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Temporal characteristics of teenagers' spontaneous speech and topic based narratives produced during school lessons

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Abstract

The aim of this presentation is to analyse the articulation and speech rates of teenagers and the types of pauses in their spontaneous speech and topic based narratives during school lessons. The speech samples were analysed in terms of temporal characteristics by Praat program. The results showed the different tempo values and various function of filled pauses in the examined situations.

Introduction

The tempo of speech is the rate at which utterances and their smaller units are pronounced. It is defined as speaking and articulation rates. Speaking rate refers to entire speaking phase including pauses versus articulation rate which refers to phases of articulation excluding pauses (Fletcher, 2010; Jacewicz, Fox & Wei, 2009). So the speech tempo indicates all of the number of different speech units pronounced by the speaker with the pauses versus the articulation rate indicates the speed of the number of speech units produced in the time actually taken to articulate it excluding the pauses from it (Gósy, 2004: 203).

Both the speaking and articulation rate are influenced by internal and external factors like age, gender, individuality and the topic of the speech, the speaking context, type of the text or the speech style (Bóna, 2010; Gocsál, 2000; de Andrade & de Oliveira Martins, 2007; Jacewicz, Fox & Wei, 2010; Laczkó, 2019; Menyhárt, 2000; Olaszy, 2006; Oyer-Deal, 1985; Quené, 2008; Torre-Barlow, 2009; Váradi-Beke, 2013).

On the basis of these findings the tempo can be changed parallel with the age and the teenagers' tempo categories seem to be fastest among the different aged people.

The scholars also emphasized the rising tempo at the beginning of teenage years both in international and Hungarian examinations (de Andrade & de Oliveira Martins, 2007; Laczkó, 1991; Menyhárt, 2000; Neuberger, 2014). The Hungarian students' speed of their spontaneous speech were also different in terms of the age (Laczkó, 2009).

The actual research question is what the speech tempo of teenagers in the communication situation like which require different cognitive strategies and

activities than spontaneous speech and how it is characterized by various types of the pauses.

This presentation is focused on the temporal analysis of topic based narratives produced by the students during school lessons. This kind of situation is different from spontaneous speech regarding the speech planning, access of lexemes and articulation processes. In the situation of the topic based narrative (as the common responses of the students in teaching–learning process), planning, conceptualisation is not simultaneous with the formulation and articulation. During the planning process the topic is exactly defined as it is based on the actual teaching material. The linguistic form is also defined because of the required parameters of narratives (the order of events, the time of them and the interrelations (Bruner, 1994; Neisser, 1994)), but the articulation is done in the given moment.

Our hypotheses were as follows. H1) The planning process of topic based narratives is more complex for the students than spontaneous speech. H2) It can be followed in different temporal parameters (tempo categories, the type of the pauses, function of filled pauses) of topic based narratives and spontaneous speech.

Method and material

In order to discuss the hypothesis the series of experiment was carried out with the participation of teenagers. The average age of them was 15.4 and 17.2 year. The students are studying in the secondary school, they all had normal hearing and intelligence with typical language development.

For the examination spontaneous speech samples and topic based narratives produced during the lessons were digitally recorded. In spontaneous speech the students had to speak about their free time activities, versus topic based narratives which were oral responses (story telling) based on the actual themes learnt by the students during the previous lessons and they had to speak about them in terms of given aspect

The time which was given to students to speak was approximately 3 minutes per person in both of the examined situations.

For the analysis the speech rates (the total number of sounds divided by total speaking time with the pauses), articulation rates (the total number of

sounds divided by total speaking time without pauses), the ratio of unfilled and filled pauses were calculated in both types of speeches. The duration of different types of pauses and the function of filled pauses (speaking intention, error and repair, uncertainty (Levett, 1989; Horváth, 2010)) was also analysed in each situations among the speakers. For the acoustic analysis the Praat program (Boersma, 2001) was used, the statistical analysis was done by the SPSS 13.00 version.

The tempo categories were measured by the number of sounds per seconds, the duration of pauses was given in milliseconds.

However the number of the students was only 5-5 in both communication situations in the different age groups, the same students took part in them. The all number of students was 20.

The time of topic based narratives among the 15 years was 8 minutes 27 seconds, and it was 8 minutes 42.7 seconds among the 17 years. The time of spontaneous speech of 15 years was 10 minutes 46.6 seconds versus the 17 years where it was 10 minutes 44.8 seconds. The average time of a speaker was roughly the same, almost 2 minutes long in topic based narratives and a little bit longer in spontaneous speech independently the age.

Results

The tempo data analysis

There was similar tendency in both age groups. The speech rates and articulation rates were much lower in topic based narratives than in spontaneous speech (Figure 1).

The differences between the speech rates is almost 1.5 sound/sec, versus the articulation rates, where it is almost 2 sound/sec. The differences were proved by the statistical analysis (paired-samples t -test: $t(3)=-9.107$, $p=0.003$).

The individual tempo categories also showed the differences between the two kind of speeches. Among topic based narratives produced by 15 years the slowest speech rate was 5.4 sound/sec, the fastest was 8.91 sound/sec ($SD: 0.911$). These tempo categories among the 17 years were 3.88 sound/sec, and 6.78 sound/sec ($SD: 1.122$). In topic based narratives of 15 years the lowest articulation rate was 8.53 sound/sec, the fastest one was 12.16 sound/sec ($SD: 1.035$). The articulation rates among the 17 years were 5.48 sound/sec and 10.94 sound/sec ($SD: 1.623$). In spontaneous speech of 15 years the lowest speech tempo was 7.18 sound/sec, the fastest was 9.49 sound/sec ($SD: 0.720$). These rates among the 17 years were 5.71 sound/sec and 9.02 sound/sec ($SD: 1.02$). In spontaneous speech of 15 years the lowest and the fastest articulation rates were

10.68 sound/sec and 12.88 sound/sec ($SD: 0.832$), among the 17 years these were 7.3 sound/sec and 13.25 sound/sec ($SD: 1.477$). So the individual tempo values could also prove the slower speed of topic based narratives comparing them to spontaneous speech, and the tendency could occur independently the age.

Figure 1. The articulation rate (AR) and speech rate (SR) in the two kind of speeches (sound/sec)

The ratio of types of pauses was similar in the two age groups in the examined situations. In topic based narratives of 15 years the ratio of unfilled pauses was 90.7%, and 92.1% among the 17 years. The ratio of filled pauses was 9.3% in the younger group, and 7.9% in the elder one. In spontaneous speech the ratio of unfilled pauses was a little bit higher, 95.5% among the 15 years, and 96.7% among the 17 years. The ratio of unfilled pauses were a little bit lower than in topic based narratives, 4.5% in the younger group and 3.3% in the elder one.

The data of the duration of pauses showed the same tendency in both age groups. In topic based narratives the unfilled and filled pauses were much longer than in spontaneous speech (Figure 2). The differences was also proved by statistical analysis ((Paired-Samples t -test: $t(3)=4.205$, $p=0.025$).

Figure 2. The average duration of the pauses (msec).

In topic based narratives of 15 years the duration of unfilled pauses were 140 ms longer than in their spontaneous speech. It was 100 ms longer among the 17 years. In terms of the filled pauses the differences can be followed mainly among the 17 years as their

filled pauses were almost 130 ms longer than in their spontaneous speech. Among the 15 years' narratives the filled pauses were 80 ms longer than in their spontaneous speech.

The analysis of filled pauses/forms and functions

The most frequent realisation form of filled pauses (Figure 3) is æ in both of the two types of speeches and in both of the two age groups.

Figure 3. The realisation of filled pauses (%)

The other kind of realisation is describing or the 15 years or the 17 years. Among the 17 years the types of ym is the second frequent category mainly in topic based narratives. The types of æm has the second place in terms of the frequency. With this ratio it is occurring only in 15 years' topic based narratives. It also describes the 17 years' spontaneous speech but the ratio is a little bit lower. In the elder group there is again one category (æh), but it describes only their spontaneous speech. The distribution of other kind of filled pauses is really low and it describes only the 15 years' topic based narratives and/or their spontaneous speech.

The analysis of the function of filled pauses (Figure 4) showed the opposite tendency in the two kind of speeches.

Figure 4. The function of filled pauses (%)

In topic based narratives the students used the types of filled pauses in the function of uncertainty in the highest ratio independently the age versus

spontaneous speech where the highest ratios were in the function of speaking intention in both age groups. The types of filled pauses were used for the error repair mainly in spontaneous speech.

The duration of types of filled pauses in the examined three functions was also analysed (Figure 5).

Figure 5. The duration of types of filled pauses in different function

In the function of speaking intention the students used only æ in topic based narratives versus spontaneous speech where other types were also used. The duration of them was longer in the 15 years' topic based narratives and shorter in the 17 years' spontaneous speech. In the function of error repair the students used only the type æ . The duration of them was longer in topic based narratives mainly among the 15 years. For the uncertainty the wide range of filled pauses was used and duration of them was also longer in topic based narratives.

Discussion and conclusion

The aim of this research was to prove that topic based narrative is more complex task for the secondary school students to produce than spontaneous speech and it can be reflected in their temporal characteristics.

The data showed topic based narratives' much slower speed than it was in spontaneous speech. Their slower speech and articulation rates are characterized by significantly longer duration of both unfilled and filled pauses than in spontaneous speech. The difference between the two kind of speeches was also proved in terms of types and function of filled pauses (see H2). The most frequent forms of them was almost the same in the two kinds of speech like in our previous findings (Laczkó, 2009), but the distribution of their function was different. In topic based narratives the leader position of filled pauses is the function of uncertainty versus spontaneous speech where the speaking intention. In the different function the various types of them had also different durations.

The data can support a lot of difficulties of teenagers to produce topic based narratives as the oral responses from the teaching material (see H1). Consequently the data obtained can predict the learning difficulties in the subjects which need oral expressions as their slow tempo might have the interrelation with their small vocabularies and their lexical access difficulties. However it must be controlled with more students, we emphasize the more need of oral presentations in teaching-learning process during the lessons and the need of reading.

References

- Boersma, P. & D. Weenink. 2008. Praat: Doing phonetics by computer (version 5.1.41). <http://www.praat.org/> (accessed 8 December 2010).
- Bóna, J. 2010. Beszédtervezési folyamatok az életkor és a beszédstílus függvényében. *Magyar Nyelvőr* 134: 332–341.
- Bruner, J. 1994. The “remembered” self. In: U. Neisser & R. Fivush (eds.): *The remembering self: Construction and accuracy in the self-narrative*. New York: Cambridge University Press, 41–54. <https://doi.org/10.1017/CBO9780511752858.005>
- Fletcher, J. 2010 (2nd edition). The prosody of speech: Timing and rhythm. In: W. J. Hardcastle, J. Laver & F. E. Gibbon, (eds.): *The Handbook of Phonetic Sciences*, 521–602. Oxford: Wiley-Blackwell. <https://doi.org/10.1002/9781444317251.ch15>
- Furquin de Andrade, C. & Vanessa de Oliveira, M. 2007. Fluency variation in adolescents. *Clinical Linguistics and Phonetics* 21: 771–782. <https://doi.org/10.1080/02699200701502161>
- Gocsál, Á. 2000. A beszéd időviszonyai különböző életkorú személyeknél [Speech timing in individuals of different ages]. *Beszédkutatás* 8: 39–50.
- Gósy M. 2004. *Fonetika, a beszéd tudománya*. Budapest: Osiris Kiadó.
- Horváth V. 2010. Filled pauses in Hungarian: their phonetic form and functions. *Acta Linguistica Hungarica* 57(2–3): 288–306. <https://doi.org/10.1556/ALing.57.2010.2-3.6>
- Jacewicz, E., R. A. Fox, & L. Wei. 2010. Between speaker and within-speaker variation in speech tempo of American English. *Journal of the Acoustical Society of America* 128: 839–850. <https://doi.org/10.1121/1.3459842>
- Jacewicz, E., R. A. Fox, C. O'Neill & J. Salmon. 2009. Articulation rate across dialect, age and gender. *Language Variation and Change* 21: 233–256. <https://doi.org/10.1017/S0954394509990093>
- Laczkó, M. 1991. Interrelation of articulation rate and pauses in children's speech. *Temporal Factors in speech*, Budapest: MTA, Nyelvtudományi Intézete. 139–151.
- Laczkó, M. 2009. Középiskolai tanulók spontán beszédének temporális jellegzetességei [Temporal characteristics of high school students' spontaneous speech]. *Magyar Nyelvőr* 133: 447–67.
- Laczkó, M. 2019. The Temporal Characteristics of Teenagers in Spontaneous and Rhetorical Speeches. *Journal of Linguistics and Literature* 3(1): 29–34. <https://doi.org/10.12691/jll-3-1-5>
- Levelt, W. J. M. (1989). *Speaking. From intention to articulation*. Cambridge: MA: A Bradford Book.
- Menyhárt, K. 2000. A beszéd temporális sajátosságai kétnyelvűeknél (kisiskoláskortól időskorig) [Temporal characteristics of speech in bilinguals (from pre-school age to old age)]. *Beszédkutatás* 8: 51–62.
- Neisser, U. 1994. Self-narratives: True and false. In: U. Neisser & R. Fivush (eds.): *The remembering self: Construction and accuracy in the self-narrative*, 1–18. New York: Cambridge University Press. <https://doi.org/10.1017/CBO9780511752858.003>
- Neuberger, T. 2014. *A spontán beszéd sajátosságai gyermekkorban* [Characteristics of spontaneous speech in childhood]. Budapest: Eötvös Kiadó.
- Olaszy, G. 2006. Prozódiái szerkezetek jellemzése a hírfelolvasásban, a mesemondásban, a novella és a reklámok felolvasásában [Characterization of prosodic structures in news reading, storytelling, short story and advertisement reading]. *Beszédkutatás* 14: 21–50.
- Oyer, H.J. & V. Deal L. 1985. Temporal aspects of speech and the aging process. *Folia Phoniatrica* 37: 109–112. <https://doi.org/10.1159/000265788>
- Quené, H.. 2008. Multilevel modeling of between-speaker and within-speaker variation in spontaneous speech. *Journal of the Acoustical Society of America* 123: 1104–1113. <https://doi.org/10.1121/1.2821762>
- Torre III, P. & J. A. Barlow. 2009. Age-related changes in acoustic characteristics of adult speech. *Journal of Communication Disorders* 42: 324–333. <https://doi.org/10.1016/j.jcomdis.2009.03.001>
- Váradi, V. & A. Beke. 2013. Az artikulációs tempó variabilitása felolvasásban [Variability of articulation rate in reading]. *Beszédkutatás* 23: 26–41.