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The Temporal Characteristics of Teenagers in Spontaneous and Rhetorical Speeches

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Abstract The researchers refer to tempo categories as the speech rate and the articulation rate. Both of them are influenced by different factors, like the age, the type and the style of the speech. The effect of the age on speech tempo has already proved and the results showed significant differences among the people with various age including the teenagers whose both speech and articulation rate was the highest. It is still a question what is the speech tempo of teenagers in the various speech genres like and how it is characterized by types of pauses in these communication situations which require different cognitive activities and skills. In this paper speech rate, articulation rate, types and the duration of pauses of teenager speakers' were analyzed in two communication situations: narrative and rhetorical speeches. Results show that the style of various examined genres of speech have different effect on temporal parameters of teenagers's speech both regarding the talking rates, articulation rates and also the frequency, types and the duration of pauses.

Keywords: *articulation tempo, speech tempo, communication situations, spontaneous speech, rhetoric speech*

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1. Introduction

The speech tempo is one of the most explored areas of spontaneous speech research. There are three important research areas regarding of it: 1) the function of speech tempo in the speech production process; 2) the influence of it on the speech perception and production process; 3) the changes of speech tempo by the acoustic measurements and analysis.

The tempo of speech is the rate at which utterances and their smaller units are pronounced. It is usually defined as speaking and articulation rates. Speaking rate as a gross rate refers to the entire speaking phase including pauses versus articulation rate as a net rate refers to phases of articulation excluding pauses. So the researchers refer to speech tempo as a measure of the entire cognitive and articulatory activity involved in the production of an utterance, and the articulation rate for the amount of speech produced in the time actually taken to articulate it. It is also important to distinguish the global and local tempo categories. Global tempo is the rate at which the utterances are pronounced, versus the local tempo is the rate at which smaller units are pronounced [1,2].

Both articulation and speech rate are influenced by different internal and external factors [3]. The internal factors are the speaker's characteristics including his/her age, gender, individuality, or the characteristics of his/her pauses occurring in the speech. The topic of the speech, the speaking context, type of the text and the style of the speech can also have an effect on speaking and articulation rates as the types of external factors.

The effect of the age on speech tempo has already proved both in Hungarian language [3-15] and international researches as well [2,16,17,18,19]. Summarizing the results it is worth concluding: nowadays the speech is faster than it was a couple of years ago, and the speech tempo can be changed paralel with the age. Consequently the teenagers' speech tempo can be one of the fastest among different age groups.

The tempo values of teenagers or young people can be estimated or/and measured in Hungarian. The results showed significant differences among the people with various age including youth and teenagers whose both speech and articulation rate was the highest [8,10,11]. Some differences were found among the teenagers, as the 18 year old students' speech was faster than 15 years' [4]. The scholars also emphasized the rising tempo at the beginning of teenage years [5,9,13,16]. Some experimental results regarding variable articulation rate patterns were found in reading different kind of texts [20,21,22]. The articulation tempo of the story which was full of events and activities was faster than the story with judgements [23]. Variable tempo categories were also found in telling tales, advertisement and reading news [24].

It is still a question what is the speech tempo of teenagers in the various speech genres like and how it is characterized by various types of the pauses (filled and unfilled) in those communication situations which require different cognitive activities, skills like narrative/spontaneous and rhetorical speeches. Narrative/spontaneous speech is

beginning with the speakers's focusing on a target concept and ending with the articulation [25]. In this case there are simultaneous processes of speech planning (what and how to speak, the order of the thoughts) and the selection of appropriate lexemas which are necessary for the creation of linguistic structures in order to access the articulatory gestures. The articulation is done in the given moment of the speech. In rhetorical speech during speech planning, conceptualisation is not simultaneous with the formulation and articulation. It is called as the memorized speech when the speaker tries to remember his/her former planned thoughts and their linguistic forms and tells them by heart. This kind of speech consists of arguments, so it has very logic structures and the topic is known in advance in order to prepare for it. The articulation is also done in the given moment of speech, but it has close interrelation with the studying of the written text in advance and the operation of the memory. On the basis of these findings we thought that the speed of teenagers' speech samples will be determined by the type and the style of the texts, as the two communication situations require different cognitive (mental) activities in terms of planning. Furthermore we thought that teenagers' speech tempo will be fast in both situations, but the rhetorical speech might be a bit slower because of longer pauses in them which the speaker need to remember the thoughts (arguments) or/ and the text.

2. Participants, Method, Material

In order to discuss the hypothesis a series of experiments were carried out with the participation of 16-17 year old secondary school students (the average age was 16,7 years). The students participated in the examination had normal hearing and intelligence with typical language development, and all students study in the same secondary technical school. The students who were selected in the examination, took part at the rhetorical competition organized by the school, so their rhetorical speech for the examination was told by them and recorded at the school event mentioned above. That's why these students' spontaneous speeches were also used for the analysis. Unfortunately the gender analysis will not be available as there were five girls and one boy among the students. For the examination the spontaneous speech and rhetorical speech samples were digitally recorded. However the number of the students was only 6-6 in both communication situations, the same students took part in them.

The time which was given to students to speak and express their thoughts was approximately 3 minutes per person both in spontaneous and rhetorical speeches. In the spontaneous speech the students had to speak about the family life after they got the instruction from the leader of the experiment. The speech samples were recorded in their natural surroundings in a silent room of their school. The rhetorical speech samples were recorded at the rhetorical competition organized in their school. In this case the students had to memorize their written texts in advance and tell them to the audience. They previously had enough time to choose one between two topics (the value of family nowadays, the use of Internet versus books) in order to collect their arguments and discuss the topic. All of the students who took part in the experiment chose the second topic, so the topic of the analysed rhetorical speeches was advantage and disadvantage of the Internet use versus books. The first we recorded the students' rhetorical speeches created by them for the competition, then (in a week) their spontaneous speeches were recorded.

For the analysis the speech rates (the total number of sounds divided by total speaking time including pauses), articulation rates (the total number of sounds divided by total speaking time without pauses), the ratio of silent/unfilled and filled pauses were calculated in both types of speeches.

The duration (length) of different types of pauses and the function of filled pauses (start/continue the speech, error and repair, uncertainty) was also examined in each situations among all speakers. For the acoustic analysis the Praat program [26] was used, while 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.

The time of spontaneous speech was 14 minutes 6 seconds. In the case of rhetorical speech it was a little bit longer, 18 minutes 11 seconds. Consequently the average time of a speaker was longer in the case of rhetorical speech, 3 minutes 1 second versus spontaneous, where the length was only 2 minutes 20 seconds including the time of pauses.

3. The Results

3.1. Tempo Values

Both the articulation and speech rates (cf. Figure 1) were rather fast as we expected, and the average tempo values were similar to each other in both communication situations. Articulation rates were a little bit higher in spontaneous speech versus the rhetorical speech where the tempo rates were a little bit higher.

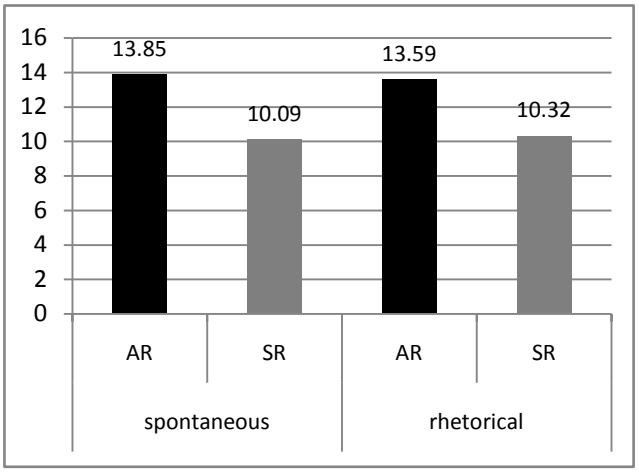

Figure 1. The average articulation and speech rates (sound/sec)

In the spontaneous speech the articulation rate was 13,85 sounds/sec, but in the rhetorical 13,59 sounds/sec, while the speech rate was 10,09 sounds/sec in the first communication situation (speaking narratives) and 10,32 sounds/sec in the other one, telling the rhetorical speech. However the differences were not proved by statistical

analysis (Paired-Samples T test: t(11)=0,034 p=0,973), the various individual tempo results (cf. Figure 2) are also showing the tempo differences between the two kind of speeches.

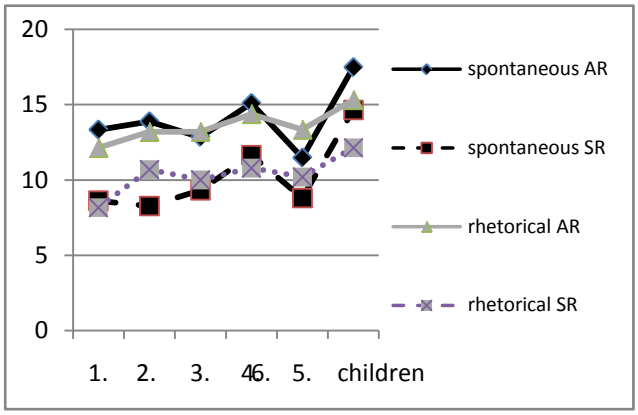

Figure 2. The individual tempo results (sound/sec)

The higher individual articulation rates are also followed among the students regarding their spontaneous speech and the higher speech rates can also be seen among them in terms of their rhetorical speech. There are much more students whose articulation rates are faster in spontaneous than in rhetorical speech, and there are also much more children who have faster speech rates in rhetorical speech than in spontaneous speech. The slowest articulation rate was 11,48 sounds/sec in the spontaneous speech, and the fastest rate was 16,48 sounds/sec, the dispersion was 1,752. These values are 12,13 sounds/sec and 15,31 sounds/sec in the rhetorical speech, where the dispersion was only 1,103, so these articulation rates are much more equalized than they were in the spontaneous speech. The slowest speech rate was 8,27 sounds/sec in the narrative/spontaneous speech where the fastest value was 13,9 sounds/sec and the dispersion was 2,221. In the rhetorical speech the slowest speech rate was almost the same as it was in the spontaneous speech, 8,17 sounds/sec, but the fastest speech rate was again slower, 12,13 sounds/sec. The dispersion is also smaller (1,294), than it was in the spontaneous speech, consequently the values of speech rates in the rhetorical speech are closer to each other.

The various tempo values can also be followed in the ratio of the time of pauses. The ratio of them was higher (28,45%) in the narrative speech comparing it to the rhetorical (24,2%), and these differences are also proved by statistical analysis (Paired-Samples T test: t(1)=11,141, p=0,05). The question is whether this ratio depends on the number of different kind of pauses or the duration of them in a higher extent in the examined communication situations. That's why we analysed the ratio of the number and the duration of the types of pauses.

Unfilled pauses/silent pauses is a silent period of the speech process which has a well defined length, 100-1500 ms [27,28]. The filled pause/hesitation phenomenon is a kind of get stuck in the speech process accompanying it with various sounds like vowel/vowels, consonant/consonants or their connections [29,30,31,32].

The ratio of the number of silent/unfilled pauses and hesitation phenomena/filled pauses (cf. Figure 3) showed opposite tendency in the examined communication situations. In spontaneous speech the ratio of hesitation phenomena was twice (19,8%) as it was in rhetorical speech (9%), where the ratio of silent pauses was much more (91%) than in narrative/spontaneous speech (80,8%). However these data are showing the opposite tendency about the planning process the difference was not proved by statistical analysis (Paired-Samples T test: t(1)=6,810, p=0,09). The difference between the two kind of communication situation can be followed in the ratio of the duration of silent/unfilled pauses and hesitation phenomena/filled pauses. In spontaneous speech the ratio of the duration of silent pauses is 87,8% versus the ratio of hesitation phenomena which is 12,2%. These data are 94,6% regarding the duration of silent pauses and 5,4% in terms of the duration of hesitation phenomena in the rhetorical speech. (The total (100%) was the duration of all pauses' duration in both communication situations).

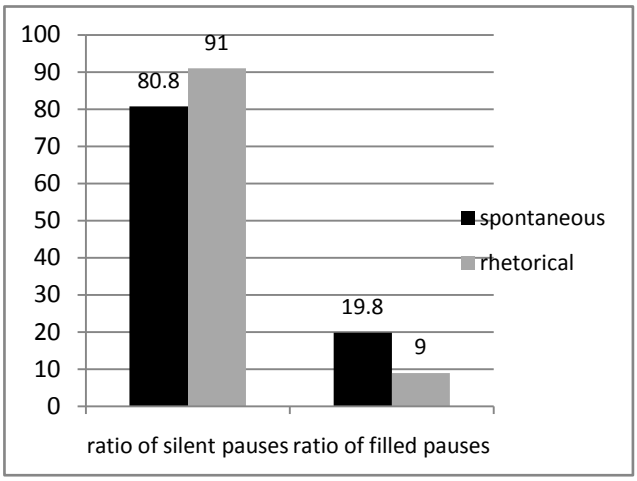

Figure 3. The ratio of the number of silent pauses and hesitation phenomena (%)

These findings were correlated with the frequency of pauses. (It is given in number/minute.) The number of all pauses/minute was more in spontaneous speech (6,43 per minute), and less in rhetorical speech (4,16/minute). Comparing the types of pauses in the two communication situations the opposite tendency was found again as the higher number of types (both the unfilled and filled) of pauses/minute was followed in the spontaneous speech. Although the differences are higher in the case of silent pauses (in narrative speech: 5,16/minute, in rhetorical speech: 3,78/per minute), and smaller regarding the filled pauses (in spontaneous speech: 1,27/minute, in rhetorical speech: 0,37/minute), the data were not proved by statistical analysis (Paired-Samples test: t(2)=3,779, p= 0,063).

The average duration of total pauses used by the speakers was also different in the various speech styles, as in narrative speech it was 39,887 sec/person and a bit longer in the rhetorical speech, 44,0125 sec/per person (cf. Figure 4). This tendency was proved in terms of the silent pauses as well. In narrative speech the length of it is 35,025 sec /per person, but in the rhetorical speech it is 41,617 sec/person. The average duration of filled pauses showed the opposite tendency as the total was 4,862 sec/per person in narrative speech and much less in rhetorical speech (2,395 sec /person). These data obtained showed close interrelation with the duration of the type of

a pause (cf. Figure 4). In the rhetorical speech the student speakers had significantly longer pauses than in narrative speech independently of the type of pauses (Paired- Samples Test: t(2)=- 6,211, p= 0,025). The duration of one silent pause in rhetorical speech is 604,63 ms, versus the spontaneous where it is much shorter, 484,22 ms. This tendency can be followed in filled pauses as well. The duration of one filled pause in rhetorical speech is 350,7 ms, but it is again shorter in spontaneous speech, only 272,68 ms. Summarizing the results it is worth concluding that the duration of the pauses are much more important factor for the articulation and speech rates in both communication situation than the number of the pauses.

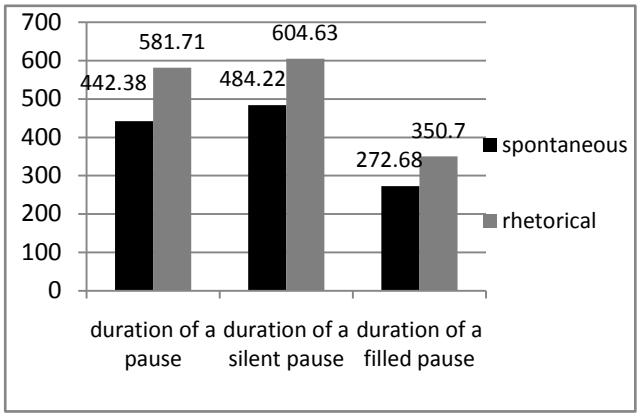

Figure 4. The average duration of the type of a pause (ms)

3.2. The Function of Filled Pauses/Hesitation Phenomena

We analysed the function of filled pauses in both communication situations. The hesitation phenomena mostly have the following functions in the speech production: they refer 1) to the intention of the speaker that he/she is ready to speak 2) to the uncertainty of the speaker 3) the repair of speaker's error [12,25,33,34,35,36]. The ratio of hesitation phenomena in these functions (cf. Figure 5) showed some common features, but also the differences and the opposite tendency between the communication situations. The highest ratio was found in the function of the uncertainty independently of the type of the communication. The second frequent category was the function of the intention of the speaker, but the ratios were significantly lower, and the less ratio was in the case of the repair of errors. In spontaneous speech the ratio of speaking intention and the repair of errors was lower comparing the values to the rhetorical speech, but the ratio of hesitation phenomena which refer to the uncertainty was higher versus rhetorical speech.

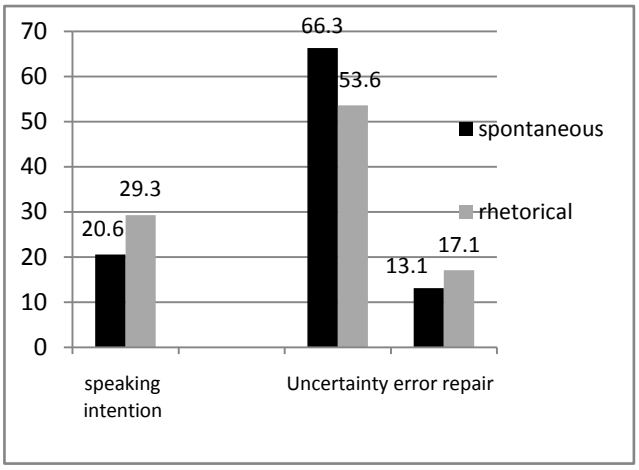

Figure 5. The ratio of hesitation phenome in different function (%)

On the basis of these data it seems to conclude that teenagers taking part in the examination have the most problems with planning process in both communication, especially in spontaneous speech. However in the rhetorical speech they had planned the concepts in advance and they had to recall the lexemas of the written text in a given moment, they had serious problem with uncertainty, which might be because of their memory deficit. It can be with the interrelation of their higher ratios of those filled pauses which have the function of speaking intention as their ratio is higher in rhetorical speech than in spontaneous.

The duration and the types of hesitation phenomena in different functions was also analysed. The most frequent category was *œ* in both situations and in all functions. The second frequent category was *ym*, but it did not occur in all positions and in both communication. There were some special kind of hesitation phenomena like *œh*, *m* which described or the spontaneous speech or the rhetorical and function of them was also different. The duration of these filled pauses (cf. Figure 6) was calculated and compared in terms of most frequent categories (œ, *ym*).

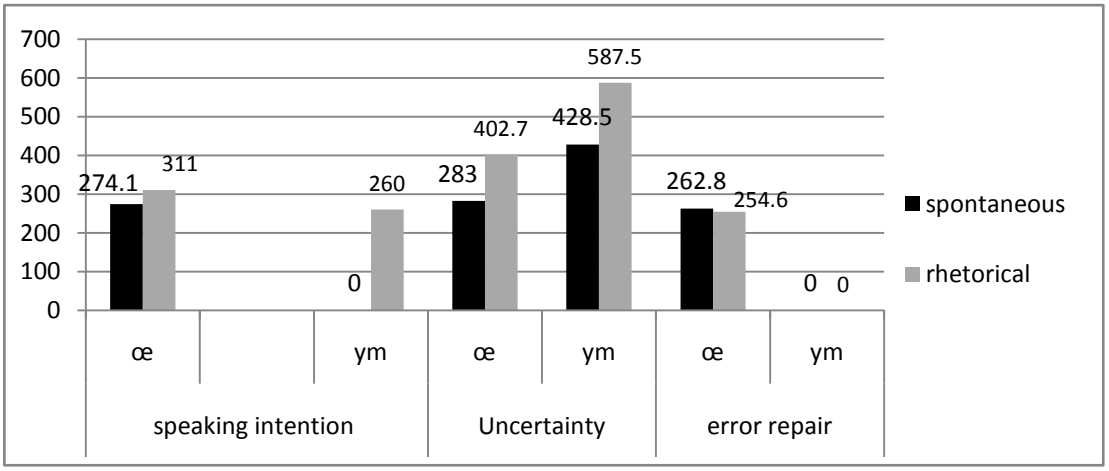

Figure 6. The average duration of filled pauses in the different functions

The duration of filled pauses was much longer in the function of uncertainty and intention of the speakers in rhetorical speech except the case of repair of errors, where the duration of filled pauses is a little bit shorter versus the spontaneous speech. The high differences are also followed in the case of *ym*, in the function of uncertainty.

4. Discussion and Conclusion

In this paper we analysed the teenagers' speech and articulation tempo values, the ratio of their pauses and types of them in various speech genres.

The result have confirmed all our hypothesis. Firstly the measured speech and articulate rates data confirmed, that speed of teenagers' speech samples in the examined communication situations also will be fast, as it was found in our and others previous researches [4,13,16]. Both tempo values were similar to the tempo categories measured in earlier Hungarian examinations [4,10,36], however they may also be determined by the type and style of the texts and may differ from each other. The influence of the type and the style of the text on tempo categories can occur mainly in the ratio of pauses including their types, and also the duration of them. However the number of pauses was less in rhetorical speech than in spontaneous the length of them was significantly longer and it was also found in both types of pauses.

Although the tempo categories were similar in the examined speaking contexts the rhetorical speech seems to be characterized by slower speech rate. It might be because of the duration of pauses which are much longer in rhetorical speech versus the spontaneous. The longer duration of hesitation phenomena was also proved in rhetorical speech except for the repair of errors which needed shorter time than in spontaneous speech. The lower tempo values and the longer duration of all kind of pauses and longer hesitation phenomena almost in all functions seem to prove that rhetorical speech is based on other kind of speech planning and needs other cognitive (mental) activities and skills like the appropriate capacity of memory and the well known operation of it. However the teenagers had written their texts, were not able to tell rather continuously their thoughts and arguments, but they were able to correct their mistaken lexemas during the shorter time as they had to remember and recall the studied one instead of search for the appropriate one in the spontaneous speech.

As the experiment was carried out with only some students the opposite tendency regarding articulation and speech rates in spontaneous and rhetorical speeches can be valid among the students participated in the examination. In order to emphasize the results this kind of analysis should be done with the participation of more number of students.

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