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## The impact of immediate task repetition on breakdown fluency

### Summary

The focus of the present study is to explore the relationship between the task repetition including a tightly structured narrative and the breakdown fluency, i.e. number of pauses per minute, average duration of pauses, and phonation-time ratio. Thirty-three Croatian learners of English performed the narrative task twice. The temporal fluency variables were extracted by speech analysis program Praat in order to be automatically measured for evaluation (Boersma & Weenink, 2017). The results show that during the immediate, second encounter with the same task, the subjects employ significantly less pauses and their average length also decreases significantly. The significant difference is also obtained for the phonation-time ratio. The recorded progress in fluency measures can be explained by the priming effect and, consequently, the reduced cognitive load. The presented results point to the conclusion that well-known topics with a tightly structured storyline are connected with improvements in fluency, regarding breakdown fluency variables, even in the case of learners at a higher level of language proficiency. The findings of the study have implications for L2 pedagogy, highlighting the effective impact of task repetition on the development of oral fluency.

**Key words:** breakdown fluency, task-based teaching, task repetition

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## 1. INTRODUCTION

Attaining native-like fluency in terms of fast, smooth and automatic speech flow is one of the ultimate goals of many L2 learners. L2 fluency can be explained by Levelt's model of speech production for L1, which has been revised and adapted to incorporate L2 speech (Kormos, 2006; Segalowitz, 2010). This model explains the efficient functioning of the speech production mechanisms and the concept of fluency, pointing to fast retrieval speed and the speaker's control over the linguistic forms. In other words, fluency refers to the proceduralization and automatization of lexical retrieval, grammatical, and articulation rules, as well as to the skilful coping with various forms of speech disfluencies caused by different conceptual demands (Segalowitz, 2010). Segalowitz (2010, 2016) distinguishes three domains referring to L2 fluency development. The first domain of fluency, being a global measure of language proficiency, is termed *cognitive fluency*. Cognitive fluency represents the reflection of utterance fluency, i.e. it points to the overall efficiency of the processes involved in the production of speech. *Utterance fluency* is associated with temporal variables such as speech rate, mean length of runs, phonation-time ratio, articulation rate, silent pauses and the like (e.g. Götz, 2013; Kormos & Dénes, 2004; Prefontaine, 2010). Thus, utterance fluency refers to objective and quantifiable phonetic measurements of L2 speech. Baker-Smemoe, Dewey, Bown, and Martinsen (2014) suggest that utterance fluency features could predict the higher proficiency levels, whereas Tavakoli, Nakatsuhara, and Hunter (2017) assume that certain utterance fluency measures could accurately differentiate between lower levels of proficiency. In other words, utterance fluency measures might be able to group learners into proficiency levels from the lower intermediate to the upper intermediate.

In task-based studies regarding L2 fluency attainment, utterance fluency is further divided into breakdown fluency, speed fluency, and repair fluency (Skehan, 2003; Tavakoli & Skehan, 2005). *Breakdown fluency* is generally assessed by pause frequency and amount of speaking time, whereas *speed fluency* is usually measured by speech rate or the number of syllables/words uttered per second/minute (Götz, 2013). *Repair fluency* is connected with the frequency of self-repairs (Kovač & Milatović, 2012), repetitions, reformulations, etc. Besides cognitive and utterance fluency, Segalowitz (2010, p. 48) also includes the third domain or *perceived fluency*, referring to 'the inferences speakers make about speakers' cognitive fluency based on their

perceptions of utterance fluency'. All three domains, viewing fluency from the three different perspectives, are intertwined and connected.

### **1.1. Breakdown fluency**

As opposed to speed fluency, breakdown fluency is generally associated with pausing. In the early studies, Beattie (1980), for example, assumes that fluent speech and silent pauses in L1 speech alternate, emphasising that within clause pauses are connected with linguistic planning, pointing to the need for additional time. The speaker may require additional time for various reasons, for example, to search for ideas, words, grammatical structures, to correct overt and covert errors, or to search for more appropriate ways to express his/her ideas (Yuan & Ellis, 2003). This is the major difference between L1 and L2 speech production. Whereas message planning in L1 requires conscious attention, the formulation and articulation are automated processes which can run in parallel without the speaker's conscious attention. However, in L2, the formulation and articulation processes are only partly automated, largely depending on the speaker's proficiency level.

Broadly speaking, pauses in L2 serve different functions compared to L1; firstly, they can signal difficulties in speech planning and speech production, and secondly, they can also occur as a result of doubts about what to say next (Goldman-Eisler, 1961). Fillmore (1979) argues that the temporal characteristics of speech, such as hesitations and pauses, are the ones defining a fluent speaker according to perceptions of native speakers' fluency, whereas Kowal, O'Connel, O'Brien, and Bryant (1975) emphasise that an increase in L2 proficiency corresponds to a decrease in the frequency and length of silent pauses in reading. Duez (1985) states that hesitations in speech which disrupt the smooth flow of L1 speech occur in different forms, such as silent pauses, filled pauses, repetitions, lengthened syllables or combinations of these.

In a multiple-case study, Lennon (1990) reports that pause frequency and pause length decrease with an increased exposure to L2. Furthermore, Riazantseva (2001) points out that pausing, like intonation, is a developmental phenomenon which becomes nativelike with higher language proficiency. However, pauses are not only indicators of the underlying difficulties in speech planning and speech production, they are also important for the listener who needs sufficient time to process the ongoing speech (Arnold, Fagnano, & Tanenhaus, 2003).

According to Segalowitz (2010), appropriate pausing highly influences perceived fluency in L2 since rapidity and smoothness of performance create the impression of

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attained nativelike fluency. Riggenbach (1991) and Yang (2012) suggest that pauses in L2 are distributed nativelike if they occur at clause boundaries. In their view, within-clause pausing does not sound fluent.

Pause frequency in L2 research has been calculated in different ways, for example, Kormos and Dénes (2004) show the number of silent pauses per minute, Freed (1995) counts the number of silent pauses per 100 words, and Möhle (1984) counts the number of silent pauses per 100 syllables. Another pause measure is phonation-time ratio which is expressed 'as the percentage of time spent speaking as a percentage proportion of the time taken to produce the speech sample' (Towell, Hawkins, & Bazergui, 1996, p. 91). The third most commonly used pause measure is average pause duration which is expressed by dividing the total length of pauses by the total number of pauses (Kormos & Dénes, 2004; Tavakoli & Skehan, 2005). Rossiter (2009) emphasises that the number of pauses per second and pruned speech rate are strong predictors of fluency. Witton-Davies (2014) reports that, among other fluency variables, pause length, pause frequency, as well as phonation-time ratio, are the most reliable measures of utterance fluency.

Fluency studies applying Praat script are relatively new (Prefontaine, 2010). Prefontaine (2010) conducted a study using Praat software to measure the phonation-time ratio, syllables per second, and other temporal fluency variables. Her study is important since it is one of the first attempts to use automatic speech rate measurement to evaluate tasks.

Segalowitz (2010), Kormos and Dénes (2004), Götz (2013), and Prefontaine (2010) point out that the findings related to fluency are not easily comparable due to a lack of consistency in applying the same objective variables and research methods. In pausological research field, there is a cut-off point below which pauses are ignored. Generally, it varies from 0.2 and 0.3 seconds (e.g. de Jong, Steinel, Florijn, Schoonen, & Hulstijn, 2013; Kormos & Dénes, 2004; Lennon, 1990; Tavakoli & Skehan, 2005; etc).

## **1.2. Task repetition**

Time pressure affects to a considerable extent unautomated L2 speech and task-based language teaching approaches have been suggested to ease the processing pressure by providing the learners with more time to plan (e.g. Bygate & Samuda, 2005). Drawing on Levelt's model of speech production, Ellis (2005) proposes a framework of task-based planning and respective pedagogic interventions aiming at manipulating the

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planning process itself. Previous studies considered two principal types of task-based planning which differ in terms of when the planning takes place, i.e. pre-task planning and within-task planning (Ellis, 2005). The former occurs before the task has been performed, while within-task planning occurs during its performance. Pre-task planning can be further subdivided into strategic planning and task repetition. The opportunity for strategic planning before speaking provides the learners with some time to test their own capabilities and to maximize the use of the existing linguistic repertoire. Task repetition as a fluency enhancing strategy may involve the repetition of the same or the slightly modified task, or just parts of a task at intervals of time. As pointed out in Ellis (2005), in task repetition, the first performance is considered a pre-task activity or a preparation for the following performance.

As suggested by Richard and Theodore (2014), language teaching should focus on the task-based language teaching. Van den Branden (2016) defines a pedagogic task as a goal-oriented activity which involves a meaningful use of language. According to Lambert, Kormos, and Minn (2017), there are four criteria a task must fulfil in order to play a relevant role for both research and pedagogical purposes. Firstly, a task is an activity in which meaning is primary. Secondly, there is some connection to authentic situations. Thirdly, learners must use their own resources to finish the activity, and last, there is a communicative outcome. According to another definition provided by Bozorgian and Kanani (2017), a pedagogic task is an activity requiring the language to be pragmatically processed in order to reach a desirable outcome, hence it can be evaluated according to two criteria: firstly, if the propositional content has been adequately conveyed by the speaker, and secondly, if the interlocutor has correctly understood its meaning. Theories explaining speech production in L2 emphasise the necessity of introducing speech tasks into curricula based on Levelt's model of speech production (e.g. Bygate & Samuda, 2005; Kormos, 2006; Skehan, 2009). Task repetition and task structure have been investigated over the past few decades in order to confirm the existence of a beneficial impact on developing fluency (e.g. Bozorgian & Kanani, 2017; Bygate, Skehan, & Swain, 2001; Ellis, 2005; Lambert et al., 2017; Tavakoli & Foster, 2011).

To date, repetition effects have been investigated immediately, after days and weeks (e.g. Bygate, 1999; Bygate et al., 2001; de Jong & Perfetti, 2011; Gass, Mackey, Alvarez-Torres, & Fernández-García, 1999; Lynch & Maclean, 2001; Wang, 2014). Accordingly, studies have provided substantial evidence that repeated practice favourably influences fluency (e.g. Bygate et al., 2001; de Jong & Perfetti, 2011;

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Lambert et al., 2017; Lynch & Maclean, 2001; Tavakoli & Foster, 2011; Wang, 2014). The results of early empirical studies reveal that during the first encounter with the task, the speaker is primarily focused on the content of the preverbal message (e.g. Bygate, 1996). Due to the limited attentional resources and the limited capacity of the working memory, the speaker's attention is usually focussed either on the form or on the meaning (Lambert et al., 2017; Skehan, 1998). Consequently, during the second encounter with the same or slightly altered task, the speaker's attention will shift from the meaning to the form resulting in greater accuracy and fluency (Samuda & Bygate, 2008). However, the effects of task repetition vary depending on the conceptual demands of the tasks, i.e. different tasks vary in terms of the pressure they pose on the working memory in different stages of speech production (Skehan, 2009). Task repetition involves two phases. In the first phase, the speaker organises the cognitive content, finds the appropriate lexical items and the corresponding grammatical forms within the limited time-constraints of real-life interaction. In the second phase, the speaker upgrades the previous performance. By way of analogy, repetitions might potentially lead to the integration of knowledge and performance, thus facilitating the processes at the levels of conceptualisation and formulation. Wang (2014), for instance, points out that not only the formulation phase, but also the articulation phase, significantly benefit from the previous performance.

According to Lambert et al. (2017), task repetition displays a major impact on the level of conceptualisation. In the repeated task, the macrostructural conceptual plan for the message to be conveyed will already be accessible, which will in turn assist the formulation phase by reducing the processing pressure. However, in the case of more demanding conceptual plans, the speaker will probably not recall the content entirely, but the familiarity with the task will have a positive effect on the repeated performance. Consequently, task repetition might strengthen and speed up the established links between the conceptualisation and the formulation level, hence the formulation will become more accurate because the speakers' attention shifts towards monitoring for correctness and appropriateness. As stated by Kormos (2006), Skehan (2009), Segalowitz (2010), Lambert et al. (2017) and others, the positive impact of task repetition on performance is connected with the cognitive demands of the employed tasks.

The overall positive effects of task repetition are strongly related to different task design features and implementation options. Besides the criterion of structure, task

familiarity and cognitive demands, the proposed effects can also be related to the proficiency level of speakers (Segalowitz, 2010).

Regarding breakdown fluency measures, several studies investigate the influence of task repetition on pausing and phonation-time ratio. In a large study including thirty-two Japanese learners of English who completed three communication tasks six times, Lambert et al. (2017) conclude that clause-final pausing decreased between the first two performances and mid-clause pausing decreased gradually up to the fourth performance. Also, an important finding is the reduction of clause-final pausing, pointing to the benefits of repetition in the conceptualisation phase. Furthermore, de Jong and Perfetti (2011) examine the impact of task repetition on L2 fluency enhancement. In their study one group of participants spoke about the same topic three times, while the other group talked about three different topics. Different fluency measures are taken into consideration and long term gains in breakdown fluency, relating to the mean length of pauses and the phonation-time ratio, are recorded for the group who spoke about the same topic three times. In another study, Matsumura, Kazuyo, and Africano (2008) conclude that the repetition of a narrative task seems to be helpful in decreasing the pause length. Moreover, gains are also obtained for the phonation-time ratio.

Researchers often provide an instructional model for L2 teaching using the results obtained by task repetition which are explained by the psycholinguistic model of speech production. Tavakoli and Hunter (2018) point out the necessity of the integration of fluency fostering activities into language teaching practice. In the view of Gatbonton and Segalowitz (2005), automaticity and proceduralization of knowledge can be achieved through practicing tasks that are genuinely communicative. Repetition of recurrent phrases might seem monotonous at first, however, it is a fundamental feature of common discourse and should be more involved in teaching activities.

Similarly, it should be emphasised that despite the increased interest in task repetition as a fluency enhancement strategy, recent studies suggest that task repetition is not frequently used in classrooms for the purpose of promoting fluency (Tavakoli & Hunter, 2018). In fact, Rossiter, Derwing, Manimtim, and Thomson (2010) suggest that teachers are more likely to use free communication activities rather than the ones proposed by L2 research and there is a general consensus that many students do not have enough opportunity to improve their oral fluency. Also, Tavakoli and Hunter (2018) point to the existing gap between fluency research and pedagogic practice which can only be bridged if researchers and language teachers work together.

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In sum, pedagogic tasks play an important role in L2 teaching since they provide the learners with the possibilities to use their linguistic knowledge in relatively natural communicative contexts, and tasks involving repeated performances lead to long term changes in speech processing (Ellis, 2009). According to Wray (2002), formulaic sequences will emerge as a result of a continuous practice of phrases and clauses. In other words, proceduralization and automatization are the result of the repeated use of grammatical structures and words, potentially leading to new production rules which may gradually be strengthened through repetition.

The study described in this paper is an attempt to find out whether task repetition, based on cognitively less demanding tasks, significantly influences speech pausing and the total amount of speaking in the case of more proficient speakers.

The present study is thus expected to extend the current knowledge about the impact of task repetition on EFL learners' speech fluency.

The following research hypotheses are proposed:

- Immediate task repetition of a tightly structured narrative significantly influences the number of pauses in the speech of more proficient learners of English.
- Immediate task repetition significantly influences the average duration of pauses in the speech of more proficient learners of English.
- Immediate task repetition significantly influences the phonation-time ratio in the speech of more proficient learners of English.

## 2. RESEARCH DESIGN

### 2.1. Participants

Thirty-three Croatian EFL learners, first-year undergraduate engineering students (14 female and 19 male students aged between 18 and 19) participated in the study. The participation was voluntary. All of them shared the following characteristics: a) the subjects were sampled from the population of English learners at the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split according to their proficiency level based on the results of the English State Matura Exam. According to an interview which preceded the recordings, all participants in the study scored excellent or very good grades in the English State Matura Exam at the highest level (A level). State Matura Exam is a secondary school leaving examination in Croatia; b) all of them attained almost identical levels of education; in fact, they learned English at primary school and at the high school, as well as in private

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schools, for at least nine years; c) none of them spent more than ten days in an English speaking country.

## 2.2. Materials and procedures

Samples of speech were collected from the same subjects in an informal atmosphere in an ordinary office at the Faculty. The participants were seated opposite the researcher and they were briefly informed about the nature of the first task. The computer with the microphone was placed between the subject and the researcher. Each student was individually audio-recorded and the total recorded speaking time amounted to sixty-seven minutes. In order to ensure the comparability of the results with similar studies, an oral narrative task was employed in this study. The participants were asked to respond to a narrative speech task including a picture description. This task is very similar to traditionally used devices in research and L2 assessment (Kormos & Dénes, 2004). The cartoon is selected from a popular book of cartoons by a well-known American cartoonist (e.g. Kormos & Dénes, 2004; Riazantseva, 2001; etc). The selection criteria for the chosen cartoon are its relative simplicity and familiarity. This kind of task is non-interactive and has been popular among researchers. The cartoon description consists of a six-picture sequence arranged in a logical order. The story is highly structured, with a clear beginning, a middle part and a predictable ending. The content of the story is relatively familiar with the vocabulary including high frequency words and formulaic expressions. The pictures depict two people meeting in a park, talking to each other, spending some time together, and eventually getting married.

According to Tavakoli and Skehan (2005), this tightly structured narrative has a clear story developing in pictures, with the sequence of events being fixed, and without the possibility to rearrange the pictures without affecting the main theme of the story.

Hence, in the present study, the following performance conditions were defined (Saeedi & Kazerooni, 2013):

- a) *Cartoon description.* The participants were required to look at the series of pictures including the tightly structured narrative before starting to retell the story taking into consideration that the listener (researcher) could not see the pictures and could only grasp the meaning according to what she hears. The participants were given 30 seconds to look at the pictures before telling the story.
  - b) *Immediate task repetition.* After completing the narration for the first time, the participants immediately started to retell the story once again without being previously informed about the second performance.
-

### **2.3. Quantifiable measures of breakdown fluency**

The temporal fluency variables were measured by speech analysis program Praat in order to automatically calculate the temporal variables for evaluation purposes.

The measures of fluency examined in this study are as follows:

- a) The number of silent pauses per minute, where the Praat is configured to detect pauses over 0.25 seconds. Following from de Jong et al. (2013), a silent pause is an unfilled silence of longer than 0.25 s. The number of silent pauses per minute is obtained by dividing the number of pauses over 0.25 s and the total time in minutes spent to produce the speech sample.
- b) Average pause duration is expressed by dividing the total length of pauses by the total number of pauses.
- c) Phonation-time ratio is calculated 'as the percentage of time spent speaking as a percentage proportion of the time taken to produce the speech sample' (Towell et al., 1996, p. 91).

### **2.4. Statistical analysis**

The statistical analysis was performed under two different task conditions, i.e. first performance of the task and repeated performance using descriptive statistics, the Shapiro-Wilk normality test, and the parametric paired t-test or the non-parametric Wilcoxon matched pairs test. The level of significance equals 0.05.

Before the application of a suitable statistical test, it is necessary to verify the prerequisite of normal distribution for the use of the parametric test (if so, since two samples at the same subjects are compared, the t-test for dependent samples, i.e. the paired t-test, is used). The paired t-test assumes that the differences between the pairs follow a normal distribution. If the prerequisite is not met, the Wilcoxon matched pairs test is performed as the broadly applied non-parametric test for two dependent samples. The Shapiro-Wilk test has been used to test normality, emphasised in many papers as the highly efficient normality test (e.g. Coin, 2008; Henderson, 2006; Keskin, 2006). If the p-value of the test is greater than the level of significance, it can be concluded that there is no evidence that the population significantly deviates from the normally distributed population. In that case, the paired t-test is utilised to test two dependent samples; otherwise the non-parametric test is preferred.

### 3. RESULTS

In this section, the findings of the study in relation to the research hypotheses will be discussed. The sample parameters related to the average pause duration (APD) are presented in Table 1 together with a percentage difference between the arithmetic means. It can be noted that the average pause duration in the repeated task is more than 21% lower compared to the first performance. However, further tests were subsequently performed in order to determine whether the obtained difference was statistically significant.

According to the results of the Shapiro-Wilk test, ( $W = 0.5631, p < 0.0001$ ), it may be stated that the distribution of the pair differences significantly deviates from the normal distribution. Hence, the non-parametric Wilcoxon matched pairs test is applied, Table 2. As can be seen, the significant difference between the average duration of pauses is obtained between the first population (first performance of the task) and the second population (task repetition). The pairing effectiveness is tested by means of computing the non-parametric Spearman correlation coefficient ( $rs = 0.299, p = 0.0454$ ). It can be concluded that the pairing is effective.

**Table 1.** Sample parameters for average pause duration (APD)

**Tablica 1.** Rezultati za prosječno trajanje stanki (PTS)

APD / PTS	First time / Prvi put	Repetition / Ponavljanje
Min	0.45	0.33
Me	0.78	0.73
Max	4.78	1.27
AM	0.93	0.73
StD	0.73	0.24
SE	0.13	0.04
AM difference / Razlika AM	-21.51%	

Legend / Legenda

Min – minimum sample value / najniža vrijednost u uzorku, Me – median / medijan, Max – maximum sample value / najviša vrijednost u uzorku, AM – arithmetic mean / aritmetička sredina, StD – standard deviation / standardna devijacija, SE – standard error / standardna pogreška

**Table 2.** Wilcoxon matched pairs test for average pause duration (APD)  
**Tablica 2.** Wilcoxonov test ekvivalentnih parova za prosječno trajanje stanki (PTS)

APD / PTS	Wilcoxon matched pairs test / Wilcoxonov test ekvivalentnih parova			
	Sum of positive ranks / Zbroj pozitivnih rangova	Sum of negative ranks / Zbroj negativnih rangova	<i>W</i>	<i>p</i>
	392.0	-169.0	223.0	<b>0.0473</b>

The second tested variable is the number of pauses per minute (NPMIN). The difference between the means of the first sample (first performance of the task) and the second sample (task repetition) equals -8,64%, Table 3. Once again, the distribution of the pair differences significantly departs from the Gaussian distribution ( $W = 0.8812$ ,  $p = 0.0018$ ) pointing to the Wilcoxon matched pairs test to be used, Table 4. The p-value does not reach the threshold value indicating the significant difference between the number of pauses per minute between the populations. The pairing is effective ( $r_s = 0.720$ ,  $p < 0.0001$ ) where the high value of the Spearman correlation coefficient can be noticed.

**Table 3.** Sample parameters for the number of pauses per minute (NPMIN)  
**Tablica 3.** Rezultati za broj stanki u minuti (NSMIN)

NPMIN / NSMIN	First time / Prvi put	Repetition / Ponavljanje
Min	3.18	1.28
Me	13.92	13.08
Max	26.20	24.93
AM	14.47	13.22
StD	6.34	6.30
SE	1.10	1.10
AM difference / Razlika AM	-8.64%	

#### Legend / Legenda

Min – minimum sample value / najniža vrijednost u uzorku, Me – median / medijan, Max – maximum sample value / najviša vrijednost u uzorku, AM – arithmetic mean / aritmetička sredina, StD – standard deviation / standardna devijacija, SE – standard error / standardna pogreška

**Table 4.** Wilcoxon matched pairs test for the number of pauses per minute (NPMIN)**Tablica 4.** Wilcoxonov test ekvivalentnih parova za broj stanki u minutu (NSMIN)

NPMIN / NSMIN	Wilcoxon matched pairs test / Wilcoxonov test ekvivalentnih parova			
	Sum of positive ranks / Zbroj pozitivnih rangova	Sum of negative ranks / Zbroj negativnih rangova	<i>W</i>	<i>p</i>
	401.0	-160.0	241.0	<b>0.0320</b>

**Table 5.** Sample parameters for the phonation-time ratio (PHTRATIO)**Tablica 5.** Rezultati za omjer vremena fonacije i vremena govorenja (VFVGOMJER)

PHTRATIO / VFVGOMJER	First time / Prvi put	Repetition / Ponavljanje
Min	0.50	0.65
Me	0.83	0.84
Max	0.95	0.99
AM	0.79	0.84
StD	0.13	0.09
SE	0.02	0.02
AM difference / Razlika AM	6.33%	

Legend / Legenda

Min – minimum sample value / najniža vrijednost u uzorku, Me – median / medijan,  
 Max – maximum sample value / najviša vrijednost u uzorku, AM – arithmetic mean /  
 aritmetička sredina, StD – standard deviation / standardna devijacija, SE – standard  
 error / standardna pogreška

**Table 6.** Paired t-test for the phonation-time ratio**Tablica 6.** T-test za zavisne uzorke za omjer vremena fonacije i vremena govorenja

PHTRATIO / VFVGOMJER	Paired t-test / t-test za zavisne uzorke		
	<i>t</i>	<i>df</i>	<i>p</i>
	3.620	32	<b>0.0010</b>

In order to gain more insight into the influence of task repetition, a final observation about the breakdown fluency concerns the phonation-time ratio. The difference between the means equals 6.33%, Table 5. There is no evidence that the differences between the pairs significantly deviate from the normally distributed population ( $W = 0.9540$ ,  $p = 0.1734$ ). Hence, the parametric paired t-test can be utilised, Table 6. The p-value is lower than the threshold value pointing to the significant difference between the populations. The pairing is effective and the Pearson correlation coefficient almost reaches 0.8 ( $rp = 0.797$ ,  $p < 0.0001$ ).

#### 4. DISCUSSION

A brief inspection of the presented tables and the performed statistical analysis points to the existence of significant differences in the average pause duration, number of pauses per minute, and the phonation-time ratio between the first and the repeated performance. Therefore, all three hypotheses have been confirmed. The significant differences regarding all investigated breakdown fluency measures may be explained by the trade-off hypothesis (Skehan, 1998). Due to the limited attentional capacity, speakers must decide which stage of speech production will be prioritised (i.e. conceptualisation, formulation, articulation, or monitoring). Therefore, while repeating the task, the speakers can rely on the previously formed conceptual plan and easily activate the recently used linguistic units which are still highly activated. Consequently, the attentional resources become freed up, reducing the level of attention towards the simultaneously running processes of conceptual planning, linguistic encoding, articulation, and monitoring. In other words, whereas the first encounter with the task requires certain trade-offs in terms of the distribution of attentional resources among the different stages of speech production, the second encounter significantly decreases these efforts, enabling the learners to reactivate the

previously formed content, as well as the linguistic units. Hence, the necessary production processes will be facilitated since there are strong connections between the conceptual plan and the lexical-grammatical forms which still have a high degree of priming due to the previous performance.

Lambert et al. (2017) provide evidence that the previous encounter with the task positively influences all three major processes involved in speech production including monitoring, which are reflected in substantial gains in fluency measures regardless of the proficiency level and task type. As a result of automatization and proceduralization, the speakers display a reduced need for pauses due to the priming influence. De Jong and Perfetti (2011) agree that the temporal fluency measures can mirror the degree and amount of chunking and automatization.

The presented findings regarding phonation-time ratio are particularly relevant if considered from the standpoint of perceived fluency. The ultimate goal of an L2 speaker is to attain nativelike fluency which is, in turn, evaluated by the listener. Previous research suggests that phonation-time ratio is also among the important variables relevant in the perception of fluency (Cuccharini, Strik, & Boves, 2002; Kormos & Dénes, 2004).

An interesting observation is made by Lambert et al. (2017), who suggest that the improvements in fluency can be expected not only for lower proficiency students, but also for relatively high levels of proficiency. However, Segalowitz (2010) points to somewhat different conclusions compared to the ones observed by Lambert et al. (2017). In his view, the encoding mechanisms of proficient L2 speakers are relatively automated and more attentional resources are available for content conceptualisation, as well as for monitoring. Therefore, fewer gains from the task repetition are expected particularly for cognitively less demanding tasks. Yet, improvements might be achieved for tasks with high conceptualisation demands. With respect to the present study, the data analysis reveals that immediate repetition based on tasks with a highly structured nature, which are cognitively less demanding, significantly influences the number of pauses, average duration of pauses, and the amount of the total speaking time in the speech of more proficient learners of English. Therefore, the obtained results are in line with Lambert et al. (2017). For this reason, it is indeed reasonable to assume that there is substantial evidence that the task repetition has an effective

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impact on the breakdown fluency even for more proficient speakers who perform cognitively less demanding tasks.

The results obtained in this study confirm the importance of implementing task repetition into classroom activities. Therefore, it is advisable to raise awareness about the positive effects of task repetition on fluency. If learners are introduced with the concept of fluency in general and perceived fluency in particular, prior to practicing these tasks, the learners will become more aware of how to draw on primed language. Consequently, they will become aware that primed language will positively influence the subsequent performances which will further increase oral fluency.

## 5. CONCLUSION

The study reported in this paper is an attempt to find out whether the repetition of a narrative significantly influences the breakdown fluency in the case of more proficient speakers. Also, it aimed to connect the psycholinguistic model of speech production and a particular condition under which the task is performed, i.e. task repetition, which might be helpful for L2 teaching. A close inspection of the presented findings indicates that a repeated practice of tightly structured narrative tasks results in significant breakdown fluency gains, not only for less proficient speakers, but also for more proficient speakers. The results might be explained by the attentional model of speech production and the trade-off hypothesis.

Fluency gains in terms of significant decreases in the occurrence and the duration of pauses, as well as an increase in the phonation-time ratio in the case of more proficient learners, point to the importance of task repetition as a vital classroom activity. Despite the increased researchers' interest in the task repetition supported by language research, it would be very interesting to investigate the extent to which the learners actually have the opportunity to practice task repetition in order to improve their oral proficiency.

Nevertheless, the present study has a few limitations. In particular, the gains were scored for a tightly structured picture description task, therefore, the results cannot be generalised for other task types. Also, we can only confirm short-term effects which are presumably the result of the reduced cognitive load and the high activation level of all speech encoding mechanisms.

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Hrvatska

## **Utjecaj neposrednog ponavljanja zadatka na učestalost i trajanje stanki u govoru**

### **Sažetak**

Cilj je ovoga rada ispitati utjecaj ponavljanja vrlo strukturiranog zadatka na govornu fluentnost, odnosno na broj stanki u minuti, prosječno trajanje stanki te na omjer vremena fonacije i vremena govorenja. U istraživanju su sudjelovala 33 hrvatska govornika engleskog jezika koji su dvaput obavili isti narativni zadatak. Varijable vremenske fluentnosti izmjerene su programom za analizu govora Praat (Boersma i Weenink, 2017). Analiza rezultata pokazuje da se ispitanici znatno rjeđe koriste stankama tijekom drugog ponavljanja zadatka te da se prosječno trajanje stanki značajno skraćuje. Također, značajna razlika dobivena je i za omjer vremena fonacije i vremena govorenja. Zabilježena poboljšanja u promatranim mjeranjima fluentnosti mogu se objasniti učinkom aktivacije te, posljedično, umanjenim kognitivnim naporom. Dobiveni rezultati istraživanja upućuju na zaključak da su dobro poznate teme s vrlo strukturiranom radnjom povezane s poboljšanjem gorvne fluentnosti, ako se razmatraju stanke, čak i u govornika na višoj razini vladanja jezikom. Rezultati istraživanja imaju pedagoške implikacije u J2, s naglaskom na pozitivan učinak ponavljanja zadatka na razvoj gorvne fluentnosti.

**Ključne riječi:** učestalost stanki, trajanje stanki, podučavanje temeljeno na zadacima, ponavljanje zadatka

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## Synchronised and non-synchronised articulation of Polish nasals *q* and *ɛ* in child and adult speech

### Summary

Nasals are highly frequent sounds in the Polish language. It is believed that their articulation is mainly dependent on surrounding segments. The standard register of Polish language contains two different patterns of articulation of nasalised sounds, so called: synchronised and non-synchronised. This study attempts to show that surrounding consonants have different impact on the way of nasals articulation among adults and children. The acoustic methodology was applied in order to verify the hypothesis about differences in asynchronous articulation of nasals *q*, *ɛ* in CVC and CV clusters in front of stops and affricatives; and synchronic articulation before fricatives among children and adults. Nasalised sounds were investigated on the basis of utterances of two children (3;9, 10;1) and compared with similar segments of adult speech excerpted from SpokesWeb CLARIN database.

**Key words:** language acquisition, acoustic phonetics, nasals *q* and *ɛ*, Polish

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## 1. INTRODUCTION

The perception of Polish spoken language from a side of non-Slavic languages speakers might often bring the sensation of highly palatalised and nasalised speech. Even though research on nasalisation could cause certain difficulties in finding acoustically relevant measurements of degree of nasalisation and nasals segmentation, the present paper approaches the phenomenon of the articulation of nasal segments from the perspective of acoustic phonetics and language development.

The first part of present study briefly introduces the acoustic characteristics of nasalisation and describes the position of nasals *q*, *ɛ* in Polish vowel system. The following sections discuss the methodology of nasality measurements and introduce the conventions of audio data transcription, created for the need of presented research. Then, criteria for nasals acoustic classification are described in comparison with recorded voice samples. The final part contains the transcripts of recordings from which relevant clusters with nasals *q* and *ɛ* were excerpted.

Nasalisation is one of the twelve phonological distinctive features in standard Polish language and applies to bilabial /m/, alveoral /n/, retroflex /ɳ/, palatal /ɲ/, glides: /r/, /l/ and investigated nasals *q*, *ɛ* referring to /ɔ/<sup>1</sup>, /ɛ/ or /ɔN/, /ɛN/. Different interpretations of nasals were presented in Polish phonetic literature (Bethin, 1987; Dłuska, 1981; Jassem, 1974; Laskowski, 2010; Zagórska-Brooks, 1968). Even though differences in terminology among researchers are still evident, the common consensus was reached and two general patterns of nasalisation in Polish were distinguished. Depending on the character of sounds following nasals – synchronised and non-synchronised (pol. *synchroniczna*, *niesynchroniczna*), sometimes also called biphonematic and monophonematic (pol. *bifonematyczna*, *monofonematyczna*), articulation types were defined. Investigated nasals in the Polish language are orthographically represented as *q*<sup>2</sup> and *ɛ*, which might cause confusion, because in case of the first one, the cardinal /o/ not /a/ is nasalised. This orthographic tradition was established back in the 16<sup>th</sup> century where the pronunciation of *q* was closer to /a/. Though the evolution in diachronic phonetics changed the character of nasalised *q*, the outdated orthographic norm is still valid.

<sup>1</sup> In IPA convention, nasal symbol /ɔ/ differs from the one used in phonetic transcriptions of Slavic languages (AS: Alphabet Slavic), where /ø/ character is more common.

<sup>2</sup> The 'ł' diacritic (Unicode: U+02DB, HTML: &#260 and U+0104; &#1041 for capitals) as an indicator of nasalisation is used in Polish, Old Church Slavonic and some Athabaskan languages. In Lithuanian though the same symbol indicates the length of sound.

As mentioned before, the differences in articulation of nasals are predominantly dependent on their surroundings. The adjacent sounds are not the only factor influencing synchronised and non-synchronised articulation and, as presented in this study, the age of a speaker can be a modifier of the articulation type. Two aforementioned patterns will be investigated from the perspective of different age of language users. Therefore, the articulation types of nasalised sounds uttered by children will be compared with similar adults' utterances excerpted from SpokesWeb CLARIN database (Pęzik, 2015).

The purpose of this work required establishing new transcribing conventions. Unfortunately, Polish chapter of CHILDES database is not unified. Authors tend to follow various strategies in transcription of audio material and those datasets could not be taken as an example for this study. The transcription conventions applied here contain three obligatory paths: %pho – with information about phonetic layer according to IPA standards; %mor – containing the morphosyntactic relations and %eng – with Polish to English translation. Path %com – provides additional comments on the utterances or subjects' behaviour. Errors were tagged with asterisk and explained in following lines starting with: %err according to Tools for Analyzing Talk (MacWhinney, 2017, pp. 105–112). The intonation contour of utterances was tagged as well as primary and secondary stress. CLAN special characters were used to indicate laughing. The additional comments (see Appendix: line 193) were introduced for possible explanation of target phrases when an utterance was marked as mistaken. The lines with subjects' speech were written, with several exceptions, according to Polish orthographic norm – which makes the data searchable if specific phrase is of an interest to a researcher. The phonetic features with coarticulation diacritic were added in the %pho line. The accentual tagging allows to investigate the alternations of stress patterns in child speech, which might be interesting for some future research comparing the fixed place of paroxytonic accent in Polish orthoepic norm with accentual tendencies discovered among children. The phenomena of palatalization can be traced by following the '%com: palat' tag. Paralinguistic information without linguistically relevant articulation, but possibly important for conversation analysis, was described with '&=' and '!= ' (e.g. &=laughs). The syllable prolongation was noted.

The information about morphosyntactic relations was introduced manually. Tags specify: part of speech, tense, aspect, voice, grammatical person, mood, and case. The Latin case abbreviations were used. Some additional lexical and stylistic information was mentioned with DEM and AUG indexes for diminutive and

augmentative forms respectively. When change of speech act occurs, the comment is given in '%add' row (e.g. line 16). Observations on the communicative intention were rarely noted (line 21) to prevent the subjectivity of transcriber's interpretation.

## 2. CHARACTERISTICS OF NASAL SEGMENTS

The velum lowering during the articulation process and opening the velopharyngeal port causes the vocal tract extension and direction of an airstream towards nasal cavity. The movement of soft palate leads the airstream to oral and nasal cavities simultaneously. The nasalisation in Polish vowels, occurs more frequently in the second phase of articulation, in contrast to the French language, where the nasalisation is present already in the first segment of vowels (Rochet, 2015). The final segment of nasals *q*, *ɛ* has similar spectral characteristics due to fixed volume of nose cavity resonator. Exceptions could be found among patients with changes in anatomy of nasal cavity occurred as a result of endonasal sinus surgery. Nasals are ordinarily voiced and can be phonetically distinguished as sonorants (cf. Kent & Kim, 2011, p. 367). Naturally, during nasals' articulation variations in formant values are visible due to the tongue position, which is: *q* – mid-back and *ɛ* – mid-front. As a consequence of the movement of uvula and airstream division, the energy is led to the oral cavity and nasals intensity is slightly lowered compared with intensity of orals. The differences in articulation patterns of Polish nasals might raise the question of their classification. Therefore, *q* and *ɛ* cannot be clearly classified as diphthongs, because the elements /o/, /ʊ/; /e/, /ɛ/ consisting their non-synchronised articulation can be uttered independently, regardless of surroundings. This statement can be easily verified by measuring basic acoustic features of those elements separately and as a part of multisegmental entity. Nasals are typically more voiced than glides and less voiced than fricatives.

The question of nasalisation was raised in the field of language acquisition among the others by Olmsted (1966), Waterson (1971, pp. 195–200), and Macken and Ferguson (1981). The methodology of articulatory phonetics in the nasals investigation was applied by Kurowski and Blumstein (1987, pp. 1917–1927). Before the experimental methods were successfully applied in linguistics, fundamental theories on acquiring the smallest units of language system were stated by Roman Jakobson. The structuralistic approach – typical for the 'Prague Linguistic Circle' – is visible in his early works on language acquisition as well. Jakobson predicted that stops

are acquired before nasals, with fricatives next and liquids late (cf. Macken & Ferguson, 1981, p. 112). Nevertheless, stops, nasals and glides are among the first sound productions. The importance of nasals comprehension could be explained by the high frequency of nasals occurrence and supported by their language-specific discriminations (see Clark, 2016, pp. 69–72). Nasals are considerably frequent sounds in Polish, compared to English – where 18.45% of all consonants produced in initial, medial and final position contain nasal characteristics (Ardussi Mines, Hanson, & Shoup, 1978). Also, language-specific differences in a degree of nasality are noticeable.

Investigated nasals could be problematic for sign language users, because labiograms of both phases of *q*, *ɛ* articulation (regardless of synchronised or non-synchronised character) are very similar to /o/ and /e/ (Styczek, 2010, p. 99). Furthermore, deaf subjects significantly differ from non-clinical subjects in velopharyngeal openings during nasals articulation.

Nasalised sounds followed by a vowel, due to inevitable influence of coarticulation, considerably increase their degree of nasalisation (see Nasal assimilation in: Czaykowska-Higgins, 1992, p. 140). However, the degree of nasalisation of surrounding vowels was questioned by Bell-Berti (1993) and interesting conclusions on the anticipatory coarticulation were reached. The extended presence of nasality in orals caused by velopharyngeal dysfunctions (VPD) is defined as hyperrhinolalia. The method of measuring a degree of nasalance, called nasometry, allows to conduct relevant research even with young participants (Whitehill & Lee, 2008, p. 335). Nasometry provides a nasalance score, which is a ratio of nasal acoustic energy to the sum of nasal and oral acoustic energy multiplied by 100. In principle – the higher the nasalance score, the higher the degree of nasality. Other methods in nasalance research, though dependent on signal intensity<sup>3</sup> refer to: nasal pressure, vibration and flow. This investigation is based exclusively on the acoustic methodology, however, it could be easily supported with nasometric method. Interestingly, cinefluorographic methods allow to observe that the degree of nasality of English high vowels /i/, /u/ is greater than low vowels (cf. Chen, 1996, p. 17), which might not necessarily be the case in the Polish language.

Acoustic properties of nasals can be distinguished based on typical low intensity and dense pattern of resonances and anti-resonances (Kent & Kim, 2011, p. 398).

<sup>3</sup> Possible solution to obtain relevant measures of nasality was proposed by Horii (1980). The index HONC (Horii Nasal-Oral Coupling Index) is the ratio of nasal accelerometric amplitude to voice amplitude.

Cross-linguistic spectral analysis of nasalised sounds pointed that F1 is clearly separated from the other formants. The appearance of a pole-zero pair above the first formant is also a vivid effect of nasalisation (Chen, 1996, p. 40). The general tendency of large formant bandwidths is noticeable. High density of formants combined with antiformants and flatter spectrum at low frequencies could be pointed as a general acoustic characteristic of sounds articulated via nasal cavity. The visual recognition of nasalisation on spectrograms should be driven by identifying the blank fields where very little of spectral energy was recorded. The careful following of formant transitions might be helpful in identifying nasality on the spectrographic picture.

### **3. MATERIAL**

The recordings were made in a playtime situation with Tascam DR-05 handheld recorder. Microphones were set in omnidirectional mode. Applied sampling ratio was 44100 Hz. The audio-material was excerpted from two recording sessions which took place in subjects' home environment. Both participants were boys aged 3;9 and 10;1. Researcher's presence and so called Labov's effect had no influence on subjects' behaviour. Subjects' speech was natural and non-stimulated, therefore some overlapping interactions with their parents are noticeable (see Appendix lines: 119, 211, 223, 241, 256, 260, 265, 315, 330). Both children and their parents come from dialectically unmarked region of Poland. Parents of recorded children accomplished university education and a socio-economic status of the family could be estimated as middle-class. The adults' speech samples used for the comparison were downloaded from SpokesWeb – conversation data search database – the spoken part of Polish corpus created as a part of CLARIN-EU infrastructure (Pęzik, 2015). The referential database of SpokesWeb was unfortunately low in metadata. Thus, the information about adults whose voice was analysed in comparison to child speech is highly limited. The policy of CLARIN consortium data protection requires that all files must not contain any personal information. The search options were limited to the speakers' sex, age and education level. Unfortunately, no information about dialectic affiliation or place of birth was enclosed in metadata.

#### **3.1. Criteria for sample selection**

Firstly, the non-stimulated natural speech of two children (boys aged 3;9 and 10;1) was recorded during their playtime. Secondly, the audio data underwent transcription and annotation process. Nasalised sounds were excerpted from the audio paths and after FFT transformation the spectral analysis of sounds was conducted by the means

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of STx package (Balazs, Noll, Deutsch, & Laback, 2000) and Praat 6.0.36 (Boersma & Weenink, 2017) software.

Excerpted samples of nasalised utterances were admitted as synchronic ones if at least two out of five characteristics of nasality applied to the investigated segment: (1) Additional formant (approx. 300 Hz) with relatively high amplitude. Sometimes F1 – significantly reduced – could be combined with so called 'nasal formant'; (2) The higher values of F1 and F3<sup>4</sup>; (3) Increased F4; (4) Higher F3 values; (5) Additional formant in one or more of the following ranges: 0.7 kHz, 1.0–1.2 kHz, 1.8–2.25 kHz and 2.7–2.9 kHz. The segmentation should be done with a maximum frame of 45–50 ms after the vowel onset.<sup>5</sup>

The articulation pattern, or more precisely: anticipatory coarticulation effect, suggests that non-synchronised articulation of nasals *q*, *ɛ* indicating denasalization of initial segment should be noticeable in front of stops and affricates (e.g. pol. /p/, /b/, /t/, /d/, /tɛ/, /dʒ/, /tʂ/, /dʐ/, /k/, /g/), whereas the synchronised articulation is expected when nasals are followed by fricatives (pol. /v/, /f/, /s/, /z/, /c/, /z/, /ʂ/, /ʐ/, /x/). Two abovementioned assumptions will be verified and compared on the basis of two sets of recordings (children: index<sub>1</sub> and adults: index<sub>2</sub>) within two groups with nasalised vowels in the final and medial position (CV, CVC).

#### 4. RESULTS

Within distinguished categories the following clusters were retrieved: CV<sub>ch/a</sub> -kę /kɛ/, -tą /tɔ/, -ię /jɛ/, -mą /mɔ/, -gę /gɛ/, -lę /lɛ/, -szę /ʂɛ/, -czę /tʂɛ/ (lines: 37, 120, 124, 135, 203, 334, 392, 397, 407); CVC<sub>ch/a</sub> -cząt- /tʂɔt/, -ięć- /jɛtɛ/, -ręk- /rɛk/, -jęd- /jɛd/, -jęk- /jɛk/, -jęci- /jɛtɛ/ (lines: 31, 37, 101, 140, 144, 149, 236, 245, 249, 283, 367). The rest of samples came from untranscribed recordings from which following groups were selected: -pącz- /pɔtʂ/, -kąt- /kɔt/, -wąs- /vɔs/, -węż- /vɛz/, -węch /vɛx/, -wąż- /vɔz/, -męs- /mɛs/, -węsz- /vɛʂ/, -tęż- /tɛz/, -mąż- /mɔz/.

In total 48 samples belonging to clusters: CV<sub>ch</sub>, CV<sub>a</sub>, CVC<sub>1ch</sub>, CVC<sub>2ch</sub>, CVC<sub>1a</sub>, CVC<sub>2a</sub> were measured. The groups with nasals in the final position (CV<sub>ch</sub> CV<sub>a</sub>) were investigated as independent units with long pause before the next segment or as a final part of a sentence, so the inter-lexical assimilations were not taken into consideration. The results of measurements are given in Table 1. Summarized results for each cluster are presented in Table 2. The second table shows the percentage of samples for which the relevant acoustic feature of initial segment nasality was found.

<sup>4</sup> Higher than oral, cardinal equivalents – /o/, /e/.

<sup>5</sup> The changes are usually noticeable right after 20 ms.

Interestingly, non-synchronous articulation of investigated nasals had some common acoustic characteristics in adult and child speech. The non-synchronous realisation of Polish nasals was relatively often characterised by presence of F2 and F3 in the range between 2300 and 2600 Hz. Considerable differences were noticeable especially in the range of F2, the values of which are highly subject-dependent (as well as F4). The non-vocalic (always second) part of non-synchronised nasals was often accompanied by high amplitude additional formant in utterances registered in both groups. The non-synchronous realisations had additional formant (around 300 Hz). Even though the nasalised segments are typically longer than oral ones, the tempo of child speech should not be compared with adults' utterances. The second segment of non-synchronised nasals often had two formants very close to each other or even combined.

In the CV<sub>a</sub> cluster category, seven utterances were marked as synchronised; whereas among the same type of adults' utterances in group CV<sub>ch</sub> five productions had clearly synchronised character. Nasals followed by stops or affricates were synchronised in five cases of adult speech but only in three cases in child speech. Third group, consisted of nasals followed by fricatives, was the most frequently synchronised among two groups of subjects. Child speech in CVC<sub>2</sub> was synchronised in five samples and adults' utterances were synchronised in seven cases. No acoustic characteristics of nasalization were found at four child utterances: /jɛ̃/ with nasal in final position; in CVC<sub>1</sub> group: /tʃɔ̃t/ with nasal in medial position followed by stop consonant; /jɛ̃tʃ/ with nasal before affricate and, surprisingly, with nasal in medial position followed by fricative: /vɛ̃z/. Within the set of adults' utterances, the only sample without nasalization features measured was /jɛ̃k/ with nasal followed by stop consonant. Overall, the low degree of nasalization was found among nasals in final position /gɛ̃/ articulated by adults and /mɔ̃/, /lɛ̃/ groups from child samples – all belonging to CV clusters. None of the mentioned utterances from set CVC<sub>1</sub>: /jɛ̃tʃ/, /rɛ̃k/, /kɔ̃t/ reached the nasality threshold. Among nasals followed by fricatives (CVC<sub>2</sub>), utterances /vɛ̃z/, /mɔ̃z/ and /vɛ̃x/ were not recognised as synchronous and the nasality degree result at /mɔ̃z/ was equal in child and adult pronunciation. The highest score on created nasality scale among children utterances was noted at /jɛ̃d/ and /vɔ̃s/ from CVC<sub>1</sub> and CVC<sub>2</sub> respectively.

The aim of this work was to compare the nasality degree of nasalised segments in child and adult speech, although the size of recorded data as well as a number of subjects seems too small to declare some general tendencies in Polish nasals articulations.

**Table 1.** Nasality in children and adults' speech – individual samples  
**Tablica 1.** Nazalnost u dječjem govoru i govoru odraslih – svi uzorci

		1		2		3		4		5		Nasality degree / Stupanj nazalnosti	
Group / Grupa	Utterance / Izgovoren segment	CH	A	CH	A								
CV	/kɛ/	+	+	-	+	+	+	-	+	-	-	0.4	0.8
	/tɔ/	+	+	-	+	-	-	+	+	-	-	0.4	0.6
	/jɛ/	-	+	+	-	-	+	-	-	-	+	0	0.6
	/mɔ/	-	-	-	+	+	+	+	-	-	+	0.2	0.4
	/gɛ/	+	-	+	-	-	-	-	-	-	+	0.4	0.2
	/lɛ/	-	+	+	-	-	+	-	-	-	-	0.2	0.4
	/ʂɛ/	+	+	-	+	-	-	-	-	+	-	0.4	0.4
	/tʂɛ/	-	-	+	+	-	-	+	-	-	+	0.4	0.4
CVC <sub>1</sub>	/tʂɔt/	-	+	-	-	-	+	-	-	-	-	0	0.4
	/jɛtɛ/	-	-	-	-	-	-	-	+	+	-	0.2	0.2
	/rɛk/	-	-	-	+	-	-	-	-	+	+	0.2	0.4
	/jɛd/	+	-	+	+	-	-	+	-	-	+	0.6	0.4
	/jɛk/	-	-	-	-	-	-	+	-	+	-	0.4	0
	/jɛtɛ/	-	+	-	-	-	+	-	-	-	-	0	0.4
	/pɔtʂ/	+	+	-	-	+	+	-	-	-	-	0.4	0.4
	/kɔt/	-	-	-	+	-	-	-	-	+	-	0.2	0.2
CVC <sub>2</sub>	/vɔs/	+	+	-	+	+	-	-	+	+	+	0.6	0.8
	/vɛz/	-	-	-	-	-	+	-	-	+	-	0	0.4
	/mɔz/	-	-	+	-	-	-	-	-	-	+	0.2	0.2
	/vɔz/	+	+	+	-	-	+	-	-	-	+	0.4	0.6
	/mɛs/	-	-	-	+	-	+	+	-	+	-	0.4	0.4
	/vɛs/	-	+	-	-	+	-	-	+	+	+	0.4	0.6
	/tɛz/	+	-	-	+	-	+	-	-	+	+	0.4	0.6
	/vɛx/	-	+	-	-	-	+	-	+	+	+	0.2	0.8

#### Legend

Numbers 1–5 refer to acoustic characteristic mentioned above. Index CH – child utterance from recordings; index A – adults' utterances excerpted from SpokesWeb CLARIN database; group CV – consonant + nasal in final position; group CVC<sub>1</sub> – consonant + nasal + stop/affricative; group CVC<sub>2</sub> – consonant + nasal + fricative. Nasality degree index indicates if the utterance character was synchronised ≤ 0.4 or non-synchronised > 0.4.

### Legenda

Brojevi 1–5 odnose se na akustičke karakteristike nazalnosti. Oznaka CH odnosi se na dječji govor sa snimaka, a oznaka A na govor odraslih prikupljenih iz baze podataka SpokesWeb CLARIN; skupina CV označava konsonant + nazal u finalnoj poziciji; skupina CVC<sub>1</sub> odnosi se na konsonant + nazal + okluziv/afrikata; skupina CVC<sub>2</sub> odnosi na konsonant + nazal + frikativ. Indeks stupnja nazalnosti govorí o pojavnosti sinkronizirane nazalnosti  $\leq 0.4$  ili nesinkronizirane  $> 0.4$ .

**Table 2.** Nasality in children and adults' speech – segment clusters

**Tablica 2.** Nazalnost u dječjem govoru i govoru odraslih – skupine glasova

	1	2	3	4	5
CV <sub>ch</sub>	0.5	0.5	0.25	0.75	0.13
CV <sub>a</sub>	0.63	0.63	0.5	0.25	0.5
CVC <sub>1ch</sub>	0.25	0.13	0.13	0.25	0.5
CVC <sub>1a</sub>	0.38	0.38	0.38	0.13	0.25
CVC <sub>2ch</sub>	0.25	0.25	0.25	0.13	0.63
CVC <sub>2a</sub>	0.5	0.38	0.63	0.38	0.88

### Legend

CV<sub>ch</sub> – group: consonant + nasal in final position uttered by child; CV<sub>a</sub> – group: consonant + nasal in final position uttered by adults; CVC<sub>1ch</sub> – group: consonant + nasal + stop/affricative uttered by children; CVC<sub>1a</sub> – group: consonant + nasal + stop/affricative uttered by adults; CVC<sub>2ch</sub> – group: consonant + nasal + fricative uttered by children; CVC<sub>2a</sub> – group: consonant + nasal + fricative uttered by adults. Numbers 1–5 refer to acoustic features mentioned above.

### Legenda

CV<sub>ch</sub> označava konsonant + nazal u finalnoj poziciji koje izgovara dijete; CV<sub>a</sub> označava konsonant + nazal u finalnoj poziciji koje izgovara odrasla osoba; skupina CVC<sub>1ch</sub> odnosi se na konsonant + nazal + okluziv/afrikata koje izgovara dijete; skupina CVC<sub>1a</sub> odnosi se na konsonant + nazal + okluziv/afrikata koje izgovara odrasla osoba; skupina CVC<sub>2ch</sub> označava konsonant + nazal + frikativ koje izgovara dijete; skupina CVC<sub>2a</sub> označava konsonant + nazal + frikativ koje izgovara odrasla osoba. Brojevi 1–5 odnose se na akustičke karakteristike nazalnosti.

## 5. CONCLUSIONS

Polish nasal realisations – synchronised and non-synchronised are mostly dependent on the manner of articulation of adjacent segments. Interestingly, not only articulatory patterns influence the character of nasalization, but it appears that adults' speech, in a few cases among investigated clusters, significantly differed from child's utterances in terms of nasality of initial segment. However, in none of the samples all five characteristics of nasality were found. The highest nasality degree was noted among segments uttered by adults in /ṽs/ and /ṽx/ CVC<sub>2</sub> clusters and in final /k̃/ segment classified as CV<sub>a</sub>. The highest nasality degree among utterances produced by children was noted, surprisingly, in CVC<sub>1</sub> group where theoretically non-synchronous nasals realisation could be expected. Nevertheless, the tendency of non-synchronous articulation of excerpted groups was present within the set CVC1<sub>ch</sub> where five out of eight samples were pronounced in non-synchronised manner; compared to three samples from CVC1<sub>a</sub> cluster. The most frequent acoustic feature among utterances from all groups was (5) – presence of additional formant in abovementioned ranges. Then, the additional so called 'nasal' formant was also observed in a large set of investigated samples. The presence of increased F3 value was less noticeable feature. It is worth to notice that F2 and F4 are the most subject-dependent vowels formants. To obtain results based on different measuring approaches the investigation of nasalisation should be supported with nasometric research. More representative group of participants is also preferable. Additional referential data about adult subjects derived from SpokesWeb CLARIN could be an asset in a future research.

To conclude, this research has shown that non-synchronised as well as synchronised articulation manners can occur in different surroundings in child speech and in adults' utterances. Apart from adjacent segments, the age of language user has a significant influence on the character of nasalisation of Polish *q*, *ɛ* nasals.

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## APPENDIX / PRILOG

- 1        @Begin  
 2        @Languages: pol  
 3        @Participants: WUJ Adult, MAM Mother, JED Child, BAR Target\_Child  
 4        @ID: pol|change\_corpus\_later|WUJ||male||White,MC|Adult|higher||  
 5        @ID: pol|change\_corpus\_later|MAM||female||White,MC|Mother|higher||  
 6        @ID: pol|change\_corpus\_later|JED|10;7.|male|||Child|||  
 7        @ID: pol|change\_corpus\_later|BAR|3;9.|male|||Target\_Child|||  
 8        @Media: 1, audio  
 9        @Location: Wroclaw, Poland  
 10      @Situation: Jedrzej i Bartus are playing together  
 11      @Interaction Type: family  
 12      @Recording Quality: good  
 13      @Transcription: detailed  
 14      @Transcriber: Jacek  
 15      @Date: 27-OCT-2017  
 16      %add: Bartus to Jedrej  
 17      \*BAR: pokāzać ci↑ ?  
 18      %pho: pokazate tɛ  
 19      %mor: VER|pokaz-ać PRO|ci  
 20      %eng: do you want me to show you?  
 21      %act: wants attention  
 22      \*JED: co ?  
 23      %mor: PRO|co  
 24      %eng: what ?  
 25      \*BAR: ɿyyyɿ (1.7) → nājpierw t̄eba [\* p]  
 26      %err: trzeba  
 27      %com: palat  
 28      %pho: najp̄erf t̄eba  
 29      %mor: POST|naj-pierw V|trzeba  
 30      %eng: first you should  
 31      \*BAR: na te piecātki [\* p] m [\* 0v] tu  
 32      %err: c/cz, verb omission  
 33      %osit: is instructing how to make a stamp

- 34 %pho: na te piecɔ̄tki  
35 %mor: PRO|na PRO|te N:NOM:PL|pieczatk-i  
36 %eng: on this stamps  
37 \*BAR: zrōbić jēdną pieczatkę  
38 %pho: p̄jetʂɔ̄tkɛ  
39 %mor: V|zrobi-ć DET:NUM|jedną N:ACC|pieczatk-ę  
40 %eng: make one stamp  
41 \*BAR: u jeścę [\* p]  
42 %err: ś/sz ć/cz  
43 %com: palat  
44 %pho: u jec̄tēe  
45 %mor: PTL|jeszcze  
46 %eng: else  
47 \*BAR: o wlaśnie ↑tāk to miało być  
48 %pho: o wlaenie ↑tak to miało bitɛ  
49 %mor: PRT|wlaśnie tak DET|to V:PAST|miało V:INVbyć  
50 %eng: it was supposed to be like this  
51 \*JED: &= laughing  
52 \*BAR: o to hop siup  
53 %pho: o to xop ɛup  
54 %com: rythmed phrase  
55 \*BAR: ↑&=laughing  
56 \*BAR: ciu  
57 %pho: tɛu  
58 \*BAR: @x hop siup pierwszy [\* p] raz  
59 %err: metathesis ś/sz  
60 %pho: xop ɛup p̄erfši ras  
61 %mor: NUM:ORD|piērwszy raz  
62 %com: palat rythmed phrase  
63 %eng: first time  
64 \*BAR: uwaga↑ →uwaga uwaga bo jedzie rozwaga  
65 %pho: uvaga↑→uvaga uvaga bo jedże rosvaga  
66 %mor: CO|uwaga CONJ|bo V:PRES:3SING|jedzie N:NOM|rozwag-a  
67 %eng: watch out the thought is coming

- 68     %com: rythming wordplay with 'lamaga' and 'rozwaga': clumsy and thought  
69     \*BAR: ☺li↑  
70     %pho: wi↑  
71     %com: happiness interjection  
72     \*JED: ☺& &=laughing  
73     \*BAR: mama mama mama  
74     %pho: mama [x 3]  
75     %mor: N:NOM:SING|mam-a  
76     %eng: mom [x 3]  
77     \*BAR: ☺.&=>laughing↑  
78     \*JED: uwaga  
79     %pho: uvaga  
80     %mor: N:NOM:SING|uwag-a  
81     %eng: attention (watch out)  
82     \*BAR: uwāga  
83     %pho: uvaga  
84     %mor: N:NOM:SING|uwag-a  
85     %eng: attention (watch out)  
86     \*BAR: uwāga uwāga bo jedzie rolwāga [\* n]  
87     %pho: uvaga uvaga bo jedżę rolvaga  
88     %mor: N:NOM:SING|uwag-a [x 2] CONJ|bo VERB: 3SING|jedzie  
      N:NOM:SING|rolwag-a  
89     %com: wordplay and ryhming  
90     %eng: watch out watch out because the [neologism] is coming  
91     \*BAR: lee ju↑hu☺  
92     %pho: we juxu  
93     %com: interjections and laughing  
94     \*JED: hmm☺  
95     %pho: xm  
96     %com: breathy voice  
97     \*BAR: &=>lauhgting  
98     \*BAR: hop siup  
99     %pho: xop ęup  
100    %com: rythmed wordplay
-

- 101 \*BAR: tely [\* p] pienć [\* p]  
102 %err: cz/t r/l e/ę [cztery pięć]  
103 %pho: tely p<sup>je</sup>ńtē  
104 %mor: NUM|czter-y NUM|pięć  
105 %eng: four five  
106 \*BAR: szēś [\* p] siēdem ūsiem  
107 %err: metathesis ś/śc  
108 %pho: śeś eedem oœem  
109 %mor: NUM|sześć NUM|siedem NUM|osiem  
110 %eng: six seven eight  
111 \*BAR: pien [\*] dziesięć  
112 %com: unclassified error utterance close to cardinal numerical '5' without  
113 afticative consonant  
114 %pho: p<sup>ien</sup> dżeeɛtē  
115 %mor: @x NUM|dziesi-ęć  
116 %eng: @x ten  
117 \*JED: &=coughs  
118 \*JED: &=lauhgting  
119 \*MAM: mhm  
120 \*BAR: proszę nagrānie  
121 %pho: proœ̃ nagraje  
122 %mor: IMP|prosz-ę N:ACC:SING|nagrani-e  
123 %eng: give me the recording  
124 \*BAR: proszę↑  
125 %pho: proœ̃  
126 %mor: IMP|prosz-ę  
127 %eng: please  
128 \*JED: &=laughing  
129 \*BAR: ee  
130 %com: &=inhaling  
131 \*JED: przeprāszam  
132 %pho: p<sup>še</sup>prāʂam  
133 %mor: V:1:SING|przeprasza-m  
134 %eng: I am sorry  
135 \*BAR: przēcież jā się
-

- 136 %pho: p̄set̄ęs ja ę̄s  
 137 %mor: CONJ|przecież PRO|ja PRO:REFL|się  
 138 %eng: but I  
 139 \*JED: &=caught  
 140 \*BAR: poślizgnąłem tato  
 141 %pho: poślizgnąłem tato  
 142 %mor: V:PAST:1:SING|po-ślizgną-łem N:VOC:SING|tat-o  
 143 %eng: I have slipped myself dad  
 144 \*BAR: tato poślizgnąłem się tato  
 145 %pho: tato poślizgnąłem ę̄s tato  
 146 %mor: N:VOC:SING|tat-o V:PAST:1:SING|po-ślizgną-łem  
 PRO:REFL|się  
 147 N:VOC:SING|tat-o  
 148 %eng: dad I slipped myself dad  
 149 \*BAR: poślizgnąłem się  
 150 %pho: poślizgnąłem ę̄s  
 151 %mor: V:PAST:1:SING|po-ślizgną-łem PART:REFL|się  
 152 %eng: I slipped myself  
 153 \*BAR: to się poślizgnąłem  
 154 %pho: to ę̄s poślizgnąłem  
 155 %mor: PRO|to PART:REFL|się V:PAST:1:SING|po-ślizgną-łem  
 156 %eng: this I slipped myself  
 157 \*WUJ: no to się nīe ślizgaj  
 158 %add: Uncle - adult to Bartus - direct\_child  
 159 %pho: no to ę̄s nie ślizgaj  
 160 %mor: CONJ|no PRO|to PART:REFL|się V:AUX:NEG|nie  
 V:IMP:2:SING|ślizgaj  
 161 %eng: so do not slip  
 162 \*JED: cicho  
 163 %pho: t̄ęxo  
 164 %mor: V:IMP|cicho  
 165 %eng: [be] quiet  
 166 \*BAR: niē↑ nie mam p̄icho [\* p:m]  
 167 %err: metathesis p/t̄ē  
 168 %com: picho/cicho initial segment changed

- 169 %pho: *je↑ je mam p̄xo*  
170 %mor: AUX:NEG|nie AUX:NEG|nie AUX|mam @x  
171 \*JED: &=breathing  
172 \*BAR: *tyl- [\* 0] tak↑ głośno*  
173 %err: syllable omission -ko  
174 %pho: *til tak gwoēno*  
175 %mor: @x PRO|tak ADV|głośno  
176 %eng: but that loudly  
177 \*BAR: &=hisses  
178 \*BAR: &=laughing  
179 \*BAR: *ja piērsy [\* p] ja'H↑ piersy [\* p]*  
180 %err: omission\_w metathesis\_s/§ [x 2]  
181 %pho: *ja p̄ersi ja p̄iersi*  
182 %mor: PRO:1:SING|ja NUM:ORD:1:SING:MASC|pierwsz-y [x 2]  
183 %eng: me first [x 2]  
184 \*JED: @xxx whisper  
185 \*BAR: *uwāga uwāga↑*  
186 %pho: *uvaga uvaga*  
187 %mor: N:NOM:SING|uwag-a [x 2]  
188 %eng: attention (watch out)  
189 \*BAR: @xxx &=squeals  
190 \*JED: &=caught  
191 \*BAR: @xxx tie [\* p: m] kōcham  
192 %err: methatesis t̄/t̄ē  
193 %com: target\_strasznie  
194 %pho: *tē koxam*  
195 %mor: PRO:REFL:2:SING|cię V:PRES:1:SING|kocha-m  
196 %eng: I love you  
197 \*JED: &=giggling  
198 \*BAR: us [\* n: uk]  
199 %com: neologism  
200 \*BAR: @xxx  
201 %com: sounds like English  
202 \*BAR: &=screaming  
203 \*BAR: @xxx ↑ tu na chwīlę

- 204 %pho: tu na xfilɛ  
205 %mor: DET|tu PART|na chwilę  
206 %eng: here for a moment  
207 \*JED: o niē  
208 %pho: o ne  
209 %mor: PART|o nie  
210 %eng: oh no  
211 \*MAM: ja nie mogę  
212 %pho: ja ne mogɛ  
213 %mor: PRO:1:SING|ja NEG|nie V:PRES:1:SING|mog-ę  
214 %eng: I cannot  
215 \*BAR: &=shouting  
216 \*JED: &=giggling  
217 \*BAR: zobacz  
218 %pho: zobać  
219 %mor: V:IMP:2:SING|zobacz  
220 %eng: look  
221 \*BAR: @xxx  
222 %com: unclear  
223 \*MAM: przestań skakać  
224 %pho: p̄zestaj̄ skakat̄  
225 %mor: V:IMP:2:SING|przestań V:INF|skaka-ć  
226 %eng: stop jumping  
227 \*BAR: trz̄ymaj kierōwi [\* m] bō się nie poprāwi  
228 %com: singing  
229 %err: omission  
230 %pho: t̄simaj k̄erovi bo eẽ ne popravi  
231 %mor: V:IMP:1:SING|trzyma-j target\_N:ACC:SING|kierow- CONJ|bo  
232 PART:REFL|się NEG|nie V:FUT:3:SING|popraw-i  
233 %eng: hold the target\_wheel\* because it will not get better  
234 \*BAR: &=screaming  
235 \*JED: &=laughing  
236 \*BAR: ja miāłem zdjēcie na mōje przygōdy  
237 %pho: ja miawem sdjētce na moje p̄sigodi
-

- 238    %mor: PRO:PER:1:SING|ja V:PAST:1:SING|miał-em  
      N:ACC:SING|zdjęci-e PART|na
- 239    PRO:POS:1:SING|moje N:NOM:SING|przygod-y
- 240    %eng: I had a photo on my adventures
- 241    \*MAM: Jēzu niē skacz
- 242    %pho: Jezu ne skatš
- 243    %mor: N:VOC:Jeu PART:NEG|nie V:IMP:1:SING|skacz
- 244    %eng: Jesus do not jump
- 245    \*BAR: @xxx zdjęcie do naszego
- 246    %pho: zdjētē do našego
- 247    %mor: N:NOM:SING|zdjęci-e PREP|do  
      PRO:POS:GEN:SING:2:PLUR|nasz-ego
- 248    %eng: photo to our
- 249    \*BAR: pilnika pięknego
- 250    %pho: pilnka pięknego
- 251    %mor: N:GEN:SING|pilnik-a ADJ:GEN:SING|piękn-ego
- 252    \*BAR: koniec
- 253    %pho: koniec
- 254    %mor: N:NOM:SING|konie-c
- 255    %eng: the end
- 256    \*MAM: przestań skakać
- 257    %pho: pzęstaj skakatę
- 258    %mor: V:IMP:2:SING|przestań V:INF|skaka-ć
- 259    %eng: stop jumping
- 260    \*MAM: rozumiesz co do ciębie mówię
- 261    %pho: rozumieś co do těbě muvie
- 262    %mor: V:PRES:2:SING|rozumie-sz PART|co do  
      PRO:PER:REF:1:SING|ciebie
- 263    V:PRES:1:SING|mówi-ę
- 264    %eng: do you understand what I am talking to you
- 265    \*MAM: niē skacz
- 266    %pho: ne skatš
- 267    %mor: PART:NEG|nie V:IMP:1:SING|skacz
- 268    %eng: do not jump
- 269    \*MAM: niē skacz bo mniē do szālu doprowādzisz zāraz

- 270 %pho: jie skatş bo mien do şawu doprowadzisş zaraz  
271 %mor: PART:NEG|nie V:IMP:2:SING|skacz CONJ|bo  
PRO:PER:REF:1:SING|mnie  
272 PART|do N:GEN:SING|szał-u V:2:SING|do-prowadzi-sz ADV|zaraz  
273 %eng: do not jump it drives me crazy  
274 \*BAR: &=screaming  
275 \*BAR: māma  
276 %pho: mama  
277 %mor: N:NOM:SING|mam-a  
278 %eng: mom  
279 \*BAR: @xxx bądż cicho bo  
280 %pho: bɔdz texo bo  
281 %mor: V:IMP:2:SING|bądż ADV|cicho CONJ|bo  
282 %eng: be quiet because  
283 \*BAR: bo Jędruś nagrąwa filmiki  
284 %pho: bo Jędruę nagrıva filmiki  
285 %mor: CONJ|bo N:NOM:SING:DEM|Jędrus V:PRES:3:SING|nagrywa  
286 N:ACC:PLUR:DEM|filmik-i  
287 %eng: be quiet because Jedrus is recording films  
288 \*BAR: &=shouting  
289 \*MAM: @xxx  
290 \*BAR: &=singing  
291 \*BAR: &=singing ↑  
292 \*JED: māma  
293 %com: whispering  
294 %pho: mama  
295 %mor: N:NOM:SING|mam-a  
296 %eng: mom  
297 \*BAR: &=singing  
298 \*JED: māma  
299 %com: whispering  
300 %pho: mama  
301 %mor: N:NOM:SING|mam-a  
302 %eng: mom  
303 \*BAR: mani [\* n]
-

- 304 %com: neologism  
305 %pho: ma;ji  
306 \*BAR: &=shouting  
307 \*BAR: a:oa [\* n]  
308 %pho: āaoa  
309 \*BAR: chŷba @xxx  
310 %pho: xiba  
311 %mor: PART|chyba  
312 %eng: perhaps  
313 \*BAR: &=shouting  
314 \*BAR: &=singing  
315 \*MAM: niē skacz  
316 %pho: jie skatš  
317 %mor: PART:NEG|nie V:IMP:1:SING|skacz  
318 %eng: do not jump  
319 \*BAR: &=singing  
320 \*BAR: dlaczego nie ma głośni [\* 0]  
321 %com: omission\_głośni-0  
322 %pho: dlatšego jie ma gwoenj  
323 %mor: AUX:WH|dlaczego PART:NEG|nie V:3:SING|ma target\_N:GEN  
324 %eng: why there is no [\* 0]  
325 \*BAR: dlaczego niē ma głosnych [\* p]  
326 %err: s/ś  
327 %pho: dlatšego jie ma gwosnix  
328 %mor: AUX:WH|dlaczego PART:NEG|nie V:3:SING|ma  
ADJ:GEN:PLUR|głošny-ch  
329 %eng: why there is no loud  
330 \*MAM: bo mówisz  
331 %pho: bo muviš  
332 %mor: CONJ|bo V:PRES:2:SING|mówi-sz  
333 %eng: because you are speaking  
334 \*BAR: nie mówię  
335 %pho: jie muvie  
336 %mor: PART:NEG|nie V:PRES:1:SING|mówi-ę  
337 %eng: I am not speaking
-

- 338 \*BAR: ja przēcież niē mówiłem  
339 %pho: ja p̄seteęs j̄ie muviwem  
340 %mor: PRO:PER:1:SING|ja PART|przecież PART:NEG|nie  
V:PAST:1:SING|mówił-em  
341 %eng: but I was not speaking  
342 \*JED: &=giggling  
343 \*BAR: māma @xxx głōs  
344 %pho: mama gwos  
345 %mor: N:NOM:SING|mam-a N:NOM:SING|głos  
346 %eng: mom sound  
347 \*JED: &=whispering @xxx  
348 \*BAR: tu j̄est szlaban niē možna przejēchać  
349 %pho: tu jes słaban j̄ie možna p̄sejexatē  
350 %mor: PRO|tu V:3:SING|jest N:NOM:SING|szlaban PART:NEG|nie  
V:INF|možna  
351 V:INF|prze-jech-ać  
352 %eng: here is the bar cannot go  
353 \*BAR: cō mam zrōbić  
354 %pho: co mam zrobite  
355 %mor: AUX:WH|co V:PRES:1:SING|mam V:INF|zrobi-ć  
356 %eng: what should I do  
357 \*BAR: uwaga intaka [\* n]  
358 %com: ryhming  
359 %pho: uvaga intaka  
360 %mor: N:NOM:SING|uwag-a  
361 %eng: watch out  
362 \*BAR: &=yells  
363 \*BAR: o niē chȳba  
364 %pho: o j̄ie x̄iba  
365 %mor: PART:NEG|o nie PART|chyba  
366 %eng: oh no perhaps  
367 \*BAR: krēlka nie ma taka para [\* n]  
368 %com: neologisms, unclear  
369 %pho: krēka j̄ie ma taka para  
370 \*BAR: mi (...) mi mi mi mi

- 371 %com: vocalizes: mi [x 5]
- 372 \*BAR: mi mim mi mim mi mim
- 373 %com: pitch shifting; rise-fall-rise
- 374 \*BAR: tā:k
- 375 %pho: tak
- 376 %mor: AUX:AFF|tak
- 377 %eng: yes
- 378 \*BAR: &=mumbles
- 379 \*BAR: oō ja upādłem na podłōgę
- 380 %pho: o:o ja upadwem na podwoge
- 381 %mor: INT|oo PRO:PER:1:SING|ja V:PAST:1:SING|upadł-em ADV|na
- 382 N:ACC:SING|podłog-ę
- 383 %eng: oh I fell on the floor
- 384 \*BAR: ale zimno mi
- 385 %pho: ale zimno mi
- 386 %mor: CONJ|ale ADV|zimno PRO:PER:REF|mi
- 387 %eng: but I am cold
- 388 \*BAR: tāk to mi jēst zimno
- 389 %pho: tak to mi jes zimno
- 390 %mor: AUX:AFF|tak PRO:DEM|to PRO:PER:REF|mi
- V:PRES:3:SING|jest ADV|zimno
- 391 %eng: this way I am cold
- 392 \*BAR: chōdź na chwīlę
- 393 %pho: xotę na xfile
- 394 %mor: V:IMP:2:SING|chodź PART|na ADJ|chwilę
- 395 %eng: come here for a moment
- 396 \*JED: &=whispering @xxx
- 397 \*BAR: &=singing
- 398 \*BAR: &=yells
- 399 \*BAR: hii jūhu
- 400 %com: wordplay
- 401 \*BAR: dlaczego dzīś nie ma głōsu
- 402 %pho: dlatšego dze nje ma gwosu
- 403 %mor: AUX:WH|dlaczego ADV|dzīś AUX:NEG|nie V:PRES:3:SING|ma
- 404 N:GEN:SING|głos-u

- 405    %eng: why today there is no sound  
406    \*BAR: &=screaming  
407    \*BAR: ja właśnie skaczę  
408    %pho: ja vwaɛɲe skatʂɛ  
409    %mor: PRO:PER:1:SING|ja PART|właśnie V:PRES:1:SING|skacz-ę  
410    %eng: I am just jumping  
411    @End

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## Sinkroniziran i nesinkroniziran izgovor poljskih nazala *q* i *ɛ* u govoru djece i odraslih

### Sažetak

Nazali *q* i *ɛ* u poljskom jeziku artikuliraju se na dva načina – sinkronijski i asinkronijski, a nazalnost je jedno od dvanaest distiktivnih obilježja poljskih fonema. Smatra se da način artikulacije nazaliziranih segmenata uglavnom ovisi o njihovu okruženju. U ovome je članku pažnja usmjerena na usvajanje jezika te je pretpostavljeno da se način artikulacije *q* i *ɛ* značajnije razlikuje kod djece i odraslih govornika.

Spontani govor dvoje djece snimljen je i transkribiran uz pomoć programa CLAN. U radu su primjenjena vlastita pravila transkripcije u koju su uključeni podaci o fonetskoj realizaciji u standardu IPA s primarnim i sekundarnim naglaskom, morfosintaktičkom strukturom rečenice, posebnim komentarima o koartikulaciji ili pogreškama te niz paralingvističkih podataka o izgovoru. Krajnji redovi namijenjeni su engleskom prijevodu. Govor odraslih govornika poljskog jezika preuzet je iz korpusa SpokesWeb CLARIN.

Polazi se od pretpostavke da je asinkronična artikulacija nazala tipična za *q* i *ɛ*, koji se nalaze ispred afrikativnih suglasnika, ali da je sinkronički način artikulacije ispred frikativa, jer su izmjereni segmenti nazalizirani u sredini slogovne jezgre konsonant-vokal-konsonant (CVC). Dodatno su istraženi nazali u krajnjem položaju konsonant-vokal (CV). Sinkronizacija segmenata bila je označena ako su se na spektru pojavile barem dvije od pet navedenih karakteristika: (1) dodatni formant (oko 300 Hz) s relativno visokom amplitudom – ponekad redukcijom F1, sažimanje prvog maksimuma s takozvanim nazalnim formantom; (2) povećane vrijednosti F1 i F3; (3) veći F4 u odnosu na nenazalni segment; (4) veće vrijednosti F3 te (5) prisutan dodatni maksimum u okviru 0,7 kHz, 1,0–1,2 kHz, 1,8–2,25 kHz i 2,7–2,9 kHz. Na osnovu tih kriterija napravljena je skala nazalnosti.

Spektrogramska analiza materijala pokazala je sličnosti u nazalima u govoru djece i odraslih, kao što su F2 i F3 u dometu 2 300 i 2 600 Hz, iako neka obilježja nazalnosti nisu bila zabilježena niti u jednom dječjem izgovoru grupe CVC /vɛz/. Najveći stupanj nazalnosti dječjeg izgovora bio je zabilježen u grupama CVC /jɛd/ i /vɔs/. Detaljni prikaz nazalnosti u okviru 24 konsonantske skupine s nosnim segmentom sadrži Tablica 1. U budućim

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istraživanjima pojavnosti nosne artikulacije poželjno je ponoviti postupak na većem broju ispitanika da bi se mogao donijeti zaključak o općenitim tendencijama nazalne artikulacije segmenata *q* i *ɛ*.

**Ključne riječi:** usvajanje jezika, akustička fonetika, nazali *q* i *ɛ*, poljski

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## **Ukrainian vowel phones in the IPA context**

### **Summary**

Acoustic and articulatory properties of Ukrainian vowels are investigated in this study and a full set of relevant IPA notations are proposed. The notations are shown in the vowel diagram and the table. The results of the earlier acoustic invariant speech analysis based on special software, auditory and spectrum analysis were used and the results are discussed in the context of general and Ukrainian phonetic laws governing language evolution and acoustic properties of non-stressed vowels in relation to their stressed cognates. Such combined approach resulted in a more detailed vowel inventory than proposed heretofore. The findings of this research contribute to better understanding of Ukrainian language and its special features in comparison with other world languages that may have substantial practical use in various phonetic and translation studies, as well as in modern linguistic technologies aimed at artificial intelligence development, machine translation incorporating text-to-speech conversion, automatic speech analysis, recognition and synthesis, and in other areas of applied linguistics.

**Key words:** Ukrainian vowel phones, International Phonetic Alphabet, vowel diagram, acoustic properties of vowels

## 1. INTRODUCTION

Rapid development of modern linguistic tools, offering unprecedented perspectives for modern linguistics (see Shyrokov, 2011, p. 3), imposes a need for more thorough and detailed investigation of the special features of the world languages. Recent advances in automatic speaking systems, translation and text-to-speech technologies (realized in such tools as Google Translate, Microsoft Cortana, Apple Siri, SAPI Phone Converter, etc.) are provided by elaboration of relevant phone sets and lexicons of the English, Spanish, Portuguese, Italian, Chinese, German, and other technologically supported languages. However, not many world languages take advantage of modern linguistic technologies to their full extent (Scannell, 2007, p. 1; Vakulenko, 2015, p. 9). Given this, the under-resourced languages such as Ukrainian need more detailed investigation, particularly in the field of speech processing that has experienced significant progress in the past decade (Besacier, Barnard, Karpov, & Schultz, 2014, p. 85). In addition, European perspectives of Ukraine result in intensification and diversification of its trade, political, economic, scientific and cultural relations with the world countries that give rise to further interest in its linguistic issues.

The first difficulty in incorporating Ukrainian into modern speaking tools is that the relevant phonetic studies are scarce and not widely known in the world. The lack of reliable and sufficient experimental data on the Ukrainian phones motivates researchers to draw analogies with the more explored world languages or to make conjectures that are not duly justified (see Bilodid, 1969; Buk, Maczutek, & Rovenchak, 2008; Pompino-Marschall, Steriopolo, & Žygis, 2017; Tocjka, 1981; Zhovtobrjukh & Kulyk, 1965). Correct comparison with other languages accounting for the special features of the Ukrainian phonetic system is necessary for phone mapping rules needed in various phonetic studies and for speech recognition purposes.

The most famous works in the Ukrainian phonetics are the *Contemporary standard Ukrainian. Phonetics* (Bilodid, 1969), and *Contemporary standard Ukrainian: Phonetics, orthoepics, graphemics, orthography* (Tocjka, 1981), both written in Ukrainian decades ago. It is noteworthy that the section 'Vowels' in Bilodid (1969) was written by Tocjka, who based her assumptions on her own observations and measurements, as well as on observations and conclusions of Broch (1910), Synjavskij (1929), Zilinskij (1932) whose work was also translated from

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Polish into English in 1979, and of Kalynovych (1947), Brovchenko (1954), Zhovtobrjukh and Kulyk (1965), and others. Previous studies were used with minor changes (and without up-to-date experimental evidence) in a number of the later Ukrainian textbooks.

Thus, the second problem is that the mentioned studies are grounded on outdated phonetic data collected with old-fashioned apparatus.

Third, the results on speech sound production in Bilodid (1969) and Tocjka (1981) are obviously based on the experimental data received from but one speaker that is far from being sufficient.

An attempt to describe the Ukrainian vowels in terms of the IPA notations was made by Bilous based on acoustic and auditory analysis of the speech of one female native Ukrainian speaker (see Dudnyk, 2004, pp. 20–23) that provides a somewhat different picture from that described in Bilodid (1969) and Tocjka (1981). Bilous assigns IPA symbols to vowels according to absolute values of their first and second formants. It is necessary to note that this approach has two intrinsic issues that should be accounted for to avoid possible errors, which was not demonstrated in her study.

First, it is a well-known fact that formant frequencies vary from speaker to speaker, being higher for children and women and also for raised pitch. So, reliable conclusions on average absolute formant values may be drawn only on the basis of statistically significant measurements or normalized (to the fundamental or any other formant) frequency quantities which were not done. Second, there are two different kinds of resonance in the human vocal tract: (1) a **tube resonance**, where the formant frequencies correlate with the tube length, or tongue position along the vocal tract, and (2) a **low-frequency Helmholtz resonance** appearing in a relatively large volume with a narrow constriction, where the formant frequencies depend on the cross-sectional area and the length of the constriction and a large tube volume (see details in Stevens, 1998, pp. 138–142). Most of the formants are caused by tube resonance and, therefore, well correlate with the back-front tongue position. However, the lowest formants in 'high' vowels, such as Ukrainian /i/, /u/, and /y/, arise due to the Helmholtz resonance and, therefore, are not inversely proportional to the tongue height (actually, in the Ukrainian [y], like in the English [u], two first formants are caused by the Helmholtz resonance). Accordingly, the vowel location on the Jones diagram determined by its articulation cannot be straightforwardly inferred from its formant frequencies: in high vowels like an /u/, the first formants

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are caused by the Helmholtz resonance, so there is no simple correlation between formant frequencies and the tongue position as for the low ones. Unfortunately, this fact was not duly commented and accounted for in Dudnyk (2004) throwing some doubt on reliability of relevant conclusions. As emphasized in Vakulenko (2000, 2007, 2010, 2011a, 2011b, 2015), the only acoustic invariant characteristic of a speech sound is its formant ratio, i.e. relation between permanent formant frequencies. So, when relating phone articulation with its acoustic characteristics, it is necessary to carry out the relevant **normalization** of the latter ones.

Buk et al. (2008) try to describe Ukrainian phones in terms of IPA notations based on their own interpretation of the conventional literature on Ukrainian phonetics. The authors do not present their original experimental phonetic data, though a significant number of conjectures and declarations in this work (some of them being fairly novel for the Ukrainian phonetics) are not duly grounded on relevant linguistic facts and necessary references. The issues will be discussed in more detail when relevant.

A draft investigation of the Ukrainian phone system following IPA conventions was proposed in Steriopolo (2012) saying that additional research is needed.

The recent article 'Ukrainian' (Pompino-Marschall et al., 2017) presents alternative results on phonetic properties of Ukrainian speech sounds grounded on recordings of one male talker from Bukovyna (South-Western Ukraine). In particular, a somewhat retracted articulation of a /u/ has been reported. However, in order to represent IPA notations, observation of articulation movements of a speaker are needed, but also their instrumental recording as well as examination and comparison with the data obtained in other phonetic experiments. Besides, there is no explanation why the authors follow the theoretical classification of Buk et al. (2008) which has no references to experimental studies. There is no information on how the articulation data were obtained (automatic processing, filming, palpation, etc.). The formant frequencies were not normalized throwing certain doubt on the description of low vowels /a/ and /e/.

Finally, in order to determine the most relevant International Phonetic Alphabet (IPA) symbol for the given Ukrainian sound is not straightforward and easy since it requires collecting representative experimental data, profound comparative analysis of the multi-lingual phonetic material, and good command of

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the IPA notations. In particular, unreasonably large distance between the stressed and unstressed [и] and [у] (apparently due to inaccurate interpretation of these vowels) in the results of Bilous (Dudnyk, 2004, pp. 20–22) contradicts the general tendency of Ukrainian vocalism to preserve a vowel property in a non-stressed position (see Tocjka, 1981, p. 101).

The invariant acoustic approach to analysis of the Ukrainian vowels (pronounced by six native Ukrainian talkers) was carried out by Vakulenko (2000, 2007, 2010, 2011a, 2011b, 2015) where their absolute and invariant (robust) acoustic characteristics were found. It was demonstrated that the only acoustic invariant characteristic of a speech sound is its formant ratio, i.e. relation between permanent formant frequencies. These results add important information to the description of the Ukrainian speech sounds that should be accounted for in creating an inventory of Ukrainian sounds.

The situation with the Ukrainian phonetics is rather special. On one hand, there is an urgent need to know phonetic characteristics of Ukrainian speech sounds in due detail relevant for modern speech processing tools. On the other, there is no reliable experimental evidence on Ukrainian phones, given that such a task requires not only sufficient time, but also corresponding equipment and a specially trained team. The first urgent task is to propose the most likely candidates for every phone in question that would be involved in neural speech processing tools and are to be automatically adjusted and updated.

So, this article is aimed to analyze phonetic features of the Ukrainian vowels in the IPA notations context, and to present a Ukrainian phone system.

## **2. RESEARCH METHODS AND MATERIAL**

The choice of research methods and approaches is determined by the fact that there is no governmental maintenance of the phonetic field in Ukraine. For example, the experimental phonetic laboratory at the Kyiv National University after Taras Shevchenko is the last working laboratory of this kind in the capital of Ukraine. The available experimental equipment for the articulation study is totally outdated there and does not meet the requirements of modern research. Therefore, this laboratory is focused only on the tasks associated with the teaching process.

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At the same time, recent rapid advance in linguistic tools (see above) requires detailed and immediate knowledge on Ukrainian phones.

This research is based on the combined use of auditory comparative analysis, auditory observation, acoustic invariant speech sound analysis (presented earlier in Vakulenko, 2007, 2015, pp. 162–179 and new one).

The auditory comparative analysis was done by auditory comparison of the CD-quality recorded speech of four native Ukrainian professional actors trained according to the orthoepic norms described in Bilodid (1969), with reference IPA sounds on the page of the Experimental Phonetic Laboratory 'Arturo Genre' (Laboratorio di Fonetica Sperimentale). One of the speakers represented the southwestern dialect group, and three represented the southeastern dialect group which forms the basis of the contemporary standard Ukrainian. Thus, we provided not only the data on the standard Ukrainian, but on its dialectal variations also not included in research for decades (the more detailed comparison with the previous studies will be presented in the Discussion section).

This analysis was applied to the back phonemes /a/, /o/ and /y/ that have clear sound in Ukrainian but may cause difficulties in their classification. Front phonemes that also cause classification problems but are often realized in an unclear or mixed sound were excluded.

The utterances with non-high vowels in the next syllable were chosen thus excluding vowels harmony effects. The central parts of the analyzed vowels (5–10 cycles of the fundamental frequency, depending on the sound quality) were selected and played back in a soundproof room. The total numbers of acoustic realizations of the Ukrainian phonemes /a/, /o/ and /y/ were 40, 60 and 40, respectively. The number of listeners was 5 (three male and two female native speakers of Ukrainian). They were asked to compare the analyzed sound with the reference IPA sounds of [ɑ], [ɛ] and [a] (possible realizations of an /a/), [ɔ] and [ɔ̃] (possible allophones of an /o/) and [u] and [ʊ] (possible allophones of an /y/), respectively, as pronounced in 'Arturo Genre', and indicate notations corresponding to the most similar sounds. The results are summarized in Table 1, Table 2 and Table 3, where the vowels were separated according to their accent distribution (stressed and non-stressed) and to the presence or absence of palatalizing effect from preceding consonants. The numbers of assessments were averaged for each case and rounded to integer values.

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**Table 1.** Perception of the Ukrainian vowel /a/  
**Tablica 1.** Percepcija ukrajinskog vokala /a/

Listener and classification / Red. br. slušača i klasifikacija	In initial position, after plain consonants (excluding [j]) and vowels, stressed/non-stressed / U inicijalnoj poziciji iza konsonanata (osim [j]) i vokala, naglašeno/nenaglašeno	After [j] and palatalized consonants, stressed/non-stressed / Iza [j] i palataliziranih konsonanata, naglašeno/nenaglašeno
L1: [ɑ]	14/3	1/2
L1: [ɛ]	5/16	19/16
L1: [a]	1/1	0/2
L2: [ɑ]	17/2	3/5
L2: [ɛ]	3/17	17/14
L2: [a]	0/1	0/1
L3: [ɑ]	13/3	2/2
L3: [ɛ]	7/16	15/16
L3: [a]	0/1	3/2
L4: [ɑ]	15/3	0/1
L4: [ɛ]	5/16	20/18
L4: [a]	0/1	0/1
L5: [ɑ]	12/2	1/2
L5: [ɛ]	6/17	18/15
L5: [a]	2/1	1/3
Average / Prosjek: [ɑ]	14/3	1/2
Average / Prosjek: [ɛ]	5/16	18/16
Average / Prosjek: [a]	1/1	1/2

**Table 2.** Perception of the Ukrainian vowel /o/  
**Tablica 2.** Percepcija ukrajinskog vokala /o/

Listener and classification / Red. br. slušača i klasifikacija	In initial position, after plain consonants (excluding [j]) and vowels, stressed/non-stressed / U inicijalnoj poziciji iza konsonanata (osim [j]) i vokala, naglašeno/nenaglašeno	After [j] and palatalized consonants, stressed/non-stressed / Iza [j] i palataliziranih konsonanata, naglašeno/nenaglašeno
L1: [o]	20/19	5/4
L1: [ɔ]	4/2	4/2
L2: [o]	21/19	4/3
L2: [ɔ]	3/2	5/3
L3: [o]	22/20	7/5
L3: [ɔ]	2/1	2/1
L4: [o]	20/17	6/4
L4: [ɔ]	4/4	3/2
L5: [o]	20/18	5/3
L5: [ɔ]	4/3	4/3
Average / Prosjek: [o]	21/19	5/4
Average / Prosjek: [ɔ]	3/2	4/2

The auditory assessment was used to study the perceptual character of spontaneous Ukrainian speech heard in Kyiv in 1991–2017.

To adjust acoustic proximity of Ukrainian vowels, we used the results of our phonetic experiments presented in Vakulenko (2000, 2007, 2010, 2011a, 2011b, 2015), where six native Ukrainian and ten native American English talkers in total were involved to produce Ukrainian and American English speech sounds, respectively. They pronounced (in triple repetition) separate sounds, words and given word combinations in a normal tone of voice, in a whisper and in changing tone (rising and falling). Five Ukrainian informants spoke standard Ukrainian based on the southeastern dialect group, and one spoke southwestern. Thus, the obtained invariant (independent of the talker identity and the speech mode) speech sound characteristics, in comparison to those of normal spontaneous speech only, have a higher robustness

degree that is important for various automatic linguistic tools dealing with speech analysis, recognition and synthesis.

**Table 3.** Perception of the Ukrainian vowel /y/  
**Tablica 3.** Percepcija ukrajinskog vokala /y/

Listener and classification / Red. br. slušača i klasifikacija	In initial position, after plain consonants (excluding [j]) and vowels, stressed/non-stressed / U inicijalnoj poziciji iza konsonanata (osim [j]) i vokala, naglašeno/nenaglašeno	After [j] and palatalized consonants, stressed/non-stressed / Iza [j] i palataliziranih konsonanata, naglašeno/nenaglašeno
L1: [u]	18/3	2/2
L1: [o]	2/17	18/18
L2: [u]	16/5	3/2
L2: [o]	4/15	17/18
L3: [u]	19/3	2/2
L3: [o]	1/17	18/18
L4: [u]	17/2	3/3
L4: [o]	3/18	17/17
L5: [u]	18/4	3/4
L5: [o]	2/16	17/16
Average / Prosjek: [u]	18/3	3/3
Average / Prosjek: [o]	2/17	17/17

Also, an additional spectral analysis was carried out. Within this thread of research, the CD-quality recorded speech of a native Ukrainian professional actor (born in Dnipro, Central Ukraine) trained according to the orthoepic norms described in Bilodid (1969), was also used to examine acoustic realizations of the Ukrainian phoneme /e/.

The used software for the acoustic analysis was Sound Forge 4.0, WaveLab 2.1, and CoolEdit 95. The sound segmentation was performed by selecting specific patterns in oscillograms, with audio control. The selection on the oscillogram with relevant visual outline and sound was used for the frequency analysis giving rise to corresponding spectrograms (two- or three-dimensional).

We did not use the popular program Praat as its formant recognition accuracy does not meet our requirements. Particularly, it was experimentally shown that this software failed to correctly determine the test monochromatic signals. The signal of 100 Hz was interpreted as a sound with a fundamental frequency of 111 Hz and two formants of 2588–2793 Hz and 3933–4002 Hz, the signal of 1000 Hz was interpreted as a sound with a 'double' fundamental frequency of 978 and 1022 Hz and two formants of 1084–1122 Hz and 3490–3754 Hz, and the signal of 5000 Hz was interpreted as a sound with a fundamental frequency of 1068–1081 Hz and three formants of 2344–2352 Hz, 4959 Hz and 4997 Hz (see further details in Vakulenko, 2011, pp. 171–172, 2015, pp. 166–167).

To illustrate our findings, the three-dimentional (waterfall) spectrograms obtained from fast Fourier transform were used. They are highly informative and have a number of advantages. First of all, they include three parameters (time, frequency, amplitude) instead of two parameters in the usual two-dimensional spectrograms (amplitude vs frequency). This makes such spectrograms preferable for tracking temporal changes in spectral composition (for example, formant shifts) or selecting time intervals with quasi-stationary acoustic characteristics, and for general estimations and comparisons. In this sense, just a single waterfall spectrogram may substitute a number of two-dimensional spectrograms covering relatively small time span, usually 10 ms (cf. Stevens, 1998, p. 298, p. 408).

There is also a purely mathematical reason to use a single waterfall spectrogram covering relatively large time period. The spectrograms of the waveform  $f(t)$  are built on the basis of its temporal Fourier transform (see van Belle, 2014):

$$\hat{f}(\omega) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{+\infty} f(t) e^{-i\omega t} dt,$$

where  $\omega$  is the cycle frequency, and the integration over time is taken from minus infinity to plus infinity. Given that infinite boundaries are always an idealization, each spectrogram is just an approximation to the exact function image in the frequency space. If the analyzed time interval  $t$  is much larger than the oscillation period  $T$ ,  $t/T \gg 1$ , the spectrogram inaccuracy is small. The shorter is the time span, the larger are the boundary effects (where the transformed function abruptly jumps to zero) that may significantly distort real acoustic data.

A certain drawback of approximate visual frequencies measurements in three-dimentional spectrograms is compensated by strict arithmetic calculations of these

within relevant periods in the oscillograms. So, the formant frequencies were estimated visually through the waterfall spectrograms by projecting on the frequency axis the point of maximum amplitude of the given harmonic at the certain time moment corresponding to the analyzed phone, and then calculated exactly from the oscillogram as inverse periods of corresponding modes.

The compliance of the obtained results with the general and Ukrainian phonetic laws and acoustic properties of unaccented vowels in relation to their accented cognates (Bilodid, 1969, p. 63, pp. 116–118, pp. 378–381; Stevens, 1998, pp. 294–299; Tocjka, 1981, pp. 100–101; Zhovtobrjukh & Kulyk, 1965, pp. 118–119) was checked.

### 3. UKRAINIAN VOWEL SYSTEM

A stressed Ukrainian vowel /a/ is traditionally described as a low back vowel (Bilodid, 1969, p. 59; Tocjka, 1981, p. 51) or a low back vowel approaching a central one (Zhovtobrjukh & Kulyk, 1965, p. 118), whereas Bilous, as well as Press and Pugh refer it to the central category (Dudnyk, 2004, pp. 20–22; Press & Pugh, 2015, p. 22). Our measurements indicate that this sound has the second permanent formant Fp2 in the range of 1000–1200 Hz, thus being a low back advanced vowel [ɑ̄] with a formant ratio  $r = \text{Fp2/Fp1} = 4/3$  (Vakulenko, 2000, 2007, p. 84, 2010, p. 28, 2011a, p. 173, 2011b, p. 439, 2015, p. 167; cf. Stevens, 1998, p. 286). This conclusion is confirmed also by our auditory comparative analysis (see Table 1), where the majority of utterances (14 of 20) were recognized as [ɑ̄].

Its unstressed counterpart is characterized as a probably mid central vowel (Bilodid, 1969, p. 113) or a midlow central vowel (Dudnyk, 2004, pp. 20–22; Tocjka, 1981, p. 101). Our auditory comparative analysis (see Table 1) confirms that this is a midlow central vowel [ə] (16 of 20 utterances). This phone appears also in the letter <я> readout: after [j] in an iotated vowel [jə] and after palatalized consonants (cf. Bilodid, 1969, p. 125). A similar sound is heard in the second syllable of the German *besser*.

The Ukrainian non-stressed vowels have a vowels harmony feature, or, in other words, a property of harmonic, or distant, or vocal assimilation. This is a special type of regressive assimilation of vowels in adjacent syllables when a previous vowel more or less assimilates to the following one (Tocjka, 1981, p. 104). Thus, the quality of an /a/ may be modified even further to [āe]([ʒ<sup>+</sup>]) before front vowels as in я́це 'egg',

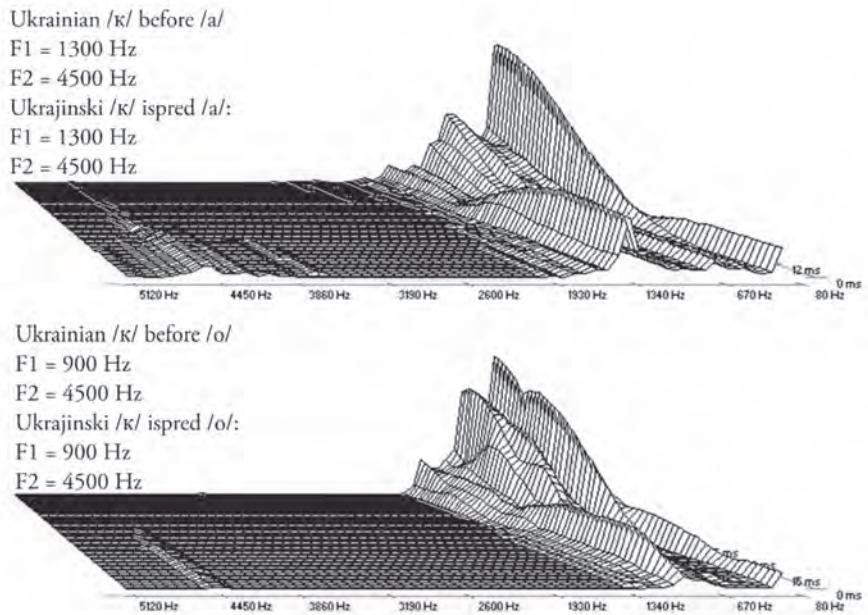
якій 'what' (cf. Bilodid, 1969, p. 124; Broch, 1910, p. 115; Pompino-Marschall et al., 2017, p. 7).

A stressed Ukrainian vowel /o/ is characterized as a midback labialized vowel, more closed than the /a/ (Bilodid, 1969, p. 59; Tocjka, 1981, pp. 53–54). It is difficult to place in the classification diagram. Tocjka places this sound nearer to /a/ on the articulation chart and closer to /y/ on the acoustically determined diagram (Tocjka, 1981, pp. 59–60). Press and Pugh propose the symbol [ɔ] stating (without any experimental evidence) that its approximate pronunciation is 'as in English *got*, not as in English *more*' (Press & Pugh, 2015, p. 19), thus unreasonably referring this sound to low back vowels (British English [ɒ] or American English [ɑ]). At the same time, it is admitted that 'unstressed [ɔ] before stressed [u] (and at times even [i]) may narrow to [u] or [ɔw] or, perhaps better, to [o]' (Press & Pugh, 2015, p. 22). Such drastic change of an unstressed vowel articulation from low ([ɒ]/[ɑ]) to high ([u]) is very questionable for the Ukrainian vocalism where stressed and unstressed vowels do not differ sharply (see Tocjka, 1981, p. 101). In turn, Bilous treats this vowel as a midheight back one with an IPA notation /o/.

The location of a Ukrainian /o/ on the vowel chart may be roughly estimated by comparison of its acoustic characteristics with those of the reference central sound [ə]. If the length of the model uniform vocal tract with rigid walls and a uniform cross-sectional area is 15.4–17.7 cm, the formant frequencies lie in the range F1 = 500–600 Hz, F2 = 1500–1800 Hz (see Stevens, 1998, pp. 285–286). With F1 = 530–540 Hz (see Vakulenko, 2000, p. 63, 2007, p. 84, 2010, 2011a, p. 173, 2011b, p. 439, 2015, p. 167), a stressed Ukrainian /o/ is expected to reside near the central line, probably a little higher.

Another argument to support this location comes from regressive assimilation of an unstressed [u] before the syllable with an [e] or [a] that in this case approximates an [e] more strongly (Zhovtobrjukh & Kulyk, 1965, p. 118). As a vowel [o] does not display such influence, it is most likely higher than a midlow [e].

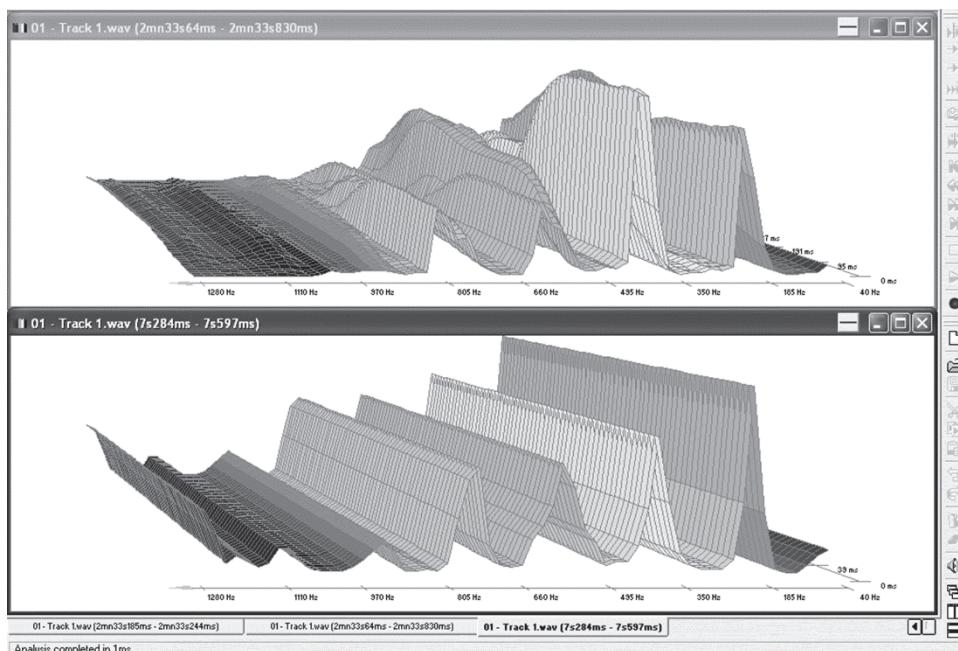
The question whether a Ukrainian /o/ is midlow (i. e. closer to [ɑ]) or midheight (i.e. closer to [u]), may be ultimately solved by addressing the flatness property of Ukrainian vowels /o/ and /y/ that results in decrease of the first formant frequencies of the preceding consonant (see Tocjka, 1981, p. 60). Figure 1 presents three-dimensional spectrograms of a Ukrainian consonant /k/ before stressed /a/ and /o/.



**Figure 1.** Three-dimensional spectrograms of a Ukrainian consonant /k/ before stressed /a/ (top) and /o/ (bottom), produced by a male speaker. Measurements are made at 12, 18 and 24 ms (top) and at 16, 24 and 32 ms (bottom).

**Slika 1.** Trodimenzionalni spektrogrami ukrajinskog konsonanta /k/ ispred naglašenog /a/ (gore) i /o/ (dolje), u izgovoru muškoga govornika. Izmjereno u 12., 18. i 24. ms (gore) te u 16., 24. i 32. ms (dolje).

It can be noticed from Figure 1 that the first formant in a /k/ has the frequency of 1300 Hz before an /a/ (taken at the time point of 12 ms) and a decreased value of 900 Hz before an /o/ (the time point of 16 ms), so a Ukrainian phone /o/ has a flattening effect on a preceding consonant. Our experiments showed that this property is not inherent to the sound [ɔ] as in English *boy*, *choice*, *thought*, etc. (see Fig. 2).



**Figure 2.** Low-frequency part of three-dimensional spectrograms of the sound /b/ in the English *boy* (top) and *bubble* (bottom), produced by a female speaker. Measurements are made at 40, 60 and 80 ms (top) and at 40, 50 and 60 ms (bottom).

**Slika 2.** Niske frekvencije prikazane na trodimenzionalnom spektrogramu glasa /b/ u engleskim riječima *boy* (hrv. dječak) (gore) i *bubble* (hrv. balončić) (dolje), u izgovoru ženskoga govornika. Izmjereno u 40., 60. i 80. ms (gore) i u 40., 50. i 60. ms (dolje).

As seen from Figure 2, [ɔ] causes no noticeable change in low-frequency behavior of [b] where the harmonics of 200 Hz, 400 Hz, 600 Hz and 800 Hz (measured at time point of 35 ms in the top and 39 ms in the bottom spectrograms) do not display any trend towards the lower values. This fact strongly supports the classification of Ukrainian /o/ as a midheight lowered back rounded vowel [ɔ]. The auditory analysis (see Table 2) also supports this conclusion (21 of 24 utterances).

The information about unstressed allophones of the Ukrainian phoneme /o/ is inconsistent. Broch notes a small difference from its stressed counterpart and a somewhat lower articulation of the unstressed one (Broch, 1910, p. 116), but see also discussion in Bilodid (1969, p. 113). Such downward movement is noticed also in the recent

investigation by Bilous (see Dudnyk, 2004, pp. 20–22). A contrary tendency to its narrower (higher) articulation in comparison to stressed /o/ is reported in Bilodid (1969, p. 112) and Tocjka (1981, p. 101), with a reserving remark about the actual absence of experimental material (Bilodid, 1969, p. 111). Press and Pugh also report more upward position of the unstressed Ukrainian [o] (Press & Pugh, 2015, p. 22). It is stated that an unstressed /o/ somewhat approaches an unaccented /y/ and that they are more akin by the tongue back position than their stressed cognates (Bilodid, 1969, p. 115).

It should be kept in mind that an unstressed vowel moves towards the central (indifferent) position on the Jones chart (cf. Stevens, 1998, pp. 294–299). As far as a stressed /o/ resides above the central line, the only way to approach center is a downward motion. So, a non-stressed /o/ must move slightly downwards (thus becoming a bit wider) and to the center, remaining a midheight lowered back but slightly advanced rounded vowel [o<sup>+</sup>] (an unstressed /y/ experiences more pronounced downward wander thus moving closer). This pattern, experimentally observed in Dudnyk (2004, pp. 20–22), correlates with the suggestions of our auditory comparative analysis presented in Table 2 (19 of 21 acoustic events). However, its marking by Bilous by /ɔ/ (as a midlow phone which resides below the central line of the vowel diagram) contradicts the above conclusions and seems not to be correct.

When the next syllable has a stressed or a secondary stressed high vowel /u/ or /i/, the vocal assimilation results in an *u*-like tinge of unstressed /o/ that correspondingly transforms into [o<sup>y</sup>]: *којух* [ko<sup>+</sup>̪zux] 'sheepskin coat', *зозуля* [zo<sup>+</sup>̪zu-ɿɛ] 'cuckoo', *виловітъ* ['vɪ̪<sup>+</sup>-ɬo<sup>u</sup>-vɪ̪, t] 'draw out!', *єїволік* ['vɪ̪<sup>+</sup>-vɔ<sup>u</sup>-ɬi, k] '(he) dragged out', (see Bilodid, 1969, p. 114, pp. 384–385; Zhovtobrjukh & Kulyk, 1965, p. 119). The variant [o<sup>y</sup>] corresponds to [o<sup>+</sup>].

An accented Ukrainian vowel /y/ is determined as a high back strongly labialized (rounded) vowel (Bilodid, 1969, p. 60; Tocjka, 1981, p. 54; Zhovtobrjukh & Kulyk, 1965, p. 119). Its IPA transcription is /u/, like in English *boost*.

It is observed that there is no qualitative difference in pronunciation of a stressed /y/ and an unstressed /y/ (Bilodid, 1969, p. 116; Zhovtobrjukh & Kulyk, 1965, p. 119), whereas Zilynskjyj and Synjavskijy state that the latter is a little wider and lower in articulation (Bilodid, 1969, p. 116). An unaccented /y/ is regarded as a midheight central vowel shifted backwards (Bilodid, 1969, p. 118; Tocjka, 1981, pp. 100–101) or as a lowered high back (advanced) vowel (Dudnyk, 2004, p. 22). Our auditory comparative analysis (see Table 3) indicates that it is a high (lowered) back (shifted to center) rounded

vowel [ʊ], like in English *oops*. This sound appears also in the letter <ю> readout: after [j] in an iotated vowel [ju] and after palatalized consonants (cf. Bilodid, 1969, p. 96).

An accented Ukrainian vowel /i/ is conventionally classified as a high front vowel (Bilodid, 1969, p. 65; Tocjka, 1981, p. 58; Zhovtobrjukh & Kulyk, 1965, p. 118). Its IPA notation is /i/, like in English *valley*. In the Ukrainian language, this vowel usually results in palatalization of the preceding consonant.

An unstressed /i/ does not differ significantly, being a bit lowered and retracted but remaining a high front vowel (see Bilodid, 1969, p. 122; Dudnyk, 2004, p. 22; Tocjka, 1981, p. 100; Zhovtobrjukh & Kulyk, 1965, p. 118). The modified IPA symbol /i̯/ seems to be appropriate here. It was stated also in Pompino-Marschall et al. (2017, p. 6) that a harmonizing tendency may result in the farther shift of an unstressed [i] preceding a stressed [ɛ] towards /e/ thus resulting in the sound [i̯] ([ɛ̯]).

There exists also a more wide allophone [i<sup>u</sup>] of the phoneme /i/ that does not result in palatalization of a preceding consonant at the morpheme boundary: *безіменний* 'nameless', *неперісторія* 'pre-history', *педінститут* 'pedagogical institute' (Bilodid, 1969, p. 183) – and may appear in the initial position in the words *інший* 'different, another', *іноді* 'sometimes', *інколи* 'time by time', *інде* 'somewhere', *інакше* 'in the other way' (Zhovtobrjukh & Kulyk, 1965, p. 161) and sometimes after a Ukrainian /p/ (Kalynovych, 1947, p. 51), but see also Bilodid (1969, p. 106). A nearby high front vowel with a more centralized (a bit lower and more retracted) articulation and the same formant ratio ( $r = 5/4$ ) is denoted by the IPA symbol [ɪ] (see Vakulenko, 2007, p. 85, 2010, 2011a, p. 172, 2011b, p. 439, 2015, p. 169). The tube resonance formants of an English [ɪ] were found at the frequencies: Fp1 = 2000 Hz (1800–2200 Hz), Fp2 = 2500 Hz (2300–2700 Hz), with a formant ratio  $r = Fp2/Fp1 = 5/4$  (large tertian) that corresponds to a Ukrainian /i/. We remind that the low-frequency (-300 Hz) incidental formant caused by Helmholtz resonance is not involved in the invariant ratio (see Vakulenko, 2007, pp. 80–82, 2010, pp. 22–27, 2011a, pp. 168–170, 2011b, pp. 434–437, 2015, pp. 159–164).

Classification of a Ukrainian /i/ is probably the most unclear, and relevant information is insufficient and contradictory. It is stated that physiological conditions of its production are investigated a little (Bilodid, 1969, p. 63). Broch, having studied the Western-Ukrainian pronunciation, described this sound as a mid-central vowel on a margin with the front row, approximate to a narrow [e] (Broch, 1910, p. 118), see also Bilodid (1969, p. 63). It is emphasized also that a narrow, raised articulation of /i/ does not make the standard norm and that in contrast to a number of Western Ukrainian

dialects where this sound is tenser and front, the typical Central Ukrainian /и/ is more light and relaxed that has to serve as a norm (Bilodid, 1969, p. 378).

Later Browchenko characterized this sound as a front (shifted backwards) high vowel, wider than a Ukrainian /и/ (Browchenko, 1954, p. 30), see also Bilodid (1969, p. 63). A stressed /и/ is considered as a front high vowel with lowered and retracted articulation (Bilodid, 1969, p. 378; Zhovtobrjukh & Kulyk, 1965, p. 118). Tocjka qualifies a stressed /и/ as a front midheight vowel (Tocjka, 1981, p. 57). Press and Pugh describe this sound as 'somewhat between English *i* in *sit* and the very beginning of the *a* in *gaze*' (Press & Pugh, 2015, p. 19), but use an inexact designation /ɪ/, as in English *sit*. The same transcription uses Bilous (Dudnyk, 2004, p. 22).

The marking /ɪ/ seems misleading for this sound because of the following:

(1) The notation /ɪ/ should be reserved for a lowered retracted allophone of /и/ with the same formant ratio ( $r = 5/4$ ) appearing at the morpheme boundary where no palatalization occurs (see above), whereas a Ukrainian /и/ has a different formant ratio of  $r = 6/5$  (Vakulenko, 2000, p. 63, 2007, p. 84, 2010, 2011a, p. 172, 2011b, p. 439, 2015, p. 167).

(2) It is a well-established fact that an unstressed /и/ approximates an unaccented [e] (see Bilodid, 1969, p. 381; Tocjka, 1981, p. 101; Zhovtobrjukh & Kulyk, 1965, p. 118) that, in turn, should be more central than a stressed /е/. So, the tentative correspondence /и/ → [ɪ] would result in an unreasonably large distance between its stressed and unstressed cognates, as can be seen from Dudnyk (2004, p. 22).

(3) An analogy with the relation between tense and lax vowels, like in English [i:] and [ɪ], is not appropriate here since there is no phonological distinction in Ukrainian based on vowel duration, diphthongization, etc. (see Stevens, 1998, pp. 294–299) and since the Ukrainian phoneme /и/ has no stress limitations.

(4) It is commonly agreed that the phones denoted by the same symbols, may sound differently across languages, so there is no threat to confuse the sound of the Ukrainian [и] with the Russian [ы].

Based on acoustic data obtained in her phonetic experiments, Steriopolo concludes that a Ukrainian /и/ is a front retracted vowel close to [i] (Steriopolo, 2012, p. 55). The essential difference in sound of Ukrainian [и] and [ɪ] as in German *bitte* led Pompino-Marschall (personal communication, 2012) to the conclusion that the first is closer to an [i]. However, later a compromising notation /ɪ/ (lying between /и/ and /и/) appeared: 'The vowel [и]... would be more correctly transcribed as [ɪ], since in contrast to [i] the tongue is quite retracted and lowered in the production of this vowel. (In the acoustical vowel

space it may seem to shift to [i] due to its articulation with strongly spread lips...)' (Pompino-Marschall et al., 2017, pp. 5–6).

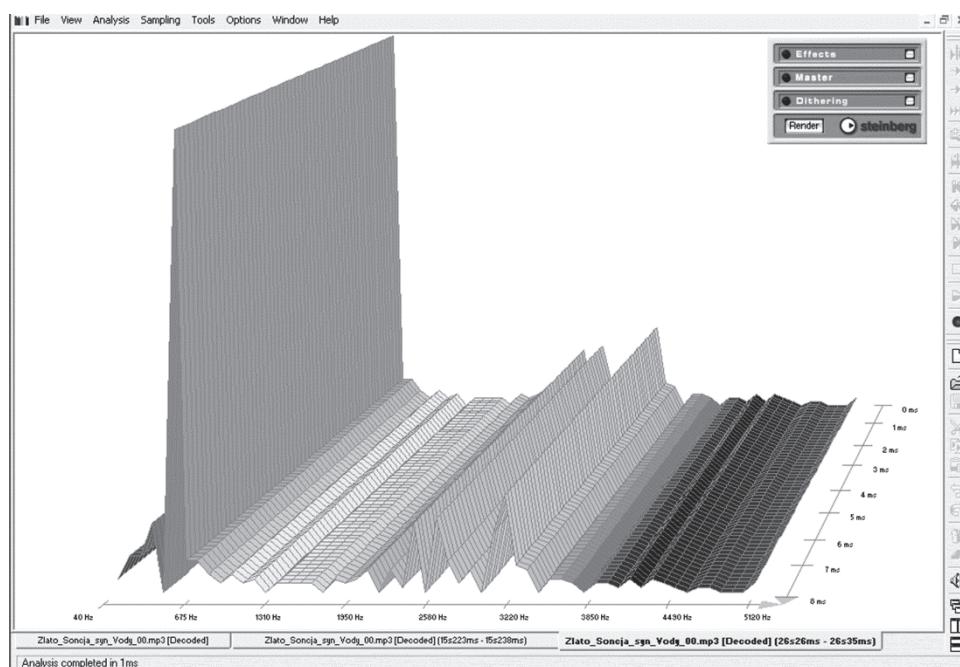
The second formants of /i/ and /e/ were found to lie in the range of 1300–2100 Hz and 1600–2600 Hz, with the central values of 1800 Hz and 2100 Hz, respectively; that is between the relevant formants of /a/ ( $F_2 = 1100$  Hz) and /i/ ( $F_2 = F_{p1} = 2400$  Hz) (Vakulenko, 2000, p. 63, 2007, p. 84, 2010, 2011a, p. 172, 2011b, p. 439, 2015, pp. 167–168). These data indicate that a stressed /i/ resides on the Jones diagram somewhere in the boundary region between central and front vowels, above an accented /e/, being a high lowered central advanced vowel. This description corresponds well to the requirement of its light and relaxed character in the standard Ukrainian (cf. Bilodid, 1969, p. 378). A similar sound is quite intelligibly heard in Polish *ryba* 'fish' and in American English *rose*'s. So, an accented Ukrainian /i/ should be accordingly rendered through the symbol [i<sup>+</sup>].

An unstressed /u/ is reported to have a lowered (wider) articulation as compared to its stressed correlate (Bilodid, 1969, p. 381; Zhovtobrjukh & Kulyk, 1965, p. 118), and classified as a front mid elevated vowel (Bilodid, 1969, p. 121). On the chart obtained by Bilous (Dudnyk, 2004, p. 22), its position is more central. It is noteworthy that the pronunciation of this sound depends on the following vowel resulting from distant assimilation: while next high vowels [i]/[i] or [y]/[y] do not cause major changes in pronunciation of an unstressed [u] – *дитина* 'child', *живі* 'live!', etc., – next [e]/[e] and [a]/[a] give rise to its notable shift down towards an unaccented [e] – *живе* 'lives', *бачила* '(she) saw', etc. (Zhovtobrjukh & Kulyk, 1965, p. 118). So, we may determine 'near' and 'distant' unstressed allophones of the phoneme /i/: a high more lowered central less advanced vowel [i<sup>+</sup>] and a midheight central vowel [ə<sup>+</sup>].

An accented Ukrainian /e/ has been considered as a mid (lowered) front (center-approached) vowel (Zhovtobrjukh & Kulyk, 1965, p. 118), or as a mid-front retracted vowel (Bilodid, 1969, p. 61), or as a front vowel on the border with the central row, mid but strongly lowered (Tocjka, 1981, p. 56), or, as follows from the chart given in (Pompino-Marschall et al., 2017, p. 5), a slightly retracted midlow front vowel. Our auditory analysis shows that this vowel is close in sound to [ɛ] as in French *même*, but a bit more relaxed. Its formant frequencies of  $F_1 = 700$  Hz;  $F_2 = 2100$  Hz (Vakulenko, 2000, p. 63, 2007, p. 84, 2010, p. 28, 2011a, p. 173, 2011b, p. 439, 2015, p. 167) suggest that the position of /e/ is midlow and front but not extreme. Thus, we propose the designation [ɛ̄].

Its unstressed cognate is described as a more raised vowel than a stressed /e/, especially before the syllable with a high vowel /i/, /ɪ/, or /y/ due to the vowel harmony effect (Tocjka, 1981, p. 104; Zhovtobrjukh & Kulyk, 1965, p. 118; see also Bilodid, 1969, p. 381), or a front mid vowel being a little more advanced than a stressed /e/ (Bilodid, 1969, pp. 119–120), or, on the contrary, a more retracted and raised as compared to /e/ vowel (Dudnyk, 2004, 20–22). All these descriptions should be adjusted to the fact that, in absence of distant assimilation or other sound interaction effects, an unaccented vowel is closer to the center of the Jones diagram than its accented cognate.

According to Brovchenko and Zilinskij, more narrow and front allophone of /e/ arises between palatalized consonants as in *ллеться* 'is flown' and also as in *знаємо* 'we know' (see Bilodid, 1969, p. 96, p. 127). Such a narrow variant does appear after palatalized consonants, as observed in our experiments (see Figure 3) and may result also due to vowel harmony (cf. Pompino-Marschall et al., 2017, p. 6).



**Figure 3.** The ending of a Ukrainian sound [e] in *спробує* '(he, she) will try', produced by a female speaker. Measurements are made at 4 ms.

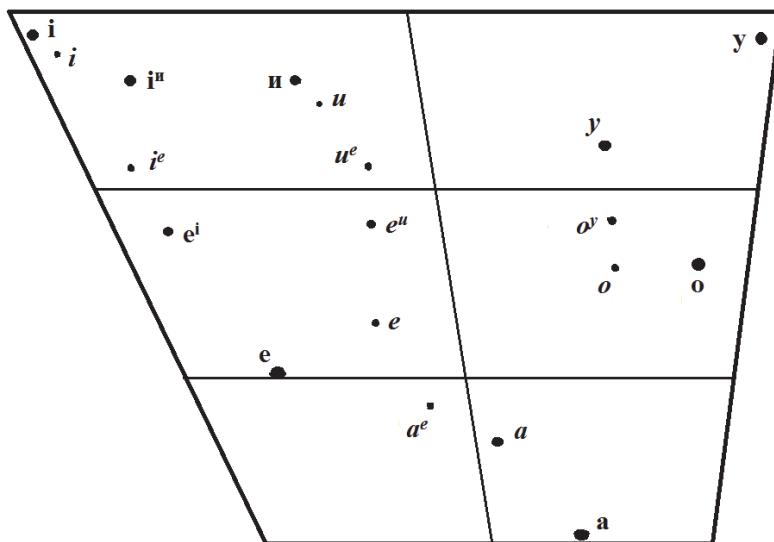
**Slika 3.** Završetak ukrajinskoga glasa [e] u riječi *спробујε* (hrv. pokušat će), u izgovoru ženskoga govornika. Izmjereno u 4. ms.

Figure 3 presents an informative 8-ms stationary interval with the most clear and characteristic sound.

This is a typical mixed phone with four major formants:  $F1 = 500$  Hz,  $F2 = 2000$  Hz,  $F3 = 2500$  Hz,  $F4 = 3100$  Hz. The first two are characteristic to /e/, where raised tongue position is manifested in the lowered  $F1$ , and  $F3$  and  $F4$  are characteristic to [i] with a relevant formant ratio of large tertian:  $r = F4/F3 \approx 1.24 \approx 5/4$  (cf. Vakulenko, 2007, pp. 84–85, 2010, pp. 28–29, 2011a, pp. 172–173, 2011b, pp. 439–440, 2015, pp. 167–168).

Thus, two major variants of an unstressed Ukrainian /e/ are possible: a 'regular' central [ʒ<sup>+</sup>] (being normally shifted towards a center of the Jones diagram) and strongly raised sound corresponding to [ə<sup>+</sup>] resulting from vocal assimilation with next high vowels. In addition, an *i*-coloured [ɛ̄] following a palatalized consonant may be both accented and unaccented.

The general diagram of Ukrainian vowels is presented in Figure 4, where the non-stressed allophones are typed in *italic*.



**Figure 4.** The diagram of Ukrainian vowels (the sounds are denoted in Cyrillic script)

**Slika 4.** Vokalski dijagram ukrajinskog jezika (glasovi su zabilježeni čiriličnim pismom)

The correspondence between Cyrillic and IPA phonetic symbols for the Ukrainian vowels is summarized in Table 4.

**Table 4.** Ukrainian vowel phonemes and their allophonic realizations

**Tablica 4.** Ukrajinski vokali i njihove alofonske inačice

Ukrainian phoneme / Fonem u ukrajinskom jeziku		Chief allophone / Glavni alofon		Other allophones / Ostali alofoni	
Cyrillic / Ćirilica	Latin / Latinica	Cyrillic / Ćirilica	IPA	Cyrillic / Ćirilica	IPA
/a/	/a/	[a]	[a <sup>+</sup> ]	[a], [a <sup>e</sup> ]	[ɛ], [ɔ <sup>+</sup> ]
/o/	/o/	[o]	[o <sup>+</sup> ]	[o], [o <sup>v</sup> ]	[o <sup>*</sup> ], [o <sup>+</sup> ]
/y/	/u/	[y]	[u]	[y]	[ʊ]
/i/	/i/	[i]	[i]	[i], [i <sup>u</sup> ], [i <sup>e</sup> ]	[i <sup>+</sup> ], [ɪ], [e <sup>-</sup> ]
/u/	/y/	[u]	[i <sup>+</sup> ]	[u], [u <sup>e</sup> ]	[i <sup>+</sup> ], [ɔ <sup>+</sup> ]
/e/	/e/	[e]	[ɛ <sup>-</sup> ]	[e], [e <sup>u</sup> ], [e <sup>i</sup> ]	[ɔ <sup>+</sup> ], [ə <sup>+</sup> ], [e <sup>-</sup> ]

#### 4. DISCUSSION

The lack of experimental equipment in Ukraine imposes certain difficulties in carrying out phonetic research. In this context, new phonetic material and comprehensive interpretation of the data obtained are of high importance. Let us discuss more the central character of an [i] as compared to earlier results of Bilodid (1969) and Tocjka (1981). This is likely due to more detailed and versatile study of this sound in Vakulenko (2000, 2007, 2010, 2011a, 2011b, 2015) including normal speech, changing tone and whisper, involvement of larger number of informants, use of modern software, and application of acoustic invariant speech analysis. Our results are closer to those of Bilous (Dudnyk, 2004, pp. 20–22) regarding unstressed vowel and differ in the part of a stressed [i]. This difference may be caused by incorrect evaluation of this sound as [ɪ] by Bilous that resulted in unreasonably large distance between the stressed and unstressed cognates. The conclusion about placement of [i] on the vowel diagram are similar to those of Steriopolo (2012), Pompino-Marschall (personal communication, 2012), and Pompino-Marschall et al. (2017, pp. 5–6).

## 5. CONCLUSIONS

Acoustic and articulatory properties of Ukrainian vowels based on earlier studies of Ukrainian have been reported in this study. Specific experimental procedures were described and a full set of relevant IPA notations for the vowel phones of contemporary standard Ukrainian were proposed, including stressed and non-stressed vowel allophones. Auditory comparative analysis, auditory observation, and earlier acoustic invariant speech analysis were applied interpreted in the context of general and Ukrainian phonetic laws governing language evolution and acoustic properties of unaccented vowels in relation to their accented cognates. Such combined approach resulted in a more detailed phone inventory than proposed before.

Vowel chart with a full set of main vowel allophones including the non-stressed ones were proposed. The chief allophone of /u/ is determined as more central than described in Bilodid (1969) and Tocjka (1981) that may result from the more versatile investigation of its acoustic parameters in various pronunciation modes including normal speech, changing tone, and whisper. Such an approach yields invariant, robust characteristics independent on the speaker's individuality and a pronunciation mode. The chief allophone of [e] was found to be more advanced than proposed in Bilodid (1969) and Tocjka (1981), whereas we claim that due to its flattening property, a stressed Ukrainian [o] is a midheight back rounded vowel.

Due to approaches applied, one may expect that the findings of this work offer more precise, comprehensive, grounded and detailed description of the Ukrainian vowels than the previous results of Bilodid (1969), Buk et al. (2008) and Pompino-Marschall et al. (2017).

The findings of this research contribute to better understanding of Ukrainian and its special features in comparison with other world languages that may have substantial practical use in various phonetic and translation studies, as well as in modern linguistic technologies aimed at artificial intelligence development, machine translation incorporating text-to-speech conversion, automatic speech analysis, recognition and synthesis, and in other areas of applied linguistics.

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## **Vokali ukrajinskog jezika prema Međunarodnoj fonetskoj abecedi**

### **Sažetak**

U ovom se radu opisuju akustičke i artikulacijske osobitosti vokala u ukrajinskom jeziku te se daje opis vokalskog sustava u skladu s notacijom IPA. Opis je prikazan u vokalskom dijagramu i tablici. Rezultati ranijih akustičkih istraživanja, kao i istraživanja slušne procjene vokala, interpretiraju se u kontekstu općih zakonitosti u evoluciji jezika i zakonitosti specifičnih za ukrajinski jezik, što se posebno odnosi na akustičke karakteristike nenaglašenih i naglašenih vokala. Time se dobiva detaljniji vokalski sustav. Rezultati ovog rada doprinose boljem razumijevanju ukrajinskog jezika i njegovih osobitosti u odnosu na druge svjetske jezike. Praktična primjena moguća je u fonetskim i komparativnim istraživanjima, kao i u usavršavanju suvremenih jezičnih tehnologija koje doprinose razvoju umjetne inteligencije, strojnom prevodenju koje uključuje prepoznavanje tekstova govorom (engl. *text-to-speech*), automatskom prepoznavanju govora i govornoj sintezi te u drugim područjima primjenjene lingvistike.

**Ključne riječi:** fonemi ukrajinskog jezika, abeceda Međunarodnog fonetskog udruženja, vokalski dijagram, akustička analiza vokala

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## **The cognitive effects of ADHD on learning an additional language**

### **Summary**

In recent years Specific Learning Difficulties (SpLDs) in the context of learning and teaching a foreign or second language, or an Additional Language (AL), have been widely discussed. The main focus has been given to dyslexia (e.g., Kormos, 2017; Kormos & Smith, 2012; Łodej, 2016; Nijakowska, 2010) due to its frequent occurrence and evident manifestations in literacy development. *Attention deficit/hyperactivity disorder* (ADHD) has been discussed only to some extent and mainly in the comorbidity with dyslexia. Therefore, the aim of this paper is to discuss potential cognitive effects ADHD may have on the development of specific language skills in AL with a clear distinction between inattention and hyperactivity/impulsivity to direct potential research in the field and to inform AL instruction. This paper also provides substantial information about ADHD in the light of the recent change in its definition and classification.

**Key words:** ADHD, cognitive effects, learning an additional language

## 1. DEFINITION AND MANIFESTATIONS OF ADHD

According to the recent version of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, American Psychiatric Association [APA], 2013) ADHD falls under the category of learning difficulties, and not under behavioural ones as in the previous version of the manual. This change may lead to earlier recognition of ADHD, a need for more comprehensive assessment of this condition, as well as a new research stream on the effect of inattention in learning difficulties (Tannock, 2013). This change also follows the trend in Europe, where ADHD is referred to as a learning difficulty or difference due to the importance of attention in cognitive functioning in the context of learning, as well as the co-occurrence of ADHD with other SpLDs such as dyslexia (Kormos & Smith, 2012), or language impairment (Mueller & Tomblin, 2012) and autism spectrum disorder (van Steijn et al., 2012). Based on the review of 17 studies, it was concluded that the comorbidity of ADHD and other learning difficulties is slightly above 45% (DuPaul, Gormley, & Laracy, 2013); with dyslexia, as the most common specific learning difficulty, the comorbidity is estimated between 15 and 40% (Pennington et al., 2009).

The occurrence of ADHD worldwide varies between 3 and 7% (Peacock, 2001) with an average of 5% according to recent comparative studies (Smith, 2017). ADHD is hereditary in origin (Barkley, 2006) and not gender-specific, but it is more found in males than females (APA, 2018; Barkley, 1997). This difference in diagnosis may be due to that girls' behaviour may be regarded as less disruptive, and thus not associated with the manifestations typical for ADHD (Barkley, 2006). Although it is a long-life condition, it is manifested less in adults (Biederman, 2011), especially hyperactivity (Schwartz, 2002).

There are three distinct manifestations of ADHD, which are: inattention, hyperactivity, and impulsivity. The DSM-5 (APA, 2013) emphasises the dimensional approaches to ADHD, therefore, subtyping should not be used, but rather 'specifiers' or 'presentations'. Therefore, the individual with ADHD can be either (Tannock, 2013, p. 9):

- restrictively inattentive, with 6 or more inattentive but maximum 2 of hyperactive-impulsive symptoms;
- inattentive, with 6 or more inattentive symptoms but 3-5 hyperactive-impulsive symptoms;

- hyperactive and impulsive, with 6 or more hyperactive-impulsive symptoms but 5 or fewer of inattention; or
- manifests all symptoms at equal intensity.

The symptoms of inattention include low attention to details, making careless mistakes, difficulty to sustain attention for a longer period of time, appearing as not listening, failing to follow instructions, tasks incompleteness, poor organisational strategies, avoidance of tasks that require mental effort, forgetfulness, and proneness to be easily distracted by an external stimulus. The impulsiveness is manifested by lack of self-control, impatience, disturbing the others, extensive talking without attention to social conventions, unexpected blurts or answers before the question has been asked, unintentional destruction of material items, whereas hyperactivity is associated with nervous hands and legs movement, fidgeting, unexpected leaving a seated position, walking or running (APA, 2018). In addition, an individual has a difficulty to automatise behavioural rules, emotional oversensitivity, low tolerance, a lower analytical approach to complex tasks and lack of intrinsic motivation for learning (Barkley, 1997, 2006). An individual with the cumulation of symptoms of inattention, hyperactivity, and impulsivity may be regarded as 'aggressive' (Skibska, 2013) and penalised for improper behaviour, which a child cannot control without adequate accommodations of their specific needs.

Attention is an ability to select one stimulus, to redirect the focus on the appropriate stimulus, to focus on many stimuli, to maintain focus in a situation where there is no stimulus present, and to perform a few things simultaneously (Wolańczyk, Kołakowski, & Skotnicka, 1999).

Attention is related to short-term memory, which is an ability to store information, and working memory, an ability to manipulate this information in the mind over a short period of time. An example of how working memory works in AL learning is hearing a new word and trying to repeat it a few seconds later (Gathercole & Alloway, 2008). It is important to recognise individual differences in the capacity of working memory, its effect on understanding and reasoning (Baddeley, 1996), as well as the prime role of *the central executive* or an attentional controller in processing complex short-term visual and verbal information (Baddeley, 1996; Gathercole & Alloway, 2008). The central executive allows inhibiting distractions, directing attention to a task with an intention to complete it avoiding irrelevant information, planning, doing the task in a methodological way, and using effective strategies (Radziwiłłowicz, 2004; Wu, 2014).

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## 2. LEARNING AN ADDITIONAL LANGUAGE

AL learning is a complex cognitive and metacognitive activity that depends on a number of factors. Language proficiency requires the knowledge of syntax, vocabulary, phonology, and orthography (Bachman & Palmer, 1996), as well as strategic competence (Hulstijn, 2011). Following the recent view on the aptitude to learn AL (Wen, Biedroń, & Skehan, 2017), apart from the traditional Carroll's model (Carroll, 1962) that included phonemic coding ability, grammatical sensitivity, inductive and rote learning ability, one's success will depend on L1-L2 language analysis skills and the cross-linguistic phonology/orthography analysis that was proposed by Sparks, Patton, Ganschow, and Humbach (2011). Most importantly, the contemporary view of the aptitude to learn many AL skills emphasises the importance of working memory, especially its phonological component.

As working memory deficit is an underlying cause for SpLD (Kormos, 2017), for some individuals learning AL will not come naturally. Yet, to which extent one will struggle with developing specific AL skills, will all depend on their individual cognitive profile. It is therefore necessary to stress the importance of individual difference in language learning (Ehrman & Oxford, 1995).

## 3. INATTENTION IN ADDITIONAL LANGUAGE LEARNING

The ability to focus attention on one stimulus (selectivity) is important for incidental learning (Jiang & Chun, 2001), whereas working memory is for incidental and intentional learning (Robinson, 1997, 2002; Williams, 1999). With reference to the *noticing hypothesis* proposed by Schmidt (1990), which assumes that in order to learn a given form of language, a student must notice it, i.e. direct appropriate attention to a given form, selectivity of attention will be important for learning various lexical and grammatical forms. Attention is therefore significantly important in AL learning (Leow & Bowles, 2005; Robinson, 2003; Schmidt, 1995). The weaker working memory and executive control processes, which feature ADHD, will therefore affect verbal and visual information memorisation and processing, and consequently the development of different language skills (Kormos, 2017).

Sparks, Humbach, and Javorsky (2008) conducted a series of studies on university-level students to investigate the cognitive profile of individuals with ADHD, their aptitude and attainment in learning a foreign language. Their findings suggest that the ability of students with ADHD can be compared to one of the

students with other learning difficulties. However, students with ADHD are able to achieve high scores in foreign language classes (Sparks, Javorsky, & Philips, 2004, 2005), and thus it cannot be stated that they have a specific deficit in language skills, which would be a predictor for slower development of specific competencies in a foreign language (Sparks et al., 2005). However, Sparks et al. (2008) emphasise the diverse cognitive and linguistic profile of individuals with ADHD. They found that the individuals with ADHD struggled with spelling tasks but obtained similar results to the high-achievers in the tasks of memorising and analysing grammatical structures and reading comprehension. On the other hand, the recent study in the first language has shown that individuals with ADHD may have difficulty in single-word reading and reading comprehension (Cain & Bignell, 2014). In reading comprehension, working memory and control of cognitive processes play an important role (Cain, 2006), and thus it can be expected that individuals with reduced concentration will have difficulty in solving reading comprehension tasks in the first and second language. As found by Miller et al. (2013), children with ADHD have difficulty in building a coherent mental representation. Yet, considering the results of the research carried out by Sparks et al. (2008), it can be expected that adult individuals with ADHD will develop a number of compensatory strategies that would allow them to perform reading comprehension tasks successfully. In this regard, differences in approaching teaching reading strategies in the first and foreign language may be of importance.

Similar to the ability to comprehend a written text, individuals with ADHD may have difficulty in processing verbal material (Cain & Bignell, 2014). Listening comprehension tasks in the AL learning context require focusing for a longer period of time, selecting specific information, and processing this information in the context of a given task. Therefore, it may be assumed that individuals with lower attention may struggle with completing some types of listening comprehension tasks.

The findings of the studies by Alloway, Gathercole, and Elliot (2010) as well as Martinussen and Tannock (2006) that researched the ability to store information from different stimuli are noteworthy in the context of learning grammar and vocabulary in AL by individuals with ADHD. It was found that these individuals have difficulty in memorising visuospatial information; yet, they did not struggle with memorising this information when it was presented verbally. It can be therefore assumed that teaching grammatical and lexical forms to individuals with ADHD should be predominately based on the oral stimulus, or in a multisensory way, a widely

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recommended approach in teaching literacy in the first and second language to individuals with SpLDs (e.g., Kelly & Phillips, 2011; Kormos & Smith, 2012; Nijakowska, 2010).

Attention control is also necessary for writing processes and performing written tasks. Since writing in AL is less automatic than in the first language, there will be a greater load on working memory (Kormos, 2017). Students with ADHD can make spelling mistakes in single-word writing (Sparks et al., 2008), have difficulty in planning their written expressions, maintaining coherence at the sentence level, paragraph and throughout the text, writing in detail, and proofreading their work.

The number of difficulties that stem from inattention suggests that individuals with ADHD have specific writing difficulties, which also feature other SpLDs. Yet, the manifestations of writing difficulties will stem from different underlying causes. This can be exemplified by the type of misspellings, which in individuals with ADHD will most probably take a form of letter insertion, substitution, and omission (Adi-Japha et al., 2007) rather than misspellings that stem from weaker phonological awareness, which is the underlying cause of dyslexic tendencies. On the other hand, handwriting difficulties in ADHD may comorbid with those in dysgraphia, which is characterised by difficulty in motor coordination (Adi-Japha et al., 2007).

Given the results of the study by Alloway et al. (2010) as well as Martinussen and Tannock (2006), that is, storing verbal information in ADHD individuals is unaffected, it can be assumed that individuals with ADHD will not have specific difficulty in retrieving it. However, similarly to writing in AL, they may struggle with maintaining coherence on different levels of spoken expression, which may include inappropriate sentence structure and adding irrelevant information.

#### **4. HYPERACTIVITY AND IMPULSIVITY IN AL LEARNING**

Hyperactivity and impulsivity may affect production and social interaction in AL, as well as behaviour for learning with a further detrimental effect on progress in learning and attainment.

Lack of self-control, impatience, extensive talking, and unexpected utterances will impact development of spoken interaction and production especially at proficient levels, where, as according to *the Common European Framework of Reference for Languages: Learning, teaching, assessment* (CEFR), the learner is expected to pay attention to more complex social rules, wait for their turn in a longer spoken

interaction, and respond appropriately (CEFR, 2018, p. 85, 159). Since the individual with ADHD cannot voluntarily control their behaviour, they may struggle to develop effectively these socio-pragmatic aspects of speaking skills, and consequently will have difficulty to attain the advanced and proficient level of the overall language competence.

Impulsivity may also potentially affect written production in the form of extensive writing, the employment of irrelevant information, and little control over the employment of punctuation. As a result, the text will not reflect any planning, will be incoherent on the sentence, paragraph, the whole text level, and inconsistent in spelling, vocabulary and punctuation use.

Similar to speaking skills, the individual with ADHD including the hyperactive-impulsive presentation will struggle with writing at a proficient level, where the individual is expected to express themselves clearly and precisely in the correct tone and style (CEFR, 2018, p. 93). They will also find it difficult to work on complex projects that are referred to in CEFR as collaborative writing and redrafting (CEFR, 2018, p. 99).

The hyperactive-impulsive presentation of ADHD will affect behaviour for learning of the individual. The extensive needs for physical movement and interaction with other people may render impossible to complete complex tasks that require a static position. Overall, the individual with ADHD will lack of intrinsic motivation for learning (Barkley, 1997, 2006), especially when it happens in the absence of kinaesthetic and tactile modalities.

The disrupting behaviour of an individual with ADHD may also have a detrimental effect on the progress of other individuals in the class, especially when there is ineffective classroom management and classroom accommodations are not adequately employed.

## 5. CONCLUSION

ADHD has a great impact on developing all language skills in AL. Yet, given the so far research findings, it is inconclusive whether individuals with ADHD have specific difficulties in AL learning. Nevertheless, it is necessary to recognise the diverse cognitive and linguistic profile of individuals with ADHD, which stems from the heterogenic nature of ADHD and its comorbidity with other SpLDs. Therefore, progress and attainment in specific language skills will depend on individual

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differences, which are, but not exclusively, the presentation of ADHD, the age of the individual, their gender, and motivation for learning. Since ADHD falls under the legal requirement of individualisation of learning and teaching in schools, specific needs of students with ADHD need to be adequately accommodated; in-class teaching approaches should consider each manifestation of ADHD and how they affect the progress in learning of the individual and the whole class. Therefore, teaching and learning should be based on dynamic assessment and the multisensory and structured approach (Kałdonek-Crnjaković, in press). Besides, effective in-class support, students with ADHD may require additional instruction provided by specialist teachers, psychologists, or speech and language therapists.

As there are few empirical studies on ADHD in the context of AL learning, the future research can take different directions. Given the heterogeneity of ADHD as well as its co-occurrence with other SpLDs, the future research should consider the application of mixed methods, both quantitative and qualitative.

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## **Kognitivni utjecaj ADHD-a na učenje drugog i stranog jezika**

### **Sažetak**

Prema najnovijoj verziji *Dijagnostickog i statističkog priručnika za duševne poremećaje* (APA, 2013), napažnja i/ili hiperaktivnost-impulzivnost (ADHD) definiran je kao "neurorazvojni poremećaj" koji se ubraja u kategoriju specifičnih poteškoća u učenju zbog njegovog utjecaja na obrazovne i radne aktivnosti, kao i zbog pojavljivanja ADHD-a zajedno s drugim specifičnim poteškoćama u učenju, poput disleksije (Kormos i Smith, 2012). ADHD se javlja kod prosječno 5 % svjetske populacije (Smith, 2017), a zajedno s drugim teškoćama u oko 45 % populacije (DuPaul, Gormley i Laracy, 2013). Kognitivni temeljni uzrok ADHD-a jest slabija radna i kratkotrajna memorija (Baddeley, 1996; Gathercole i Alloway, 2008), a manifestira se napažnjom, hiperaktivnošću i impulzivnošću. Međutim, ova se tri simptoma ne smiju smatrati potkategorijama ADHD-a jer je potrebno prepoznati zastupljenost određenog broja simptoma (APA, 2013). Simptomi ADHD-a su, između ostalog, neobraćanje pažnje na detalje, teškoće u održavanju pažnje u zadacima i u organiziranju aktivnosti, lako odvlačenje pažnje nebitnim podražajima, nedostatak samokontrole, nestrpljivost, pretjerano pričanje, često ometanje i prekidanje drugih (APA, 2018).

ADHD u kontekstu učenja drugog i stranog jezika relativno je malo istražen. U ovom se radu pokušava napraviti analiza mogućih kognitivnih utjecaja koje ADHD može imati na razvoj jezičnih vještina u drugom i stranom jeziku, uzimajući u obzir da slabija radna memorija i izvršni kontrolni procesi utječu na pamćenje i obradu verbalnih i vizualnih informacija (Kormos, 2017).

Analiza istraživanja prikazana u ovom radu može usmjeriti buduća istraživanja u području specifičnih poteškoća u učenju i poučavanju drugog i stranog jezika kod osoba s ADHD-om. U radu se također pružaju bitne informacije o ADHD-u u svjetlu nedavne promjene njegove definicije i klasifikacije.

**Ključne riječi:** ADHD, kognitivni utjecaj, učenje drugog i stranog jezika

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**Prikaz**

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Hrvatska

## Obilježavanje pola stoljeća Odsjeka za fonetiku (1968–2018)

Odsjek za fonetiku kao zasebna znanstvena i nastavna jedinica osnovan je 1968. godine na Filozofskome fakultetu u Zagrebu. Svečana sjednica povodom obilježavanja pola stoljeća Odsjeka za fonetiku održana je u petak, 30. studenoga 2018. godine na Filozofskome fakultetu u Zagrebu. Službeni dio svečane sjednice održan je od 12 do 14 sati u dvorani III, a nakon toga su se fonetičari i uzvanici nastavili družiti uz domjenak u maloj auli pred knjižnicom. Na sjednici je govorilo devet govornika: dekanica Filozofskoga fakulteta prof. dr. sc. Vesna Vlahović-Štetić, prof. emeritus Damir Horga, pročelnica Odsjeka doc. dr. sc. Elenmari Pletikos Olof, predstojnica Katedre za primijenjenu fonetiku prof. dr. sc. Vesna Mildner, predstojnica Katedre za estetsku fonetiku i ortoepiju hrvatskoga književnog jezika prof. dr. sc. Gordana Varošanec-Škarić, predstojnik Katedre za teorijsku fonetiku doc. dr. sc. Marko Liker, pročelnica Odsjeka za lingvistiku prof. dr. sc. Vlasta Erdeljac, ravnateljica Poliklinike SUVAG doc. dr. sc. Katarina Pavičić Dokoza te voditelj Odjela lektora i fonetičara na HRT-u Tihomir Janjić, prof. Program svečane sjednice vodila je Jelena Pajić, diplomirana fonetičarka i voditeljica na RTL-u.

Svečana proslava započela je nastupom komornoga sastava akademskoga zbora Filozofskoga fakulteta Concordia discors koji je otpjevao hrvatsku himnu Lijepa naša domovino i akademsku himnu Gaudeamus igitur.

Uvodnom riječi prisutnima se obratila dekanica Filozofskoga fakulteta prof. dr. sc. Vesna Vlahović-Štetić. U svojem govoru dekanica je rekla kako Odsjek za fonetiku nije ni najmanji ni najveći, ni najmlađi ni najstariji, ali da je jedinstven na Fakultetu po tome što je na Fonetici najprije postojao poslijediplomski studij, a tek nakon njega redovni, diplomski studij. Dekanica je istaknula da je preddiplomski studij fonetike prema ocjenama studenata najbolji studij na Filozofskom fakultetu. Također je pohvalila članove Odsjeka što dužnosti koje im ona kao dekanica dodijeli

spremno i angažirano prihvaćaju te time doprinose uspješnosti rada Filozofskoga fakulteta.

Nakon govora dekanice komorni sastav akademskoga zbora Concordia discors pod ravnjanjem Lobela Filipića otpjevao je pjesme Bentbaša i Grlica je zapivala.

Professor emeritus Damir Horga, iako je u mirovini, znanstveno i nastavno još je iznimno aktivan član Odsjeka. Proveo je prisutne kroz kratki vremeplov – od osnutka Zavoda za fonetiku 1954. godine, početka izvođenja doktorskog studija fonetike 1961. godine i početka izvođenja diplomskog studija fonetike koji je prvu generaciju studenata upisao 1965. godine. Profesor je zorno prikazao kako je 1968. Zavod za fonetiku prerastao u Institut za fonetiku, a Katedra za fonetiku postala samostalan Odsjek za fonetiku te što se i kojim instrumentima tada istraživalo i poučavalo na Fonetici. Znanstveni časopis *Govor* pokrenut je 1967. godine, a od 1986. članovi Odsjeka uređuju ga i brinu se za redovito izdavanje časopisa. Članovi Odsjeka od 1984. godine organiziraju znanstveni skup koji se u prvoj godini zvao Govorna komunikacija, a od 1995. se naziva Istraživanja govora te se održava trijenalno (u 2019. godini održat će se deseti skup Istraživanja govora). Od 2012. godine bijenalno se održavaju i Dani Ive Škarića, međunarodna znanstvena konferencija o retorici i argumentaciji. Profesor Horga svoju je prezentaciju ozvučio snimkama govora osnivača Odsjeka za fonetiku akademika Petra Guberine i professaora emeritusa Ive Škarića. Petar Guberina razvio je rehabilitaciju govora prema verbotonalnoj metodi te audio-vizualnu globalno-strukturnu metodu u poučavanju stranih jezika. Time je Odsjek za fonetiku u svojim počecima bio i mjesto poučavanja stranih jezika (francuskoga, njemačkoga, talijanskoga, ruskoga i engleskoga) po AVGS metodi. Elektronička oprema Odsjeka slijedila je ondašnje znanstvene trendove na svjetskoj razini te je usmjerila istraživanja prema akustici i percepciji govora. Na akustičkim, ali i medicinskim, lingvističkim i psihološkim istraživanjima postavljeni su temelji verbotonalnoga sustava Petra Guberine. Professor emeritus Ivo Škarić razvijao je Odsjek u smjeru istraživanja i poučavanja ortoepije i retorike. Jedna od njegovih najvećih zasluga, uz mnogobrojna znanstvena postignuća, bilo je i osmišljavanje te vođenje Govorničke škole za darovite srednjoškolce. Za taj dugogodišnji projekt koji je objedinjavao i primjenjivao fonetska znanja te zbog svoje pedagoške i društvene važnosti Ivo Škarić dobio je 2007. državnu "Nagradu Ivan Filipović" za životno djelo.

Nakon izlaganja o povijesti slijedio je kratki film, video-retrospekcija o povijesti Odsjeka u kojoj smo mogli vidjeti i čuti glavne ideje većine članova Odsjeka u posljednjih 30-ak godina. Film je na temelju arhivskih snimaka pohranjenih u knjižnici

Filozofskoga fakulteta te na temelju snimaka emisija s HRT-a izradio Jordan Bičanić, stručni suradnik Odsjeka za fonetiku. Dostupan je na poveznici <https://www.facebook.com/filozofski/videos/202121977330514/>.

Pročelnica Odsjeka doc. dr. sc. Elenmari Pletikos Olof predstavila je djelatnike Odsjeka. Odsjek za fonetiku ima ukupno 14 djelatnika: 12 u znanstveno-nastavnim ili suradničkim zvanjima: prof. dr. sc. Vesna Mildner, prof. dr. sc. Gordana Varošanec-Škarić, obje redovite profesorice u trajnom zvanju, prof. dr. sc. Nikolaj Lazić, izv. prof. dr. sc. Jelena Vlašić Duić, doc. dr. sc. Ines Carović, doc. dr. sc. Arnalda Dobrić, doc. dr. sc. Gabrijela Kišiček, doc. dr. sc. Marko Liker, doc. dr. sc. Elenmari Pletikos Olof, doc. dr. sc. Diana Tomić, dr. sc. Ana Vidović Zorić, poslijedoktorandica i dr. sc. Iva Bašić, asistentica. Na Odsjeku radi i stručni suradnik Jordan Bičanić, prof., voditelj Studija za akustična snimanja te tajnica gđa Marica Živko. Knjižničarka Irena Martinović, prof. vodi zbirku fonetske literature u knjižnici Fakulteta.

Od 2005. godine, tj. nakon Bolonske reforme, Odsjek izvodi novi program preddiplomskoga studija fonetike koji je dvopredmetan, trogodišnji studij (90 ECTS-a) i program diplomskoga studija fonetike koji je dvopredmetni, dvogodišnji (60 ECTS-a) te ima tri smjera: dva nastavnička (Govorništvo i Rehabilitacija slušanja i govora) i jedan nenastavnički (Znanstveno usmjerenje fonetike). Izvedbeni planovi studija mogu se pronaći na poveznici <http://theta.ffzg.hr/ECTS/>. Na preddiplomski se studij na godinu upisuje oko 40 studenata, a na diplomski studij fonetike oko 30 studenata. Trenutačno na Odsjeku studira oko 200 studenata. Pročelnica je uručila Nagrade za izvrsnost u studiju studentima koji su u prethodnoj akademskoj godini završili studij: najboljoj studentici na preddiplomskome studiju fonetike Moniki Dražinić i najboljem studentu diplomskoga studija Mihaelu Maligecu.

Posljednjih godina pri Odsjeku za fonetiku djeluje Klub studenata fonetike Eufonija koji je dosad organizirao četiri radionice FonET-a, edukacijskoga treninga za nefonetičare. Profesori Odsjeka za fonetiku aktivno sudjeluju u radu znanstvene i strukovne udruge Hrvatskoga filološkog društva – Odjela za fonetiku, koji promiče znanstveni i stručni razvoj fonetike. Aktualna predsjednica Odjela za fonetiku HFD-a je doc. dr. sc. Diana Tomić. U 2017. godini osnovana je i Hrvatska strukovna udruga fonetičara HSUF koja pomaže fonetičarima u praktičnim pravnim savjetima pri osnivanju obrta. Predsjednica HSUF-a je Vesna Kirinić Papeš, prof. Odsjek za fonetiku ima sklopljene ugovore o međunarodnoj suradnji ERASMUS+ ugovori (studentska i nastavna mobilnost) sa Sveučilištem u Budimpešti, ELTE i sa Sveučilištem u Münchenu, LMU München te Ugovor o suradnji s Pedagoškim institutom u Ljubljani.

Odsjek se sastoji od triju katedara: Katedre za teorijsku fonetiku, Katedre za primijenjenu fonetiku te Katedre za estetsku fonetiku i ortoepiju hrvatskoga književnog jezika. Rad katedara predstavili su njihovi predstojnici.

Katedru za primijenjenu fonetiku predstavila je predstojnica katedre prof. dr. sc. Vesna Mildner. Profesorica Mildner istaknula je da je najveća prednost Filozofskoga fakulteta mogućnost dvopredmetnosti. Studij fonetike može se kombinirati sa svim drugim dvopredmetnim studijima na fakultetu kojih je na preddiplomskoj razini 34, a na diplomskoj još znatno više jer svaki studij ima nekoliko smjerova. Područja rada fonetičara raznovrsna su: rehabilitacija osoba s oštećenjem sluha, rad s televizijskim i radijskim voditeljima i novinarima, rad na scenskome i filmskome govoru, poučavanje govorništva itd. Nastavnim smjerom Rehabilitacija slušanja i govora obrazuju se stručnjaci za rad u ustanovama za dijagnostiku i rehabilitaciju osoba oštećena sluha i govora te u posebnim školama za takvu djecu, za praćenje slušnog i govornog statusa i razvoja djece u predškolskim i školskim ustanovama kako bi se na vrijeme otkrile slušne i govorne teškoće i djecu uputilo na rehabilitaciju; za rad s odraslim osobama oštećena sluha, posebice u individualnom tretmanu te za kontinuirano praćenje djece i odraslih osoba s ugrađenom pužnicom. Posebno je važno područje razvoja programa i građe za slušno-govornu dijagnostiku i rehabilitacijske postupke osoba oštećena sluha i govora. Za takve je poslove fonetičar idealan spoj jezičnih kompetencija, znanja o govoru i razumijevanja mehanizama slušanja i govora koje može pretočiti u praksu. Profesorica Mildner svoju je prezentaciju završila video-pozdravima nekoliko fonetičara koji su nam se svojim čestitkama javili iz raznih dijelova svijeta.

Katedru za estetsku fonetiku i ortoepiju hrvatskoga književnog jezika predstavila je predstojnica katedre prof. dr. sc. Gordana Varošanec-Škarić koja je govorila o programu diplomskoga studija smjera Govorništvo, o znanstvenim projektima članova katedre te o brojnim publikacijama, prije svega knjigama članova katedre. Projekti i istraživanja ulaze u različita područja govornoga djelovanja: akustička i artikulacijska istraživanja govora na materinskome i stranome jeziku, zdrav i patološki govor, slušanje, istraživanje estetike glasa, forenzična fonetika, retorika, prozodija, ortoepija itd. Studijem Govorništvo fonetičari stječu znanja i vještine potrebne za poučavanje govora i govorništva govornih profesionalaca. Govorništvo se, kao jedan od načina govora koji matično proučava fonetika, predaje u gimnazijama kao izborni ili fakultativni predmet, na zasebno organiziranim tečajevima (govorničkim školama) za darovite učenike srednjih škola, na tečajevima obrazovanja za akademske djelatnike, na tečajevima za građanstvo te kao poslovno govorništvo za poduzetnike. U elektroničkim medijima

fonetičari organizirano ili individualno (primjerice, na Odjelu lektora i fonetičara na HRT-u te na drugim televizijskim i radijskim postajama) rade s novinarima, voditeljima i spikerima (izbor na audicijama, pripreme budućih govornika te stalno praćenje, savjetovanje, analiza i vježbe).

Katedru za teorijsku fonetiku predstavio je predstojnik katedre doc. dr. sc. Marko Liker te govorio prvenstveno o znanstvenoj djelatnosti Odsjeka. U razvojnoj i znanstvenoistraživačkoj strategiji Filozofskoga fakulteta od 2018. do 2023. godine jedna od 12 glavnih istraživačkih tema je "Govorna varijabilnost i gorovne tehnologije", koja je jedna od strateški bitnih istraživačkih tema na prostoru Europske Unije. Suvremeno, neposredno proučavanje gorovne artikulacije u posljednjih je desetak godina omogućila oprema za elektropalatografska i ultrazvučna istraživanja koja se na Odsjeku koristi u Laboratoriju za gorovnu kinematiku.

Budući da Odsjek u izvedbi programa surađuje s drugim odsjecima (s Odsjekom za romanistiku, Odsjekom za kroatistiku, Odsjekom za psihologiju i Odsjekom za lingvistiku), na sjednici je govorila i prof. dr. sc. Vlasta Erdeljac, pročelnica Odsjeka za lingvistiku. Naime, Odsjek za fonetiku razvio se iz Katedre za fonetiku koja je prvotno bila upravo na Odsjeku za lingvistiku. Osim što dijele mnoge znanstvene interese, surađuju na projektima i u nastavnom programu, ta dva odsjeka planiraju izradu novoga zajedničkog diplomskog studija Kliničke fonetike i lingvistike.

Od svih institucija s kojima Odsjek surađuje naj dulja je i najvažnija suradnja s Poliklinikom SUVAG. Ravnateljica Poliklinike SUVAG doc. dr. sc. Katarina Pavičić Dokoza u svom je govoru istaknula da su Poliklinika SUVAG i Odsjek za fonetiku kao dva djeteta njihova osnivača, akademika Petra Guberine te da su mu zasigurno oba bila podjednako draga.

U ime Odjela lektora i fonetičara Hrvatske radiotelevizije nazočnima se obratio i voditelj službe Tihomir Janjić, prof., koji je istaknuo da su s novinarima, voditeljima i spikerima na Hrvatskoj televiziji fonetičari počeli raditi 1991. kada su Jasmina Nikić, prof. i prof. emeritus Ivo Škarić osnovali Službu za jezik i govor (današnji Odjel lektora i fonetičara). Važnu ulogu u brizi za jezik i govor na HRT-u ima Savjet za jezik i govor u kojem je od osnutka uvijek prisutan fonetičar, a trenutačno je njegova članica izv. prof. dr. sc. Jelena Vlašić Duić.

Na kraju svečanosti dekanica Filozofskoga fakulteta prof. dr. sc. Vesna Vlahović-Štetić i pročelnica Odsjeka doc. dr. sc. Elenmari Pletikos Olof uručile su zahvalnice institucijama s kojima Odsjek za fonetiku surađuje, zaslužnim nekadašnjim članovima Odsjeka i suradnicima te sadašnjim vanjskim suradnicima i mentorima. Dodijeljene su

zahvalnice za iznimani doprinos razvoju nastavne i istraživačke djelatnosti tijekom dugogodišnje suradnje s Odsjekom za fonetiku sljedećim institucijama:

- Poliklinici za rehabilitaciju slušanja i govora SUVAG
- Odjelu za fonijatriju na Klinici za ORL i kirurgiju glave i vrata KBC-a Zagreb
- Klinici za ORL i kirurgiju glave i vrata KBC-a Sestre milosrdnice
- Odsjeku za logopediju na Edukacijsko-rehabilitacijskom fakultetu Sveučilišta u Zagrebu
- Katedri za scenski govor na Akademiji dramske umjetnosti Sveučilišta u Zagrebu
- Hrvatskom institutu za istraživanje mozga na Medicinskom fakultetu Sveučilišta u Zagrebu
- Microtonu d.o.o.
- Odjelu lektora i fonetičara Hrvatske radiotelevizije
- Centru za odgoj i obrazovanje "Slava Raškaj" u Zagrebu
- Dječjem vrtiću "Cvrčak" u Zagrebu
- Klasičnoj gimnaziji u Zagrebu
- Privatnoj gimnaziji i strukovnoj školi "Svijet" u Zagrebu
- 18. gimnaziji u Zagrebu

Odsjek za fonetiku dodijelio je zahvalnicu za iznimani stručni doprinos u radu i razvoju Odsjeka:

- Ivančici Cesarec Bačić, prof.
- Žarku Nikinu

Zahvalnica za iznimani osobni doprinos razvoju nastavne i istraživačke djelatnosti tijekom dugogodišnje suradnje s Odsjekom za fonetiku dodijeljena je nekadašnjim suradnicima:

- prof. dr. sc. Behlulu Brestovciju
  - Višnji Crnković, prof.
  - Zdenki Gavrilović, prof.
  - mr. sc. Dunji Gojković
  - prof. dr. sc. Mladenu Hedjeveru
  - Branki Jukić, prof.
  - Marini Karneluti, prof.
  - Vesni Kirinić Papeš, prof.
  - mr. sc. Vladimиру Kozini
-

- Tonku Lonzi, prof.
- Jasmini Nikić Ivanišević, prof.
- Mariji Sabadoš-Adamec, prof.
- mr. sc. Agnezi Šimunović
- mr. sc. Branki Šindiji
- prof. dr. sc. Smiljani Štajner Katušić
- dr. sc. Đurdici Vranić

Odsjek za fonetiku dodijelio je zahvalnicu za iznimani osobni doprinos razvoju nastavne i istraživačke djelatnosti aktualnim vanjskim suradnicima i mentorima koji više od desetljeća surađuju s Odsjekom, izvode nastavu ili su mentorи studentima te ih poučavaju radu u praksi u institucijama u kojima rade:

- izv. prof. dr. sc. Adindi Dulčić
- Idi Dvorščak, prof.
- Nedi Hugo Crevar, prof. logoped.
- Spomenki Lalić, prof.
- izv. prof. art. Ivani Legati
- mr. sc. Višnji Modrić
- Andelki Ravlić, prof.
- dr. sc. Nađi Runjić

Dizajn plakata svečane obljetnice i zahvalnica osmisnila je Cvijeta Franka Škarić, mag. ing. arch. Domjenak u auli ispred knjižnice bio je obogaćen izložbom plakata o povijesti i sadašnjosti Odsjeka za fonetiku koje je 2016. godine osmisnila doc. dr. sc. Arnalda Dobrić i koji su stalno izloženi na hodniku Odsjeka.

Sjednici su uz članove Odsjeka za fonetiku i drugih odsjeka Filozofskoga fakulteta te studenata fonetike nazočili i mnogi suradnici, voditelji institucija s kojima Odsjek surađuje, vanjski suradnici, mentorи, suradnici na projektima na Odsjeku. Sjednici se odazvalo više od 100 uzvanika, među njima i gospoda Vera Guberina, supruga osnivačа Odsjeka za fonetiku, akademika Petra Guberine te nekoliko studenta iz prvih generacija upisanih na studij Fonetike.

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Prikaz

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Hrvatska

Međunarodni znanstveni skup *Jezici i kulture u vremenu i prostoru 8.*  
Novi Sad, Srbija, od 17. do 18. studenoga 2018. godine

Na Filozofskom fakultetu u Novom Sadu 17. i 18. studenoga 2018. godine održan je osmi Međunarodni znanstveni skup *Jezici i kulture u vremenu i prostoru*, koji je okupio brojne znanstvenike iz Srbije, Hrvatske, Makedonije, Crne Gore, Bosne i Hercegovine, Mađarske, Italije, Rumunjske, Ujedinjenog Kraljevstva i Poljske. Skup je otvoren pozdravnim riječima prorektora za znanost Sveučilišta u Novom Sadu, organizatora prof. dr. Stevana Stankovskoga te prof. dr. Snježane Gudurić, predsjednice Organizacijskog odbora Skupa i voditeljice čitavog projekta. Nakon toga uslijedila su predavanja pozvanih predavača. Prva pozvana predavačica bila je prof. dr. sc. Klara Buršić-Matijašić s Odsjeka za povijest Filozofskog fakulteta Sveučilišta Jurja Dobrile u Puli, koja je u predavanju pod naslovom *Toponimija Općine Vrsar – Orsera, Istra, Hrvatska* govorila o proučavanju toponomastičkih oblika općine Vrsar, predstavivši rezultate istraživanja u sklopu projekta ArchAeoCultur Centra za interdisciplinarna arheološka istraživanja krajolika. Drugo pozvano predavanje bilo je na temu *Fortress Europe under siege – the representation of the European migrant crisis in political cartoons / Europska tvrđava pod opsadom – prikaz europske migrantske krize u političkim animiranim filmovima*, a izložile su ga dr. sc. Nadežda Silaški i dr. sc. Tatjana Đurović, predavačice s Ekonomskog fakulteta Sveučilišta u Beogradu. Analizirale su metaforu *fortress Europe*, često rabljenu u političkim animiranim filmovima, a kojom se nastoji predstaviti odnos europskih zemalja prema migrantskoj situaciji s kojom se susreću. Posljednje pozvano predavanje *Reč, tišina i blagovest. Per verbanon si poria*, koje se bavilo shvaćanjem pojma *riječi* u djelima znamenitih europskih književnika, poput Dantea ili Novalisa, održala je Sandra Dučić-Collette iz muzeja Keats Sehlley House u Rimu. Nakon pozvanih predavanja predstavljeno je nekoliko knjiga i publikacija, a među njima i zbornik radova s prošlogodišnjeg,

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sedmog Međunarodnog skupa *Jezici i kulture u vremenu i prostoru*, za koji je jedna od njegovih urednica, Snežana Gudurić, istaknula kako obiluje brojnim kvalitetnim radovima koji se bave nekim aspektom jezika i/ili kulture.

Izlaganja u trajanju od dvadeset minuta organizirana su u osam paralelnih sekcija. Službeni jezici skupa bili su: engleski, njemački, francuski, ruski, španjolski, talijanski, svi jezici s područja bivše Jugoslavije, ali i mađarski, slovački, rumunjski i ukrajinski. Već su same teme pozvanih predavanja, filologija, semantika i književnost, naznačile široko područje interesa koje je ovaj skup sadržajno obuhvatio pa su i sekcije podijeljene prema pojedinim užim tematskim područjima. Tako su učenje i poučavanje stranih jezika, leksikografija i frazeologija u različitim jezicima, teorija književnosti, povijest književnosti, filologija u užem smislu, antropologija, sociologija, lingvistika u užem smislu, kognitivna lingvistika, kontrastivna lingvistika, kontaktna lingvistika, korpusna lingvistika, pragmatika, komunikologija, kulturni aspekti jezika, medijska kultura, povijest, pravni aspekti u definiranju kulture manjinskih naroda i sl., samo neke od tema kojima su se bavili radovi predstavljeni na ovome skupu. Ni fonetičari nisu ostali zakinuti za sadržaje iz užeg područja njihova interesa pa su mogli slušati brojna izlaganja koja su se bavila spontanim govorom, govornom tehnologijom, razvojem i usvajanjem govora, akustičkom analizom govora, fonetikom raznih jezika i sl. Predstavljeni su i radovi triju djelatnika Odsjeka za fonetiku Filozofskog fakulteta u Zagrebu (Damira Horge, Arnalde Dobrić i Ane Vidović Zorić). Damir Horga je, u koautorstvu s Vlastom Erdeljac s Odsjeka za lingvistiku Filozofskog fakulteta u Zagrebu, izložio vrlo zanimljiv rad pod nazivom *Distribucija nefonemskog glasnika [ə] u spontanom govoru u hrvatskom*, u kojemu je promatrana raspodjela i učestalost nefonemskoga glasnika u spontanom govoru, a rezultati su interpretirani u okviru nekih od modela govorne proizvodnje. Karla Zvonar izložila je rad nastao u koautorstvu s Arnaldom Dobrić pod nazivom *Percepcija vokala u francuskom jeziku kod govornika hrvatskog kao materinskog*, u kojem je predstavila rezultate ispitivanja percepcije stupnja otvorenosti francuskih vokala /e/ i /o/ između studenata francuskog jezika i studenata koji ne govore francuski jezik. Ana Vidović Zorić izložila je rad nastao u koautorstvu s Mirjanom Mateom Kovač s Filozofskog fakulteta Sveučilišta u Splitu pod nazivom *Obilježja i raspodjela stanki u spontanome govoru*, u kojemu je analizirala raspodjelu stanki s obzirom na njihovu funkciju i položaj u iskazu. Od ostalih fonetskih tema izdvojiti ćemo izlaganje Aleksandra Živanovića s Filozofskog fakulteta u Novom Sadu pod nazivom *A comparison of coda clusters in English and Serbian / Usporedba konsonantskih skupina koje čine kodu u*

*engleskom i hrvatskom jeziku*, u kojemu se raspravlja o obilježjima sonornosti slogova u navedenim jezicima, a prepoznata je i razlika među njima s obzirom na slogovnu strukturu vokal-konsonant-vokal (VCC), koju engleski dozvoljava, a srpski ne dozvoljava. Maja Marković i Predrag Kovačević s Filozofskog fakulteta u Novom Sadu izložili su rad *Acoustic manifestations of information and contrastive focus in Serbian / Akustička ostvarenja informativnosti i kontrastivnog fokusa u srpskom jeziku*, u kojem su predstavili rezultate pilot-istraživanja o odnosu između prozodije i informacijske strukture u srpskom, analizirajući F0, intenzitet, trajanje i ostale akustičke korelate relevantne za prozodiju. Razvojem govora bavio se rad Nine Ilić Matijević, također s Filozofskog fakulteta u Novom Sadu, pod nazivom *Usvajanje konsonantskih skupina u srpskom jeziku kao materinjem*, u kojemu je usporedila uspješnost izgovora konsonantskih skupina različitih stupnjeva izgovorne zahtjevnosti među različitim dobnim skupinama djece te prepoznala redukciju i pojednostavljanje kao najzastupljenije fonološke procese prisutne tijekom usvajanja izgovora navedenih skupina. Slobodan Jovičić s Elektrotehničkog fakulteta Sveučilišta u Beogradu pokušao je pronaći akustičke parametre kojima bi se prepoznao i analizirao stres u verbalnoj ekspresiji.

Osim izlaganja usko fonetske tematike, na skupu su se mogla čuti i izlaganja koja spadaju u širi interes fonetičara. Tako je Jagoda Granić s Filozofskog fakulteta u Splitu u okviru svoga izlaganja pod nazivom *Are you syrious: sterotipi, predrasude i jezična integracija* govorila o načinima integracije migranata u društvo zemlje domaćina, naglasivši da su usvajanje jezika i kulture te zemlje neki od ključnih faktora uspješnosti tog procesa. Zanimljivim smo prepoznali i rad Miloša Košprdića s Filozofskog fakulteta u Novom Sadu, koji se u svom radu *O vidljivosti žene u jeziku – sociolinguistička studija* bavio jezičnim obilježjima ženskog spola u različitim vrstama tekstova. Katalin Ozer i Gordana Ristić, također s novosadskog Filozofskog fakulteta, u radu pod nazivom *Pravda za Cecila: oblici verbalne agresije na internetu*, analizirale su i uspoređivale izraze verbalne agresije te psovke na internetu u komentarima na članak o odabranom događaju (ubojsvo lava u jednom od afričkih nacionalnih parkova), i to u trima različitim jezicima: srpskom, mađarskom i njemačkom. Na kraju su izvele mogući zaključak o sličnostima i razlikama u verbalnim izrazima agresije u trima navedenim kulturama čije su jezike u ovom segmentu uspoređivale. Nekoliko radova bavilo se i položajem i statusom manjinskih jezika u nekoj zemlji, kao npr. rad Annamarie Bene *Mađarski kao policentrični jezik*.

Na kraju svake sesije uslijedila je vrlo živa i konstruktivna rasprava u kojoj su sudionici izmjenjivali iskustva vezana uz vlastiti, sličan znanstveni rad te davali prijedloge o mogućim načinima interpretacije pojedinih rezultata ili o smjerovima u kojima bi se mogla nastaviti ili produbiti predstavljena istraživanja.

Nakon skupa održana je svečana večera u restoranu *Fontana* u staroj jezgri Novog Sada.

S obzirom na veliku raznolikost tema te istraživača različitog znanstvenog profila, organizatori zaslužuju pohvale za izuzetno dobru organizaciju s obzirom na vremenske, prostorne i tehničke uvjete. Štoviše, ta raznolikost i jest najveća vrijednost ovog skupa, koja je većini sudionika omogućila uvid u svoj rad iz neke druge znanstvene perspektive, a time dala i nove ideje te poticaje za daljnja istraživanja. Na zatvaranju skupa sudionici su pozvani da cijelovite radove prilože za zbornik koji će biti objavljen i predstavljen 2019. godine, a najavljen je i idući, deveti skup *Jezici i kulture u vremenu i prostoru*, s očekivanjem da će biti barem jednako uspješan kao i ovogodišnji.

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Prikaz

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Hrvatska

17. kongres Međunarodnog udruženja za kliničku fonetiku i lingvistiku (ICPLA). St. Julians, Malta, od 23. do 25. listopada 2018. godine

Sedamnaesti kongres Međunarodnog udruženja za kliničku fonetiku i lingvistiku održan je od 23. do 25. listopada 2018. godine u St. Juliansu na Malti. Kongres je organizirao Odjel za govornu terapiju Medicinskog fakulteta na Malti te Sveučilište na Malti u suradnji s Međunarodnim udruženjem kliničkih fonetičara i lingvista. Kongres je održan u hotelu Corinthia, smještenom na uzvisini ponad morske pučine odakle, za lijepa vremena, pogled seže prema Siciliji. Malta, malen otok, ali bogat poviješću i tradicijom, bio je izvrstan okvir kongresu koji, iako spada u one manjeg opsega, zbog tema kojima se bavi pretendira dugovječnosti, a time i tradiciji i bogatoj povijesti. U ugodnom hotelskom ambijentu neoklasističkog stila održano je 100 usmenih izlaganja, 77 posterskih izlaganja, osam diskusijskih izlaganja te tri plenarna izlaganja. Izlaganja su na Kongresu održali istraživači iz raznih zemalja svijeta: iz gotovo svih europskih zemalja (Malte, Španjolske, Njemačke, Irske, Grčke, Ujedinjenog Kraljevstva, Švedske, Norveške, Nizozemske, Belgije, Italije, Francuske, Mađarske) te Sjedinjenih Američkih Država, Kanade, Australije, Kine, Tajlanda i Južnoafričke Republike.

Svaki je dan na Kongresu održano po jedno plenarno predavanje. Prvog dana plenarno predavanje pod naslovom *Izazovi i mogućnosti u terapiji dizartrije / The challenges and opportunities when treating acquired dysarthria* održala je prof. emerita dr. sc. Pamela Enderby sa Zdravstvene škole i istraživačkog centra Sveučilišta u Sheffieldu, Ujedinjeno Kraljevstvo. Govorila je o tome kako se u posljednja dva desetljeća pristup dizartriji promijenio i unaprijedio zahvaljujući korištenju znanja iz neurofiziologije, fonetike i lingvistike te da je razvoj tehnologije također pomogao razumijevanju problema. Dala je smjernice za praksu na temelju

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novih spoznaja. Drugog dana Kongresa plenarno predavanje pod naslovom *Optimiziranje kliničke rehabilitacije za osobe s afazijom – koordinacija i primjena zajedničkog znanja i istraživanje novih, nepoznatih izazova i mogućnosti / Optimising clinical rehabilitation for people with aphasia – co-ordination and application of shared knowledge and the exploration of new, unknown challenges and opportunities* održala je prof. dr. sc. Marian Brady sa Sveučilišta Caledonia, Glasgow (Ujedinjeno Kraljevstvo), ravnateljica Centra za rehabilitaciju i brigu o osobama s moždanim udarom. Govorila je o važnosti kliničke lingvistike za evaluaciju te dijagnostiku i rehabilitaciju osoba s afazijom, kao i o važnosti multidisciplinarnog suradnje u tretiranju osoba s afazijom. Treće plenarno predavanje pod naslovom *Premoščivanje jaza između vanjskih dokaza i pružanja usluga djeci s poremećajima govora i jezika / Bridging the gap between external evidence and service delivery for children with speech and language disorders* održao je sveučilišni profesor govornih i jezičnih znanosti James Law sa Sveučilišta New Castle, Ujedinjeno Kraljevstvo. Govorio je o mogućnostima terapije i o poboljšanjima koja se mogu očekivati zahvaljujući intervencijama kod govorno-jezičnih teškoća. Nakon sva tri plenarna izlaganja uslijedile su vrlo dinamične i poticajne rasprave, a tako je bilo i nakon ostalih izlaganja. Usmena izlaganja organizirana su u četiri sekcije tijekom tri kongresna dana. Četiri prijepodnevne sekcije prvog dana bavile su se bilingvizmom, rascjepom nepca, jezikom kod slušnog oštećenja te fonetskim temama. Nakon toga slijedila je posterska sekcija. Izložena su 24 postera koja su tematski pokrivala razna područja govora i jezika (od fonetike i fonologije, preko bilingvizma pa do patologije i njezinih uzroka). Na poslijepodnevnim sekcijama prvog dana Kongresa nastavilo se sa sličnim temama u četiri paralelne sekcije. U sekciji o slušanju i slušnom procesiranju govorila je Iva Hrastinski s Edukacijsko-rehabilitacijskog fakulteta u Zagrebu o vezi između slušnog procesiranja i akademskih postignuća u djece koja govore hrvatski jezik. Predstavila je test o slušnom procesiranju koji je u postupku standardizacije. Nakon stanke slijedila su diskusionska izlaganja koja su se nastavljala na teme iz gore spomenutih sekcija. Prvi dan Kongresa završio je sastankom odbora Međunarodnog udruženja za kliničku fonetiku i lingvistiku (ICPLA) na kojem je naša prof. dr. sc. Vesna Mildner izabrana za predsjednicu Međunarodnog odbora ICPLA. Čestitamo joj od srca!

Usmena izlaganja drugog dana Kongresa organizirana su, kao i prethodnog dana, u četiri tematske sekcije. Jedna se bavila karakteristikama govora kod pacijenata s Alzheimerovom bolesću te blažim kognitivnim oštećenjem, druga slušnim oštećenjem, treća autizmom, a četvrta artikulacijskim teškoćama. Nakon prvog dijela

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usmenih izlaganja slijedila su posterska izlaganja. Izložena su 22 tematski različita postera. Vesna Mildner i Lara Ptičar predstavile su svoj rad u kojem su ispitivale slušno procesiranje emocija u djece s umjetnom pužnicom. Ispitivanje je pokazalo da djeca s umjetnom pužnicom, koja su bila kraće na terapiji slušanja i govora, imaju problema s prepoznavanjem pojedinih emocija. Boška Munivrana, Vesna Mijić i Vesna Mildner imale su izlaganje o istraživanju iz područja slušnih evociranih potencijala. Ispitivale su val N400 kod djece s umjetnom pužnicom, koji se javio na kratki govorni podražaj, što nije standardna paradigma za njegovo pojavljivanje. Pokazalo se da djeca koja se dobro koriste umjetnom pužnicom imaju semantičko procesiranje kao i njihovi vršnjaci. Na poslijepodnevnim sekcijama nastavilo se s usmenim izlaganjima u četiri paralelne sekcije. Teme su bile iz psiholingvistike, afazija, akustičke analize glasa i govorne produkcije (posebno kod rascjepa nepca) te jezičnog razvoja. Nakon stanke slijedila su diskusionska izlaganja podijeljena u četiri sekcije. Jedna sekcija odnosila se na kliničku fonetiku i obrazovanje terapeuta za govor i jezik. Druga sekcija je kao temu imala provjeru slušanja nakon obavljenih audioloških pretraga. Govorilo se o potrebi ispitivanja funkcionalnosti slušanja (slušnom procesiranju i kod slušno oštećenih osoba, ali i kod onih koji nemaju oštećen sluh). U trećoj sekciji govorilo se o terapiji narativnog diskursa kod osoba s jezičnim teškoćama, a četvrto diskusionsko izlaganje bavilo se razvijanjem kliničkih instrumenata za ispitivanje slušno-govornih teškoća. Drugi dan Kongresa završio je večerom u Mdini, starom, pitoresknom gradiću utvrđi koji je udaljen 20-ak minuta vožnje autobusom od hotela Corinthia. Večera je bila organizirana u jednoj od ondašnjih velebnih palača. Bila je to lijepa prilika da, uz ukusnu hranu i dobro vino, upoznamo različite sudionike Kongresa i razmijenimo iskustva. I trećeg dana Kongresa, nakon plenarnog izlaganja, slijedila su usmena izlaganja podijeljena u četiri sekcije. Teme sekcija bile su iz područja fonetike i fonologije, slušnih oštećenja, posebnih jezičnih teškoća te Alzheimerove bolesti i demencije. Kao i prethodna dva dana, i trećeg su dana slijedila posterska izlaganja, njih 30. Martina Sekulić Sović i suradnici s Odsjeka za lingvistiku Filozofskog fakulteta u Zagrebu predstavili su svoj rad pod naslovom *Olakšavaju li animacije leksičko-semantičku obradu kod prve psihotičke epizode? / Does animacy feature facilitate lexical-semantic processing in first-episode psychosis?*. Rezultati njihova istraživanja pokazali su da pacijenti imaju manje automatiziranih veza u svim testiranim leksičko-semantičkim kategorijama te da su najočuvanije značajke animiranih kategorija. Doprinos je ove studije u vezi s određivanjem klasifikatora jezika koji bi mogli pomoći u dodatnoj dijagnostici akutnog poremećaja i koji bi mogli omogućiti potencijalno

predviđanje tijeka poremećaja i njegov funkcionalni ishod. Na poslijepodnevnim sekcijama nastavilo se s usmenim izlaganjima u četiri paralelne sekcije. Teme su bile govorni poremećaji uzrokovani neuralnim oštećenjima, govor kod osoba sa sindromom Down te kod onih s autizmom. Nakon završene sekcije slijedilo je svečano zatvaranje Kongresa i poziv da se okupimo ponovno za dvije godine u Glasgowu. Kongres je završio obilaskom prebogate kulturne i povijesne baštine Malte – tog malog, ali pomorski važnog otoka u Sredozemlju. Veselimo se Glasgowu i sasvim novom ambijentu koji će sa sobom donijeti i nove ideje, nove spoznaje i nova poznanstva.

Prikaz

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Hrvatska

### Izvještaj o radu Odjela za fonetiku od lipnja 2017. do lipnja 2018.

U akademskoj godini 2017./2018. Odjel za fonetiku nastavio je s uobičajenim aktivnostima. Održana su predavanja u ciklusu *Inojezični hrvatski* koje je koordinirala dr. sc. Ivančica Banković-Mandić. Osim redovitih susreta, članice predsjedništva povremeno su se sastajale da bi razgovarale o različitim temama vezanima uz struku te su sazvale i sastanak fonetičarskih udruga.

Sastanak s članovima udruga fonetičara održan je 5. lipnja 2018. Na sastanku su bili: Vesna Kirinić Papeš, Zlatko Papeš, Matea Hotujac Drevan, Filip Kordovan (Hrvatska strukovna udruga fonetičara – HSUF), Sara Petra Mihaljević (Udruga fonetičara u zdravstvu), Boška Munivrana Dervišbegović, Ivančica Banković-Mandić, Diana Tomić (Odjel za fonetiku HFD-a) i gošća Jelena Vlašić Duić.

Jelena Vlašić Duić izvjestila je prisutne o aktivnostima u Sektorskom vijeću Filologija Hrvatskog kvalifikacijskog okvira (HKO). Navela je dva zanimanja (klinički fonetičar i nastavnik govorništva) koja predlaže umjesto postojećeg diplomiranog fonetičara, što je kvalifikacija, i ukratko spomenula procedure za izradu obaju standarda te pripremu projekta HKO-a na Filozofskom fakultetu. Tijekom razgovora o temi izneseni su brojni problemi s kojima se fonetičari suočavaju u praksi. Bilo je riječi i o filološkom znanju koje fonetičarima daje kompetencije za rad, ne samo sa slušnim, nego i s govornim i jezičnim poteškoćama.

Druga točka obuhvaćala je predstavljanje udruga i iznošenje ciljeva djelovanja svake od njih. Sara Petra Mihaljević naglasila je važnost definicije kliničkog fonetičara, kompetencija kao i isprava u kojima su navedene kompetencije koje bi trebale pružati detaljniji uvid u profesionalni profil fonetičara i tako ga činiti prepoznatljivijim i konkurentnijim na tržištu rada. Neupitno jest da to treba biti zajednički cilj i, iako to nije eksplicitno rečeno, svakako će se nastaviti suradnja na tom polju.

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Vesna Kirinić Papeš i Matea Hotujac Dreven predstavile su prvu godinu rada HSUF-a tijekom koje su zabilježile probleme s kojima se fonetičari susreću u praksi. Navele su primjer dodatnog obrazovnog programa, poteškoće pri otvaranju obrta i praksi te potencijal edukacija za asistente u nastavi kojih je na tržištu sve više, a kvalitetom nisu dorasli poslu koji ih kasnije očekuje. Spomenule su i tehnološki napredak, poput unaprjeđenja aparata koje fonetičari koriste u radu, ali i brojne nelogičnosti i nepravde u zapošljavanju drugih profila (npr. novinara) na radnim mjestima koja bi više odgovarala kvalifikacijama fonetičara. Spominjalo se vrednovanje studijskog programa, način proučavanja i razvoj AVGS metode, manjak napretka u govornoj tehnologiji itd.

Diana Tomić predložila je razmjenu informacija o aktivnostima, pozvala prisutne na Godišnju skupštinu Odjela, predložila koordinaciju i promociju struke za maturante te bolju koordinaciju tijekom javnih rasprava o zakonskim prijedlozima. Matea Hotujac Dreven predložila je sklapanje Saveza udruga i najavila prikupljanje informacija o tome. Diana Tomić obavijestila je prisutne o koracima koji se poduzimaju vezano uz organizaciju stručnog ispita, koji je za nastavnike govorništva već pripremljen, a za fonetičare rehabilitatore učinjeni su prvi koraci.

## Predavanja i sastanci

Tijekom akademske godine održano je osam stručnih predavanja:

- dr. sc. Marica Čilaš Mikulić (Croaticum – Centar za hrvatski kao drugi i strani jezik): *Važnost korekcije izgovora u inojezičnom hrvatskom iz perspektive nefonetičara* (30. listopada 2017.)
- dr. sc. Sanda Lucija Udier (Croaticum – Centar za hrvatski kao drugi i strani jezik): *Ovladavanje enklitikama u hrvatskom kao inom jeziku* (27. studenog 2017.)
- dr. sc. Maša Musulin (Odsjek za romanistiku Filozofskog fakulteta Sveučilišta u Zagrebu): *Usporedba španjolskog i hrvatskog fonološkog sustava* (20. prosinca 2017.)
- prof. dr. sc. Zrinka Jelaska (Odsjek za kroatistiku Filozofskog fakulteta Sveučilišta u Zagrebu): *Umna slika fonema: govorni i pisani ostvaraj* (29. siječnja 2018.)
- doc. dr. sc. Vesna Deželjin (Odsjek za talijanistiku Filozofskog fakulteta Sveučilišta u Zagrebu): *Zbog čega je usvajanje hrvatskih standardnih naglasaka italofonim govornicima teško?* (26. veljače 2018.)

- izv. prof. dr. sc. Željka Čelić (Odsjek za istočnoslavenske jezike i književnosti Filozofskog fakulteta Sveučilišta u Zagrebu): *Glasovi ruskoga jezika i hrvatska narječja kao pomoć pri njihovom usvajanju* (26. ožujka 2018.)
- doc. dr. sc. Kristina Katalinić (Odsjek za hungarologiju Filozofskog fakulteta Sveučilišta u Zagrebu): *Usporedba mađarskog i hrvatskog fonološkog sustava iz perspektive mađarskog kao L2* (30. travnja 2018.)
- prof. dr. sc. Višnja Josipović-Smojver (Odsjek za anglistiku Filozofskog fakulteta Sveučilišta u Zagrebu): *Pedeset nijansi kontrastivne fonologije* (28. svibnja 2018.).

### **Godišnja skupština Odjela za fonetiku**

Godišnja skupština održana je 11. lipnja 2018. Podnesen je izvještaj o radu i aktivnostima Odjela u protekloj akademskoj godini i predstavljen je plan aktivnosti za iduću godinu, s posebnim naglaskom na organizaciju skupova. Prof. dr. sc. Gordana Varošanec-Škarić najavila je organizaciju petih *Dana Ive Škarića* koje će kao predsjednica Organizacijskog odbora voditi doc. dr. sc. Alma Vančura s Filozofskog fakulteta Sveučilišta Josipa Jurja Strossmayera u Osijeku. Profesorica Varošanec-Škarić najavila je snažniju suradnju Odjela i organizatora jer je Odjel za fonetiku, iako formalno organizator, vrlo malo sudjelovao u pripremama. Nadalje, članovi Odjela izvjestili su o sudjelovanjima na konferencijama i stručnim skupovima.

Na kraju službenog dijela skupštine članovima Odjela izvođenjem govora predstavili su se studenti fonetike s kolegija Govorništvo.

Govore su izveli:

- Antun Božić – Nije sve za svakoga
- Lucia Paula Strujić – U smjeru jezičnih slaganja
- Martina Dobrica – Vrijeme za promjenu vremena.

### **4. međunarodna konferencija *Dani Ive Škarića***

Kako nas je pisanim putem izvjestio predsjednik Organizacijskog odbora Davor Stanković, prof.: "Odjel za fonetiku suorganizirao je četvrtu međunarodnu konferenciju retorike *Dani Ive Škarića* koja se već tradicionalno održava u Postirima na otoku Braču. Četvrta konferencija održavala se od 18. do 21. travnja 2018. i okupila je 40-ak retoričara iz Hrvatske i različitih zemalja, točnije: Austrije, Belgije, Češke, Italije, Izraela, Kanade, Mađarske, Nizozemske, Norveške, Njemačke, Sjedinjenih Američkih Država, Slovenije, Ujedinjenog Kraljevstva i Ukrajine. U veljači 2017. imenovani su međunarodni Programski i Organizacijski odbor koji su

osmislili trodnevni program, relevantne teme skupa (argumentacija i pravo, povijest retorike, retorika i filozofija, retorika i stilistika, retorika u medijima, retorika političkog diskursa, retorika religijskog diskursa, retorika znanosti, retorika u obrazovanju, teorija argumentacije i multimodalna retorika) te pozvali dvoje uglednih inozemnih stručnjaka za plenarne izlagače: prof. dr. sc. Petru Aczél sa Sveučilišta u Budimpešti i dr. sc. Nicka Turnbulla sa Sveučilišta u Manchesteru. Predsjednica Programskog odbora bila je izv. prof. dr. sc. Anita Runjić-Stoilova. Sudionici su konferenciju, čiji je cilj razmjena znanja, iskustava i novih dostignuća u bavljenju retorikom, ocijenili iznimno uspješnom." Od naših članova sudjelovali su Damir Horga u suautorstvu s Anom Vidović Zorić, Ines Carović u suautorstvu s Anom Mršić Zdilar, Gabrijela Kišiček, Davor Nikolić i Anita Runjić-Stoilova, koja je skup detaljnije prikazala u časopisu *Govor*.

### Izvještaji s konferencija, znanstvenih i stručnih skupova te ljetnih škola

Članovi Odjela za fonetiku i dalje redovito aktivno sudjeluju na znanstvenim i stručnim skupovima u zemlji i inozemstvu. Na godišnjoj skupštini Odjela za fonetiku članovi i voditeljica Odjela izvjestili su o aktivnostima u prethodnoj akademskoj godini. Damir Horga sudjelovao je u radu Konferencije Komisije za fonetiku i fonologiju slavenskih jezika te je za članstvo u komisiji predložio Ines Carović. Vesna Mildner u sklopu ERASMUS projekta posjetila je Sveučilište u Barceloni te je održala pozvano predavanje *Istraživanja u primjenjenoj lingvistici* u sklopu LinguaDOC – I. znanstvenog skupa doktoranada HDPL-a (Rijeka, 25. studenoga 2017.). U listopadu 2017. u Beogradu je održana konferencija *Jezik i govor* na kojoj su sudjelovale Diana Tomić i Arnalda Dobrić sa svojim koautoricama. Detalji o radu skupa prikazani su u časopisu *Govor*. Elenmari Pletikos Olof izvjestila je o radu skupa Hrvatskog društva za primijenjenu lingvistiku (XXXII. međunarodni znanstveni skup HDPL-a *Jezik i um*, Rijeka, 3. – 5. svibnja 2018. godine), a Ivančica Banković-Mandić o mladoj, ali perspektivnoj Međunarodnoj jezikoslovnoj konferenciji CLARC 2018. (Rijeka, 8. – 10. lipnja 2018.). Oba su skupa prikazana u prvom ovogodišnjem broju časopisa *Govor*. U Novom Sadu održana je od 18. do 19. studenoga 2017. konferencija pod nazivom *Jezici i kulture u vremenu i prostoru* u organizaciji Filozofskog fakulteta Sveučilišta u Novom Sadu. Na skupu je sudjelovalo oko 160 autora sa 130 radova iz Italije, Srbije, Hrvatske, BiH, Poljske, Crne Gore, Makedonije, Rumunjske i Meksika. Teme su uključivale brojne filološke interese, od književnosti do raznih lingvističkih

tema, a od članova Odjela sudjelovale su Jelena Vlašić Duić i Elenmari Pletikos Olof te Arnalda Dobrić u suautorstvu sa studenticom Irenom Milanović. Ines Carović u suautorstvu sa studenticom Tenom Žganec sudjelovala je u radu 5. međunarodne konferencije *Inovacija, tehnologija, edukacija i menadžmenta*, održane u organizaciji Međimurskog veleučilišta (MEV) u LifeClass Termama Sveti Martin 4. i 5. travnja 2018. s glavnom temom Inovacije, sigurnost i održivost u razvoju društva. Na konferenciji su sudjelovali brojni stručnjaci iz Hrvatske, Mađarske, Srbije, Češke i Slovenije s 80 izlaganja.

## Projekt proGOVORi

Tijekom akademske godine 2017./2018. Odjel za fonetiku organizirao je projekt proGOVORi. Proveden je u Gimnaziji Antuna Vrančića u Šibeniku, a financiralo ga je Ministarstvo znanosti i obrazovanja. Autorice projekta su Ana Vlah i Diana Tomić. Projekt se temelji na činjenici da hrvatski učenici u posljednje vrijeme ne postižu zadovoljavajuće rezultate na PISA testiranjima u različitim područjima, a pogotovo u medijskoj pismenosti. Djeca i mladi od najranijih dana koriste medije ne razmišljajući uvijek kritično da 1) svaka informacija nije nužno ispravna, 2) svaki korisnik s kojim stupaju u kontakt nije uvijek dobronamjeran i 3) svaki potez koji naprave negdje ostane zabilježen i može se iskoristiti protiv njih. S druge strane, poslodavci sve češće traže izvrsne komunikacijske i prezentacijske vještine svojih zaposlenika. Prateći trendove na tržištu rada, to nije ništa neobično – gotovo svaki posao u svakome sektoru uključuje rad s ljudima, a onda i komunikaciju, uvjeravanje, slušanje, prezentiranje ideja i sl.

proGOVORi je obrazovni program koji koristi sadržaje, odnosno znanja iz retorike i komunikologije, kako bi učenici osvijestili i unaprijedili vještine medijske i informacijske pismenosti, kritičko promatranje medija te kreiranje medijskih sadržaja u atmosferi neformalne edukacije. Teme o kojima se govori proučavaju se u retorici i komunikologiji od antike do danas: argumentacija, uvjeravanje, kompozicija govora, neverbalna komunikacija, strah od javnog nastupa, izvedba javnoga govora. Projekt je organiziran u dvije faze: u prvom dijelu učenici pohađaju seriju od šest do osam predavanja, a u drugom koriste opremu kako bi snimili videozapise. Pristupom u kojem se učenici potiču na praktičan rad stvara se okruženje koje imitira 'svijet odraslih' i u kojem se vježbaju komunikacijske vještine i vještine rješavanja problema na životnim situacijama. Tijekom edukacije učenici su uključeni u *brainstorming* i diskusije vezene uz aktualne probleme, poput internetske sigurnosti ili *cyberbullyinga*.

## Časopis *Govor*

*Govor* izlazi redovito. Godišnja pretplata na dva broja časopisa *Govor* iznosi 50 kn.

## Godišnja skupština Hrvatskoga filološkog društva

Predsjedništvo Hrvatskoga filološkog društva održalo je sastanak 5. veljače 2018. te je sazvalo redovitu godišnju skupštinu Hrvatskoga filološkog društva 20. veljače 2018. Na Skupštini su predsjednici odjela i urednici časopisa podnijeli izvještaje o radu. Predstavljen je i plan aktivnosti za 2019. godinu te su podneseni finansijski izvještaji i planovi. Godišnja skupština tradicionalno je započela predavanjem i stručnim razgovorom na određenu temu, koju je ove godine održala doc. dr. sc. Aleksandra Šćukanec pod naslovom: *Jezičnobiografski narativi žumberačkih transmigranata*.

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## UPUTE AUTORIMA

Časopis *Govor* objavljuje znanstvene i stručne priloge koji pridonose razvoju znanosti o govoru – izvorne znanstvene radove, studije, stručne radove, pregledne članke, znanstvene eseje, prethodna priopćenja i prikaze. Časopis izlazi dva puta godišnje. Rukopisi se šalju elektroničkom poštom na adresu [govor@ffzg.hr](mailto:govor@ffzg.hr).

Primaju se radovi na hrvatskom i engleskom jeziku. Molimo Vas da svakom rukopisu pisanom na hrvatskom jeziku, a koji je pripremljen prema uputama, priložite na kraju još i na engleskom jeziku naslov, opis slika i tablica te prošireni sažetak (*summary*) opsega od 1 800 do 2 500 znakova. Iz tog sažetka te opisa slika i tablica čitatelji koji će čitati samo dijelove teksta na engleskom trebaju saznati najvažnije informacije koje je autor člankom želio prenijeti. Savjetujemo da prošireni sažetak uključuje vrlo kratak uvod i postavljanje problema, opis istraživanja, dobivene rezultate i kratak komentar.

Časopis autorima ne naplaćuje troškove zaprimanja, recenziranja ili objavljivanja radova. Časopis se financira sredstvima Ministarstva znanosti i obrazovanja Republike Hrvatske, preplatom na tiskano izdanje i sredstvima Izdavača. Autori članaka dobit će po jedan primjerak onog broja *Govora* u kojem je njihov rad objavljen.

### Recenzijski postupak

Recenzenti su stručnjaci s područja teme koju članak obrađuje. Rukopisi poslije uredničkog pregleda podliježu tzv. dvostrukoj slijepoj recenziji (engl. *double-blind review*), procesu u kojem identitet autora recenzentu i recenzenta autoru ostaje nepoznat te komuniciraju isključivo posredstvom Uredništva. Mole se autori da iz teksta i referencija uklone informacije koje bi mogle otkriti njihov identitet (ime i prezime, ime projekta itd.), da vode računa o citiranju vlastitih radova i izbjegavaju rečenice poput "Naša prethodna istraživanja...", te da iz elektroničkog dokumenta uklone osobne podatke vidljive u opisu dokumenta (engl. *properties*).

Nakon primanja recenzija autori uz novu verziju rada šalju i odgovor na recenziju u kojem jasno navode koje su recenzentske prijedloge uvažili, koje nisu i zašto. Uredništvo časopisa potom uređuje rad u skladu s propozicijama časopisa i jezičnim standardima.

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Autori zadržavaju autorska prava za članke objavljenе u časopisu, no svojim pristankom na objavlјivanje daju časopisu *Govor* pravo prvog objavlјivanja u tiskanom te elektroničkom formatu. Radovi objavljeni u časopisu licencirani su pod Creative Commons licencom CC BY-NC-ND, što znači da se sadržaj može distribuirati uz navođenje autora u nekomercijalne svrhe bez izmjena. Autori dopuštaju nakladniku postavljanje svojih radova na web stranicu časopisa *Govor*.

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## Upute za pripremu rukopisa

1. Rukopise treba slati u A4 formatu, s dvostrukim proredom. Stranice treba numerirati redom, od naslovne do zadnje.
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4. Unutar odlomka retke ne treba odvajati prelaskom u novi red, ne treba uvlačiti prvi redak teksta, između odlomaka i prije svakog naslova poglavlja ostaviti jedan redak proreda.
5. Slikovne priloge i grafikone treba poslati izdvojene u jednom od sljedećih formata: png, jpg, gif, bmp itd. Poželjno je grafikone poslati i u MS Excel formatu. Svaki slikovni prilog mora imati redni broj i opis na hrvatskom i engleskom jeziku (primjerice: Slika 1. Grafički prikaz rezultata, Figure 1. Visualization of the results) te prijevod svih tekstualnih dijelova na engleski ili hrvatski jezik. U tekstu treba označiti mjesto na kojem se treba nalaziti određeni

slikovni prilog. Slikovni bi prilozi trebali biti crno-bijeli, oblikovani tako da se jasno vide svi elementi s obzirom na format časopisa.

6. Svaku tablicu treba obilježiti arapskim brojem i opisom na hrvatskom i engleskom jeziku (primjerice: Tablica 1. Rezultati prvog eksperimenta, Table 1. Results of the first experiment). Tekstualne dijelove tablice treba prevesti na engleski ili hrvatski jezik. Tablicu treba priložiti na kraju rukopisa, a u tekstu je potrebno označiti mjesto na kojem se tablica treba nalaziti.
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**Knjiga**

**Malmberg, B.** (1960). *La Phonétique*. Paris: Presses universitaires de France.

**Članak u časopisu**

**Gospodnetić, J.** (1982). Načela fonetike i njezin napredak. *Govor*, 4(2), 93–108.

**Članak u zborniku radova**

**Blumstein, S.** (1995). On the neurobiology of the sound structure of language: Evidence from aphasia. U K. Elenius i P. Branderud (ur.), *Proceedings of the XIIIth International Congress of Phonetic Sciences*, vol. 2 (str. 180–185). Stockholm: KTH i Sveučilište u Stockholmu.

**Članak odnosno poglavlje u knjizi više autora**

**MacNeilage, P. F.** (1999). Acquisition of speech. U W. J. Hardcastle i J. Laver (ur.), *The Handbook of phonetic sciences* (str. 301–332). Oxford, UK; Malden, Mass.: Blackwell Publishers.

**Izvor na internetu s navedenim autorom**

**Boersma, P. i Weenink, D.** (2005). Praat: Doing phonetics by computer. Dostupno na <http://www.praat.org/> [posljednji pristup 26. siječnja 2005.].

Savjetujemo autorima da navedu DOI broj za one publikacije koje ga koriste.

## INFORMATION FOR AUTHORS

Govor publishes original research articles, studies, professional articles, reviews, essays, scholarly notes, and letters to the editor that are relevant to speech science and communication. Contributions addressing the issues of speech and hearing disorders and rehabilitation will also be considered. The journal is published two times a year. The manuscripts are submitted via e-mail [govor@ffzg.hr](mailto:govor@ffzg.hr).

The languages of the journal are Croatian and English. Articles in Croatian should be accompanied by an extended summary in English and articles in English should be accompanied by an extended summary in Croatian (1800 to 2500 characters). Figure and table captions as well as the other texts in the figures and tables should also be bilingual, i.e. written in English and Croatian. We suggest that the summary be organized into a short introduction, problem definition, description of the research, and results with a brief discussion. The purpose of this addition is to enable authors who do not read the language of the article to get the most relevant information the author wanted to convey. Translations may be provided by the Editor.

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-

Arabic numerals. Figure captions and other texts in the Figure should be in English and Croatian. In the text itself the place for each figure should be clearly marked. Figures should be in black and white, with their size and complexity adjusted to the format of the Journal so that all elements are clear and visible.

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This section gives basic information about APA style citation. More information, such as publication types not listed here, can be found on APA website ([www.apastyle.org](http://www.apastyle.org)).

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**Malmberg, B.** (1960). *La Phonétique*. Paris: Presses universitaires de France.

Journal article

**Gospodnetić, J.** (1982). Načela fonetike i njezin napredak. *Govor*, 4(2), 93–108.

Conference proceedings

**Blumstein, S.** (1995). On the neurobiology of the sound structure of language: Evidence from aphasia. In K. Elenius, & P. Branderud (Eds.), *Proceedings of the XIIIth International Congress of Phonetic Sciences*, Vol. 2 (pp. 180–185). Stockholm: KTH and Stockholm University.

Book section

**MacNeilage, P. F.** (1999). Acquisition of speech. In W. J. Hardcastle, & J. Laver (Eds.), *The Handbook of phonetic sciences* (pp. 301–332). Oxford, UK; Malden, Mass.: Blackwell Publishers.

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**Boersma, P., & Weenink, D.** (2005). Praat: Doing phonetics by computer. Retrieved January, 26, 2005, from <http://www.praat.org/>

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*Govor* izlazi dva puta godišnje.

Godišnja preplata: 50 kn. Pojedini broj: 30 kn.

Uplate: Zagrebačka banka, Zagreb, IBAN račun: HR7423600001101551990  
Hrvatsko filološko društvo, Zagreb, Ivana Lučića 3.

Godišnja preplata u inozemstvu: 15 € Pojedini broj: 10 €

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IBAN HR7423600001101551990 Hrvatsko filološko društvo, Zagreb, Ivana  
Lučića 3.

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