest definition of prosody is the music of language (Kuhn, Schwanenflugel, & Meisinger, 2010), while the more complex definition is that it is about "how something is said rather than what it is" (Veenendaal et al., 2014). This indicates that speech prosody has a meaningful function because one can make the communicated listener feel emotions, intentions, attitudes, etc. via prosody (Milosky & Ford, 1997; Nygaard, Herold, & Namy, 2009; Ofuka, McKeown, Waterman, & Roach, 2000). These elements are critical in establishing connections not only about uttering words but also predicting whether to attach importance to some concepts when attributing meanings to words, because special communication basically includes elements such as volume, tone and stress of voice, rate of speech, way of inhaling-exhaling, as well as the words uttered (Özbay, 2005). These elements form the mutual domain of both speech and oral reading. Similarly, attributes such as intonation, accentuation, and rate underlie the prosodic elements in reading.

Defining prosody simply within the boundaries of the speaking skill means ignoring its scope and attributes. Scientific developments in the domain of reading specifically have shown that prosody produced during oral reading is closely related to reading comprehension (Dowhower, 1991; Kuhn et al., 2010; Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004) because oral reading prosody requires expressing the meaning in the read text in a strong and proper manner (Erekson, 2010). Due to such strong relationship between oral reading prosody and reading comprehension, it is recommended to use oral reading activities frequently in the first years of primary school (Akyol, 2011; National Reading Panel, 2000) as other students also listen when oral reading is in progress. On the other hand, oral reading of a text already provides listeners with a natural and comprehensible pronunciation (Veenendaal et al., 2014). In Akyol's (2011) definition of fluency reading, it is stated that reading should be as if it was speaking. It can be accordingly argued that prosody produced during oral reading needs to be as close as prosody during speaking.

In non-prosodic readings, the reader does not pay attention to punctuation marks, such as a slowdown in commas, a little pause at the full stop, and a slight change in the intonation in the presence of the question mark. This type of audio reading does not feel toning and highlights (Akyol, 2006; National Reading Panel, 2000; Schwanenflugel & Ruston, 2008). A similar situation is seen when text with punctuation marks is spoken by text-to-speech software. The same goes when one interacts with automatic response systems of firms; one speak with a computerized response system (Breznitz, 2006). In short, non-prozodic voices are very different from the voice in natural speech.

The most important helpers that make prosodic elements relevant in oral reading are punctuation marks. Punctuation marks and their attributes, such as inhaling-exhaling, adjusting the volume, accentuation, intonation, pausing, and stopping, help the readers determine how to process the voice through interpreting the text. However, models with natural pronunciation are needed for the development of both speech and oral reading prosody. That is why readings, that would be model for students, should be performed by a good model/teacher in the efforts of teaching and maintaining reading (Dowhower, 1991; Kuhn et al., 2006).

With the technological developments, artificial voices modeled by computers are utilized instead of natural human voice. Text-to-speech applications are frequently observed and used in this sense. These two different styles of vocalization have different prosodic structures by nature. So far, there are no studies investigating the relationship between prosodic and non-prosodic listening and comprehension with different sources of voice and Turkish speaking and reading students in Turkey in the literature. Thus, it poses a question of whether or not there are prosodic differences due to vocalization and whether or not there are possible differentiations in listening comprehension of students listening to the prosodic and non-prosodic reading.

This study aims to fill the said gap by determining how listening comprehension levels of students are affected by listening to prosodic and non-prosodic readings vocalized by computer and human. The following questions will be answered in this study:

1. Do literal listening comprehension scores differ depending on whether or not the listened text is prosodic?
2. Do inferential listening comprehension scores differ depending on whether or not the listened text is prosodic?
3. Are students' literal and inferential comprehension levels important indicators in predicting whether the listening group is prosodic or non-prosodic?

METHOD

Participants

Third-grade students of four different classes at a primary school were randomly selected in a city center in the Western Black Sea Region of Turkey. Forty-six participants (50.5%) were female and 45 (49.5%) were male. The mother tongue of the students was Turkish, and their audial and linguistic developments were normal. There were no students with learning or reading difficulty among them.

Instruments

Two texts were utilized to measure the listening comprehension of the students. The first text used was a story named "*Çatlak Kova*" (Cracked Bucket), which was composed of 183 words (Öztürk, 2016). The second text was a story named "*Tarladaki Hazine*" (Treasure in the Field), which was composed of 186 words. The story is included as a listening text in the third-grade course book. The digital version of the text in hearable format was procured from the Educational Information Network website of Ministry of National Education (EBA, 2016). The texts were also evaluated in terms of suitability for student level with Ateşman's (1997) *Turkish Readability Formula*. The texts *Çatlak Kova* (76.29>70) and *Tarladaki Hazine* (74.95>70) were found to be easy and readable in the evaluation. The texts were evaluated for comprehensibility by two academics with at the least three years of experience in Basic Education and Turkish Education, and the texts were found to be suitable for usage.

"*Informal Reading Inventory"* used reliably in Turkish reading-comprehension studies was utilized to measure reading comprehension (Akyol, 2006). According to the inventory, literal comprehension questions are rewarded 0 point when not answered, 1 point when semi-answered, and 2 points when completely answered. Meanwhile, the inferential comprehension questions are rewarded 0 point when not answered, 1 point when semi-answered, 2 points when answered closely but incompletely to the exact answer, and 3 points when completely answered.

Procedure

First, the listening comprehension text and questions were prepared to determine whether or not the classes randomly included in the research were comparable groups in terms of listening comprehension skills. The text "*Çatlak Kova*" was used, and six questions were prepared to test literal (3) and inferential (3) comprehension. The text was orally read by the researcher in the classrooms, and then the comprehension questions were distributed to the students who were asked to answer the questions. The students were told that this study was not an exam. No time limit was specified, but the students answered the questions within one class hour. The answers were graded with the Informal Reading Inventory as stated above. In the light of the data obtained, the equivalence levels of the groups were looked into, and preparations were started for application of four different types of listening in classrooms after the groups had been seen equivalent.

In the preparation phase, the teachers were asked to decide on the schedule, which includes the day and time, of application and data collection. Before the listening activities, the students were told that "participation in the research was voluntary and those who did not want to participate are allowed not to participate." The kind of design to be applied for each specific classroom was randomly decided. "*Tarladaki Hazine*" text was utilized in differentiated prosodic vocalizations. The application designs were as follows: listening to the prosodic reading performed by the model reader (MP), listening to the non-prosodic reading performed by the model reader (MNP), listening to the electronic listening text prosodically vocalized for the course book (CP), and listening to the non-prosodic reading with the text-to-speech application (CNP). Electronic version of "*Tarladaki Hazine*" was procured from EBA (EBA, 2016) for the vocalizations on digital platform, which the students were asked to listen to. Punctuation marks were omitted from the story, and the whole text was written in lower case to prepare non-prosodic MNP and CNP texts. The reason for this is that punctuation marks are important marks from which readers get prosodic tips (Shanahan, 2006; Yıldırım & Ateş, 2011). With the omission on punctuation marks, the tips, which make it possible to read the text prosodically, were prevented to contribute to non-prosodic reading. The text was read by the researcher on a fixed rate and regardless of intonation and accentuation in the MNP group while it was vocalized robotically by the software "Türkçe Seslendir" ("Vocalize in Turkish") (Tura, 2017). After four different listening practices mentioned above, students' level of comprehension was measured.

Data Analysis

SPSS (IBM Corp, Released 2015) and R Statistical Data Analysis (R Core Team, 2017) software were utilized in the data analysis. *Kruskal-Wallis (KW)* for comparison of independent groups, *Shapiro Wilk (SW)* for normality distribution, and *Conover-Iman* test for multiple comparison were used. Logistic Regression Analysis (LRA) was performed to obtain the expected value of the dependent variable as odds by the independent variables to reinforce the multiple comparison findings (Conover & Iman, 1979; Pohlert, 2016; R Core Team, 2017).

Preliminary analyses for group equivalences

Descriptive analyses were achieved from the tests conducted to determine whether the groups were comparable. The analysis results for literal comprehension scores were (M=4.13, SD=1.28, N=23) in MP group, (M=4.26, SD=1.25, N=23) in CP group, (M=4.04, SD=1.55, N=23) in MNP group and (M=3.36, SD=1.73, N=21) in CNP group. Descriptive statistics of inferential comprehension scores were (M=4.36, SD=1.78) in MP group, (M=3.39, SD=1.80) in CP group, (M=3.30, SD=2.00) in MNP group and (M=3.95, SD=1.13) in CNP group.

In the second stage, the normality distribution of the data was looked into to decide which test product will be used in multiple group comparisons. The *SW* test showed that literal and inferential comprehension scores respectively were not distributed normally (W=.909, p=.000), (W=0.933, p=.000). Accordingly, it was decided to use *Kruskal Wallis (KW)* test which is preferred for non-parametric cases in the comparison of independent groups (Leech, Barrett, & Morgan, 2005). The *KW Test* showed that there were no significant differences between the literal listening comprehension scores of the groups with 3 degrees of freedom *(H=4.34, p=.22)*. Similarly, no significant difference was observed between the groups in terms of inferential comprehension scores *(H=7.55, p=.06)*.

Another point that the study intended to investigate was the prediction of group memberships (prosodic/non-prosod-

ic) by looking into students' comprehension levels. In other words, the question was "Could students' inferential and literal comprehension scores be used to determine the odds of being in the prosodic or non-prosodic group?" Literal and inferential comprehension scores of the students were individually calculated to answer this question. Two groups were created for LRA. MP and CP classes were Group 1 in which prosodic reading was performed, while MNP and CNP classes were Group 2. The students in the classes where prosodic reading was performed were encoded with 1.

FINDINGS

This section addresses intergroup differentiation, multiple comparison, and LRA findings, respectively.

Intergroup Comparison Findings

First, the literal comprehension scores were analyzed. Descriptive statistics of literal comprehension scores were (M=5.18, SD=1.05) in MP group, (M=4.26, SD=1.14) in CP group, (M=5.04, SD=1.22) in MNP group, and (M=4.61, SD=1.82) in CNP group. As for the literal comprehension scores, the KW test was performed to determine if there was a difference between the groups by whether or not the listening text had prosodic elements. No significant difference was found between the listening comprehension scores with 3 degrees of freedom *(H=1.966, p=.579)*.

Descriptive statistics of inferential comprehension scores were (M=2.27, SD=2.25) in MP group, (M=1.91, SD=2.06) in CP group, (M=0.48, SD=1.16) in MNP group, and (M=1.35, SD=2.12) in CNP group. The KW test was also performed with the inferential comprehension scores, and a significant difference was found between the listening comprehension scores with 3 degrees of freedom *(H=12.379, p=.006)*. To find out from which groups caused the difference, Conover-Iman Multiple Comparison Test adjusted by the Holm method was carried out. Significant differences were found between MP and MNP and CP and MNP groups. CNP group did not differ significantly from other groups. However, considering the descriptive data, the difference of MP and CP from other groups is clearly seen. Mean values of the groups are given in Figure 1.

Findings of Logistic Regression Analysis

A probability-based confirmation was needed later in the analysis to reinforce the findings of intergroup difference. To meet such need, students' literal and inferential comprehension scores were taken into account, aiming to predict which group (prosodic/non-prosodic) the students could be in.

Before the LRA analysis, multicollinearity was investigated between the variables. It was concluded that multicollinearity was very low between the variables (VIF=1.1067 for inferential comprehension, VIF=1.038 for literal comprehension VIF<10). After it had been seen that the data set was suitable for LRA, Omnibus and Hosmer-Lemeshow tests were performed respectively to achieve the intended model.

According to the Omnibus test results, the model was significant in consideration of the variables in the regression model (χ^2=9.376, df=2, N=91, p<.01). In other words, the relationship between the predictor variable and the predicted variable was supported. Hosmer-Lemeshow test was conducted to determine the fit level of the model, and it was found to have an acceptable fit (χ^2=6.811, df=6, N=91, p>.05). Accordingly, it can be argued that the fit between the data and the model was sufficient. Coefficient estimates of the intended model are given in Table 1.

In the LRA, it was found that the predictive variable of inferential comprehension made a significant contribution to

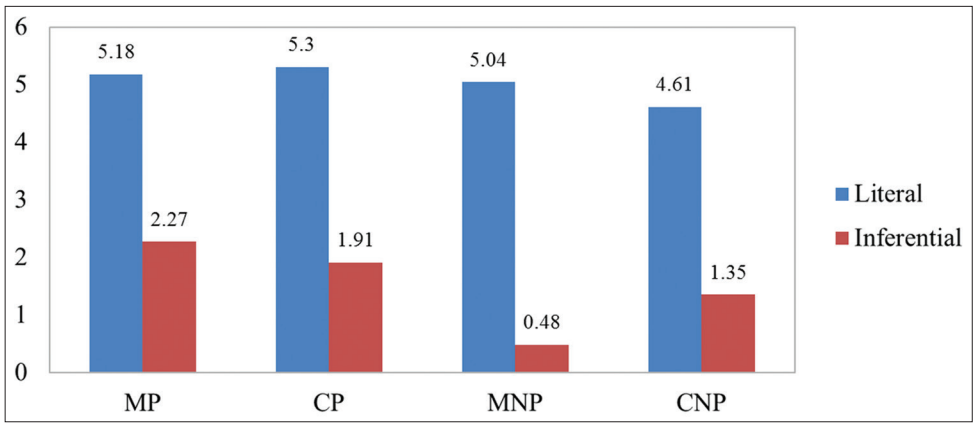

Figure 1. Graphic for comparative, descriptive statistics of literal and inferential comprehension
MP=Model prosodic, CP=Computer prosodic, MNP=Model non-prosodic and CNP=Computer non-prosodic

Table 1. Coefficient estimates for the intended model

Variable	*β*	*SE*	*Odds ratio*	*z*	*p*
Inferential comprehension	0.3062	0.1237	1.358	2.475	0.013
Literal comprehension	0.1837	0.1710	1.202	1.074	0.283
Constant	–1.3850	0.8915	0.250	–1.554	0.120

the intended model. According to the results in Table 1, it can be argued that increase per unit in inferential comprehension scores can cause an increase of 36% in the odds of being in the prosodic reading.

DISCUSSION

This study aims to determine how listening comprehension levels of students are affected by listening to prosodic and non-prosodic readings vocalized by computer and human. Listening studies in primary education are used for improving the listening comprehension skills (TTKB, 2016). In particular, using electronic stories frequently and determining how prosody affects listening comprehension at primary schools are important for the listening activities at schools. It is thought that assumptions made from the research results are of critical importance. According to the results, the students comprehended the prosodic texts in a better way, and listening comprehension was negatively influenced by less prosody or lack of prosody. When taking a closer look at the results, students' inferential comprehension skills were affected by prosodic listening, but being prosodic or non-prosodic did not have any impact on their literal comprehension skills.

The research results showed that the scores of the students in the MP group were higher than the scores of the students in the MNP group, and they also differed statistically and significantly. This result is important as it indicates how determinant prosodic reading of the text is on inferential comprehension. The studies refer to the presence of a relationship between prosody and listening comprehension (Jackson & O'Brien, 2011; Yenkimaleki & Heuven, 2016). Yenkimaleki and Heuven (2016) observed that teaching students the prosodic attributes, or in other words providing them with prosodic awareness, improved their listening comprehension skills. Then, one can mention about a relationship between sensing the prosodic structure and listening comprehension when listening. It was also observed in this study that listening comprehension was reduced when there was prosodic deprivation, which means not a sufficient amount of prosodic structure was sensed. It can be accordingly argued that the research results coincide with the findings in the literature.

Reading and listening are recipient linguistic skills and of vital importance in the meaning-making process. The relationship between reading prosody and reading comprehension has been shown in several studies in the literature (Baştuğ, 2012; Çetinkaya, Ateş, & Yıldırım, 2016; Rasinski, 2006). The case with reading comprehension can be considered somehow applicable to listening comprehension, because it is known that reading and listening comprehension skills share similar mental processes even in part (Lehto & Anttila, 2003). Thus, this result is quite important for showing the relationship between prosody and listening comprehension. It is accordingly possible to say that prosodic elements, which are important in reading comprehension, are important in listening comprehension as well.

Another finding achieved in the research is that students' literal comprehension scores did not differ by whether or not the listening text was prosodic. In other words, literal comprehension scores of the students did not differ based on the type of listening. Dowhower (1987) observed in a study on reading comprehension that students' literal comprehension scores increased when the text was read prosodically. Similarly, the literal comprehension scores were higher in the groups that listened to the prosodically-read text than in other groups. However, those higher scores were not statistically significant. When considering the results only from the aspect of higher comprehension scores, it can be argued that they coincide with Dowhower's findings. Yet, statistically significant difference in inferential comprehension was more distinctive. This might be due to the quality of the answers to the literal comprehension questions. For instance, literal comprehension questions generally start with "what, where, who, and when", and the respondents' answers are usually one or two words. At the end of listening, it is mostly enough to have heard, understood, and recalled the word properly to provide correct answer to such questions because there is no need for in-depth thinking and interpretation in such comprehension. On the other hand, it is necessary to comprehend sentences or semantic phrases formed by sentences for inferential comprehension.

Another finding obtained in this research is that CP listening scores differed significantly from MNP. It is therefore possible to say that having students listen to the electronic versions of professionally-vocalized reading texts in different voice formats provides prosodic attributes required in listening comprehension. It was also observed that non-prosodic natural human voice did not contribute to inferential comprehension.

It was found in the research that there was no statistically significant difference between CNP and other groups. Nevertheless, the students in CP and MP groups comprehended the text better than the CNP group. It is thought that this result may differ depending on the grades, ages, vocalization conditions, and larger samples. Differently from other groups, the vocalization was completely performed with the text-to-speech software in CNP. As it was the first time for the students, they might be attracted by such listening and might listened to the text curiously. It might be argued that this may be factor as to why CNP did not differ with other groups.

Findings on intergroup difference were confirmed in the Logistic Regression Analysis. Only inferential comprehension significantly contributed to the intended model. These results present the relationship between the prosodic oral reading of the listening texts and the ability to make inferences. Despite lack of direct findings in the literature, Baştuğ and Keskin (2012) found a significant relationship between reading fluency skill and inferential comprehension. However, this relationship becomes more significant when it is considered that reading fluency requires prosodic reading. In this sense, the research in question indirectly reinforces the findings on prosody and inference in this study.

The most important result achieved in this study is that prosodic vocalization plays a key role when a listener comprehends a text inferentially. There was no difference between the teacher's prosodically-vocalized story and prosodic listening

of voice records on digital media both by literal and inferential comprehension. It can be accordingly argued that electronic stories or e-books vocalized by experts can be reliably used in listening comprehension activities. On the other hand, it is hard to mention a quality listening activity when vocalization is not prosodic, whether a teacher or text-to-speech software vocalizes the text. To sum up, vocalization in listening activities should include prosodic elements in the first place.

CONCLUSION

This study tried to fill an important gap particularly on the national level. As these results are not sufficient, different types of text and grade levels need to be looked into, and their corresponding results need to be compared with the current results to explore the importance of prosodic vocalization in listening comprehension. Studies can be conducted to determine the relationship between prosodic pronunciation and listening comprehension.

It was observed in the study whether or not the listening text which included prosodic elements has a predictive effect on students' inferential comprehension. It is required to apprehend the essence of event/information in the text for inferential comprehension. For literal comprehension, catching the keywords such as date, time, place, name, among others in texts is mostly enough for listeners. Importance of prosody in communication can help understand its place in inferential comprehension, because prosody offers tips on emotions, thoughts, and intentions of the source both in reading and verbal communication. Hence, particular importance should be attached to prosody in speaking, listening, and reading activities, and attention should be paid to the presentation of appropriate prosodic models to students in the first years of primary school.

There are a few basic limitations to this study. Firstly, as the study was conducted only with the third grades, generalization of the results to other grade levels would be faulty. Secondly, since the type of text used was stories, the obtained data are limited only to stories and cannot be generalized to other types of text. Also, the procedures were also restricted to two texts as not to occupy teachers' class hours further. Lastly, there are no nationally-standardized listening comprehension tests in Turkey, thus this poses limitation in terms of internal validity.

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