SUMMARY

The aim of the article was to evaluate the rate of speech of people at an advanced old age and without any demential illnesses when compared to the control group of 9-years-old children without any developmental disorders. Because of the fact that the control group consisted of children, we have also made references to the notion of *elderspeak* – a phenomenon similar to the *baby-talk* – but related to the way younger people talk to senior citizens.

We tested the rate of speech in 32 subjects: the experimental group comprising 16 healthy people of an advanced old age without any neurodevelopmental illnesses (the average age: 83.1) and the control group, which included 16 children without any developmental disorders (the average age: 9.0) in order to achieve a correlation in terms of the male/female ratio for the comparative analysis. The analysed parameters included: the speaking rate, the articulation rate, the number of pauses, and the ratio of pauses within the speech samples.

The estimative quantitative analysis showed insignificant differences in the parameters that influence the rate of speech in both groups. The statistical analysis also showed that there were no significant differences in the main research parameters – the speaking rate, the articulation rate, the number of pauses, and the ratio of pauses.

The research hypotheses regarding the differences in the speech rate of those at an advanced old age and of the children at the age of 9 were negated by the results of the analyses. It has been proven that the rate of speech of the elderly who age physiologically does not differ from the rate of speech production by the children.

**Key words:** rate of articulation, pause, late adulthood, gerontologopaedics, gerontolinguistics
INTRODUCTION

It is obvious for every language user that the elderly speak differently than do younger people’ (Milewski and Kaczorowska-Bray 2015), yet there is still a shortage of empirical and statistical research within gerontolinguistics that would confirm such claims and impressions (see: Tłokiński, Olszewski 2014: 411). One of the areas which might require more study is that of prosody – the speaking rate and the articulation rate – of the elderly aged 75-89 (Straś-Romanowska 2011: 327) and thus, this became the focal point of our research.

There are few research areas including gerontolinguistics and gerontologopaedics which involve the following changes: changes in communication – resulting from the ageing process within the organs of speech, changes within the sense organs, changes within the nervous system (pathological and physiological), changes within the communication between the young and the elderly – elderspeak, and the changes resulting from the differences between the codes used by the younger and the older generation (Milewski, Kaczorowska-Bray 2014: 17-20). Our research focuses mainly on the selected aspects and consequences of two of them: 1. changes resulting from the physiological ageing process; 2. elderspeak. The latter is the accessory methodological term which helps us in the comparison of the two research groups: the main group - the elderly, and the control group – the children.

The selected changes in communication resulting from the physiological process of ageing

The subject of the research is centered on physiologically ageing people at an advanced old age. In contrast to the pathological process of ageing, which focuses on the medical aspects and the negative health changes in advanced old age (Herzyk 2005: 259), the physiological perspective omits any demential illnesses and treats old age as one of the developmental stages of life which involves permanent structural and functional changes adequate to the changes in the goals and objectives for this period of life (see: Krajewska 2012: 470). Leaving aside the differences between the disorders of speech realisation abilities (productive) and the disorders of speech programming abilities (systemic) (Tłokiński, Olszewski 2014: 412; see also: Krajewska 2012: 472), we can clearly distinguish three endogenous reasons for language problems in old age:

1. Problems resulting from the process of ageing within the organs of speech. These interfere with the articulatory and phonation abilities to produce speech and result from the movement limitations of the articulatory organs and impaired phonation mechanisms due to dysfunctions of intra- and extralarynx muscles, voice vibration, and reduced air flow in the upper respiratory tract (Tłokiński, Olszewski 2014; see also: Krajewska 2012, Ryan, Burk 1974).

2. Problems resulting from the ageing process within the nervous system. These are of macroscopic, microscopic, or performance character (Milewski, Kaczorowska-Bray 2015: 161-162) and result in the limitations of language programming...
in terms of syntax, lexicon, and semantics. Generally speaking, the ageing of
the nervous system involves: the slowing down of cortex neurodynamics,
attention deficits, integration and construction disorders (Krajewska 2012:
472-473), the deficiency in neural functioning within the pre-frontal areas of
the brain (Kielar-Turska, Byczewska-Konieczny 2014: 436), changes within
the psychological aspects of speech programming (Tłokiński 1990: 40),
deterioration of inner speech (Herzyk 2005: 259), disorders of procedural,
episodic, and autobiographical memory (Straś-Romanowska 2011: 333-335).

3. Problems resulting from the changes in hearing ability. These problems have
a negative impact on the perception of speech and their most common cause
is presbyacusis - a physiological hearing loss caused by the ageing process
changes within the inner ear. The changes involve the decreasing number of
hearing cells (inner, outer, and sustentacular) in the organ of Corti, dege-
nerative changes within the stria vascularis, and the increased stiffness of the
basement membrane. Simultaneously, we can observe degenerative and
involutional changes in the spiral ganglion, the fibres of the hearing nerve,
the cochlear nucleus, and other elements of the hearing tract (Tomik 2015:
103-104). Presbyacusis negatively affects, among other things, the prosodic
hearing – the process responsible for the ability to receive prosodic pheno-
mena, including the ability to perceive the rate of speech and speaking (Kurk-
owski 2013, Wysocka 2015).

Taking into consideration the field subject literature, it can be assumed that
the main causes of language competence disorders and the phonetic realisation
disorders of the elderly must also negatively affect their rate of speech produc-
tion. The rate of speech is a physical and acoustic, as well as a psychical and
physiological, phenomenon which is connected to the notion of rate of speaking.
It can be found within the fields of prosody, articulation, and the formative skills
of the language user (Grabias 2012, Wysocka 2012). However, it also possesses
pragmatic and discursive aspects. The two main parameters are the length of
the segmental units and the number of the pauses which appear between the
rhythmic groups made of segmental and supra-segmental elements. While
comparing the notions of the speaking rate and the articulation rate, and taking
into consideration their terminological ambiguities (see: Michalik, Solak 2017),
we assume that the articulation rate informs only about the number of syllables/
phones produced in the speech sample within a certain period of time, while the
rate of speaking additionally includes the duration of the pauses which were
made within the speech sample and which appear inside – or more rarely outside

There are claims within gerontolinguistic literature that the rate of speech of
the elderly is slower than of younger people. This may be the result of the ageing
process of the organs of speech and of the nervous system. Authors suggest
that the slower speech rate is a common feature of old age without any consider-
ration for the differences between physiological ageing and ageing-associated
health issues (see: Krajewska 2012: 472; Kielar-Turska, Byczewska-Konieczny
2014: 429; Tłokiński, Olszewski 2014: 412). Moreover, there is a group of phenomena which are mentioned in the context of the slowing down of speech. These include: the atrophy of the chewing muscles, the dysfunctions of the temple-jawbone joint, the loss of teeth, and the use of false teeth (Zapała, Szuta 2012: 142, 150), decreasing lung capacity (Kielar-Turska, Byczewska-Konieczny 2014: 430), the slowing down of articulatory movements and their decreasing precision (Krajewska 2012: 472), as well as problems with naming connected to a longer reaction time, searching for words within a particular grammar or semantic category, giving synonyms and antonyms, the increased frequency of repetitions and the time needed to build a sentence, especially a complex one (Kielar-Turska, Byczewska-Konieczny 2014: 430-431). On the other hand, we sometimes talk about the speech redundancy of the elderly (Tłokiński, Olszewski 2014: 413), which may increase their speaking rate.

**Elderspeak as the exogenous reason for the communicational difficulties of the elderly**

The negative stereotype of old age functioning among younger people, one created by the actual or the assumed features of ageing such as slow thinking and speaking process, naivety, childishness, lack of understanding of the modern world and people, results in the specific way of communicating with the elderly. It is additionally exacerbated by the speaker’s conviction that the older person has problems with understanding speech as well. Speech directed to senior citizens – *elderspeak* – is characterised by short sentences, the changing of pronouns (e.g., 2nd person singular into 3rd singular, 1st person singular into 1st person plural), slower verbal messages, an emotionally positive tone, and, consequently, resembles the way of talking to children (in: Milewski, Kaczorowska-Bray 2015: 165). Broadly speaking, it is a negative phenomenon from the perspective of the elderly which distorts their communicational and emotional processes and results from the speaker’s belief that they should speak to seniors as if they were speaking to children.

In the light of the fact that: (1) there is very little methodological basis for such gerontolinguistic research (Tłokiński 1990: 9; see also: Milewski, Kaczorowska-Bray 2015: 158), (2) ‘old age is often associated and compared to the period of childhood (Milewski, Kaczorowska-Bray 2015: 155), (3) there are no speech rate norms within the Polish language, the rate of speech production of the elderly was compared to the rate of the 9-year-old children\(^1\).

The aim of the article was to evaluate the rate of speech of people at an advanced old age and without any demential illnesses when compared to the control group of 9-year-old children, ones without any developmental disorders. Because of the fact that the control group consisted of children, we have also made references to the notion of *elderspeak* – the phenomenon which is similar to *baby-talk* – but related to the way younger people talk to senior citizens.

\(^1\) We assumed that children have already acquired language competence at this age
MATERIAL AND METHODS

We tested the rate of speech in 32 subjects: the experimental group 16 healthy people at an advanced old age without any neurodevelopmental illnesses (the average age: 83.1) and the control group included 16 children without any developmental disorders (the average age: 9.0) in order to achieve a correlation in terms of the male/female ratio for the comparative analysis. The analysed parameters included: the speaking rate, the articulation rate, the number of pauses, and the ratio of pauses within the speech samples.

The first stage of the research included the recording of children’s speech from the control groups. Each of the students knew the person who was responsible for the recording (student-teacher relationship). Several emotionally neutral questions were asked during these individual meetings: What do you do in the classroom/group? What do you play with the group? What did you do in the clubroom? What have you done today? What did you do yesterday? What do you usually do at home? What are you going to do?

A specific fragment of the recorded sample was selected which had to be continuous and non-interrupted by the listener. The fragment was 30 seconds long. If the sample included several 30 seconds fragments, the initial one was always selected. The analysis of the sample started with multiple listening and the preparation of its simplified transcription. The Audacity software was used during this stage of the research. The transcription allowed for the marking of phones and syllables and their number. Additional information was also marked on the transcription which included the pauses made by the speaker, their duration and form.

The second stage of the study was organised in an analogical way to the first one and included the recordings of people aged 75-89, their transcription and calculations. The participants, who lived at the ‘Kalina’ nursing home, were asked the following questions: What do you like doing? What are your interests? What have you done today? What did you do yesterday? In the case of an inability to obtain the proper answer, an open question was asked about the current social or political issues or the biography of the participant.

The third stage of the research included the comparative – quantitative and statistical – analysis of the data obtained from both groups. The analysis was performed with the use of the Shapiro-Wilk, Mann-Whitney, and Fisher-Snedecor tests. The comparison of general characteristics in both groups is presented in Table 1.

The results – the quantitative analysis

In order to verify the hypothesis regarding the differences between the speech rate criteria, the following parameters were subjected to comparative analysis and the results are presented in Table 2.

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2 The students involved in the study were from the Polish city of Tarnów.
4 The norms have been set by Anna Solak in her doctorate dissertation Tempo wypowiedzi dziecięcych, written under the supervision of Mirosław Michalik, PhD at Department of Neurolinguistics at Pedagogical University of Cracow.
The first estimation of the obtained results shows insignificant differences between the research parameters of the two research groups. Their potential statistical significance was nonetheless verified with statistical analysis.

**RESULTS**

The statistical analysis of the material performed with the use of the Shapiro-Wilk, Mann-Whitney and Fisher-Snadecor tests involved two groups of data: 1. the average rate of speaking: phones/s, syllables/s, and the average rate of articulation: phones/s, syllables/s; 2. the average ratio of pauses in the speech sample: numbers and percentage data. The results have been shown in Table 3.

With a statistical significance of \( p = 0.05 \), the performed tests did not show any statistically significant differences in the rate of speech of the two research groups – the children and the elderly.
DISCUSSION

Our data did not confirm the hypotheses implied in the field subject literature as to the differences in the speech rate between the two research groups. The analyses showed that the elderly at an advanced old age, without any demential illnesses or neurological incidents, do not speak slower than 9-year-old children. The lack of differences may be attributed to the low number of participants (N=32) and also to the relatively high level of education of the participants – 10 participants had received at least a secondary education.

Our results are different to the ones suggested by the field subject literature (see: Krajewska 2012; Kielar-Turska, Byczewska-Konieczny 2014; Tłokiński and Olszewski 2014) and may result from the fact that gerontolinguistic studies do not differentiate between physiological old age and demential old age. It should be pointed out again that our study involved participants who were ageing physiologically, and their results might be interpreted according to microgenetic theory, which emphasizes the importance of the specific pattern of neuronal

| Table 3. The average rate of tested parameters in the speech samples in the elderly in comparison to the norm |
|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Norm</th>
<th>The Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>The average rate of articulation: phones/s</td>
<td>11.23</td>
<td>1.50</td>
</tr>
<tr>
<td>The average rate of articulation: syllables/s</td>
<td>4.67</td>
<td>0.62</td>
</tr>
<tr>
<td>Number of pauses:</td>
<td>12.56</td>
<td>2.76</td>
</tr>
<tr>
<td>Ratio of pause:</td>
<td>35.90</td>
<td>6.50</td>
</tr>
<tr>
<td>The average rate of speaking: phones/s</td>
<td>7.19</td>
<td>1.27</td>
</tr>
<tr>
<td>The average rate of speaking: syllables/s</td>
<td>2.99</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Source: own material
networks formed in the speech rate of people during their life time (Pąchal-

CONCLUSIONS

The research hypotheses regarding the differences in the speech rate of
people at advanced old age and of children at the age of 9 were negated by the
results of the analyses. It has been proven that the rate of speech of the elderly
who age physiologically does not differ from the rate of speech production by
the children.

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Address for correspondence:
Miroslaw Michalik
Department of Neurolinguistics Pedagogical University of Cracow
Podchorążych 2, 30-084 Kraków
e-mail: miroslaw.michalik@up.krakow.pl