A comparison of lexical access in teenagers' spontaneous speech and recitation of poetry

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Abstract

In spontaneous speech the problem of lexical access can occur as the use of incorrect lexemes. The various types of incorrect lexemes can be based on semantic and phonetic similarity, caused by grammatical reasons, mixed idioms or compression report. They can also occur in telling the poems learnt by heart. The incorrect lexemes occurring in these situations have common elements and differences, but the question is to what extent.

A series of experiments was carried out with the participation of secondary-school children. Their improved and unimproved incorrect words selected from their spontaneous speech patterns, and their poems learnt by heart were analysed in quantitative and qualitative terms (frequency, types, word orders) both by Praat program and by statistics.

The results have confirmed the preliminary assumption and they can offer new input into serving teenagers whose development of typical language mental lexicons may serve for comparison testing of atypical language development.

Keywords

mental lexicon, lexical access, incorrect lexeme, spontaneous speech, poem learnt by heart

Porównanie dostępu leksykalnego w spontanicznej mowie nastolatków i w recytacji wierszy

Abstrakt

W mowie spontanicznej problem dostępu leksykalnego może wystąpić w formie użycia niewłaściwych leksemów. Różne ich typy mogą być związane z podobieństwem semantycznym i fonetycznym, spowodowanym względami gramatycznymi, pomieszaniem idiomów lub zjawiskiem kompresji. Mogą również wystąpić w recytowaniu wierszy uczonych na pamięć. Niepoprawne leksemy występujące w tych sytuacjach mają wspólne elementy i różnice, ale pytanie brzmi, w jakim stopniu one występują.

Przeprowadzono serię eksperymentów z udziałem uczniów szkół średnich. Poprawiane i niepoprawiane błędne słowa wybrane z ich spontanicznych wzorców mowy i ich wyuczonych na pamięć wierszy analizowano pod względem ilościowym i jakościowym (częstotliwość, rodzaje, szyk) z użyciem programu Praat i narzędzi statystycznych.

Wyniki badania potwierdziły nasze wstępne założenia i mogą wnieść nowy wkład w pomaganie nastolatkom, a także użycie badań typowego rozwoju mentalnego leksykonu w badaniach z nietypowego rozwoju języka.

Słowa kluczowe

leksykon mentalny, dostęp leksykalny, niepoprawny leksem, spontaniczna mowa, wiersz uczony na pamięć

1.   Introduction

The mental lexicon is a brain storage system which includes all language units from phonology to semantics (Aitchison 2003, Bonin 2004), rules (Emmorey-Fromkin 1988), and all of the speaker's knowledge about words in his or her language(s) (Singleton 1999, Roux 2013).

The mental lexicon can be organized by sounds (phonological similarity), or by meaning (semantic similarity) (Kraut et. al. 2002), but the age at which the word is acquired, or the

frequency of its use can also influence its organization. The words are represented in long-term memory mainly as part of a network of related words (Bruza et al. 2009). When a word is activated, other words of similar form (Stamer-Vitevitch 2012), meaning (Mirman 2011), syntax (Kim-Lai 2012), orthography (Carreiras et al. 2013) or emotional content (Bayer et al. 2012) are also activated.

The mental lexicon is of crucial importance in speech production (Levelt 1989) which begins with the speaker focusing on a target concept and ends with articulation. The main part of speech production is the lexical selection when the speaker accesses the appropriate lexical item in the lexicon. The lexical recall is determined as the selection of the right lexical concept and tagged form design (phonological form). The activation of the lexicon happens on "lemma and lexeme" levels (Aitchison 2003, Garrett 1980, Levelt 2001), as the "word stored in the mind" can contain two components: a semantic component called a lemma, and a formal component referred to as a lexeme. The lemma component includes the information on the word's meaning, its connotations, style, and syntactic pattern, but the lexeme component contains the word's morphology, phonology and orthography (Levelt 2001). The error analysis including the "tip of the tongue" (TOT) phenomenon, selection errors known as malapropisms and also the mistakes of aphasic patients show the two-level structure of the internal lexical storage system (Fromkin 1999, Aitchison 2012).

Levelt also assumes that lexical selection is competitive and constrained by grammatical class (1999). Lexical access in the speech production process is not always successful for the speakers, mainly because of competitive structures during the lexical selection. In the tip of the tongue phenomenon, the speaker knows the concept of the word, but he or she is not able to recall the correct lexeme. The speaker knows what the word is and can provide semantic information about it, but cannot remember the exact phonological form, as the lemma has been accessed, but the phonological representation has

not. Incorrect lexemes (false starts, false lexemes) can occur in the surface structure of speech production as the result of simultaneously competed structures speaking a different intention, and they can occur both on the lemma and lexeme levels (Aitchison 2012, Huszár 2005, Gósy 2001, Levelt 2001). These substitution errors are based on semantic or phonetic similarity and semantic substitutions or phonologically related substitutions (malapropism). Semantic substitutions come from selecting the wrong lemma, but phonologically related substitutions occur during the selection of the phonological representation (Fromkin-Ratner 1993, Levelt 2001). In the utterance of a Hungarian speaker beginning with "The Ameri□can attack or the Japanese attack the America" the lemma is not successful, the incorrect word is different from the target both semantically and phonologically. In the utterance beginning with "A lot of time it was □ Esperanza or Esmaralda" the lemma was correct, but the speaker made a mistake in recalling the lexeme (□ represents the silent period), so the incorrect word and the target word have semantic and phonetic similarities. Incorrect lexemes in the speech production process are mainly caused by grammatical reasoning as there is syntactic planning during the process. When speaking, one must put one's words in a certain order and add grammatical elements to the utterance. The example *There is a lot of violence from the films* shows when the incorrect preposition *from* is used instead of the correct one *in.* Incorrect lexemes can sometimes occur because of a speech situation as the outside reason or as the result of mixing idioms or a compression report (Evellei 2009). Incorrect lexemes can be monitored and possibly corrected by the speaker. The ratio of incorrect lexemes depends on the age of the speaker and the types of words. In a comparison of the false lexemes in spontaneous speech between young people and older people, the ratio of false lexemes was higher among the older people. The older people had an extremely high number of false lexemes when

retrieving various types of nouns, especially proper names (Evellei 2009).

Reciting a poem learnt by heart is a special kind of communication as the planning, the concept, and the linguistic form are given by the author and it is not necessary for the speaker to create them. The speaker does not have to select the competitive concepts, lexemes and structures as they speak. Consequently, the lexical selection procedure is absent for the speaker, but he or she has to access the corresponding articulatory gestures. Poems feature rhymes which can have a strong impact on lexical access (Rapp and Samuel 2002). Incorrect lexemes can also occur in the process of reciting a poem learnt by heart in spite of the appropriate verbal and semantic memory operation which are necessary in order to retell the poem's lexical units correctly.

This work is focused on the analysis of lexical access in teenagers' spontaneous speech and their poems learnt by heart concerning their L1 mental lexicons. The aim of this work is to examine the incorrect lexemes as substitution errors which can occur in both procedures. The preliminary assumption was that incorrect/false lexemes in both procedures have common elements, but that they also differ from each other and the question is to what extent. The goal was to answer the question with the analysis in quantitative and qualitative aspects.

2. Participants, method and material

The series of experiments was carried out with the participation of secondary school students (between the ages of 15.3 and 16.1). There were two groups of thirty students each. Their mother tongue was Hungarian, they had no mental problems, speech disorders, or hearing loss.

The experiment was divided into two parts. In the first part, the spontaneous speech samples were digitally recorded and in the second, the students' poems were also recorded. In the

spontaneous speech sample, the students were given a minute to consider their prompt question: "What is your favourite film?" In the second part, they had to learn to recite by heart a provided poem by a Hungarian poet. They were given two weeks to memorize the poem. Both speech samples for analyses were approximately three minutes long.

The first data analysis was the collection of all word substitution (incorrect lexemes) errors from both the spontaneous speech and the poem recitation. Then the mistakes were categorized as corrected or uncorrected by the students. For further analysis, the number of syllables was taken into account, as were the category of the part of speech of the pronounced false and target lexemes, and the types of interrelations between the two examined words.

In the spontaneous speech section there were 70 mistakes, and 62.9% of them were corrected by the speakers, with 37.1% uncorrected. From reciting the poems, 107 mistakes were collected and all were uncorrected by the speakers. The statistical analysis was done by the SPSS program (13.00 version).

3.   Results

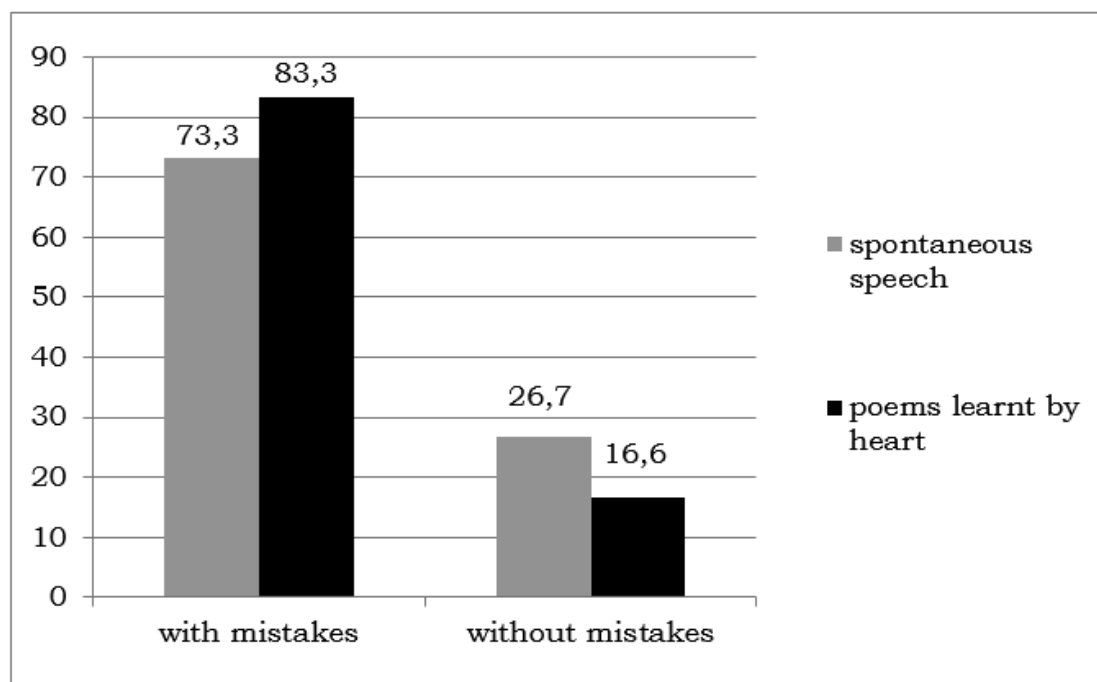Figure 1 shows the ratio of students with and without mistakes in the two kinds of communication.

Figure 1
The ratio of students with and without mistakes
in the two kind of situations (%)

The results showed the opposite tendency of what had been expected. In the spontaneous speech process there was a higher number of students without mistakes than in the poem recitation. Conversely, in the poem recitation, there was a higher number of students with mistakes than in spontaneous speech, however the differences were not proved statistically. This ratio was also followed in terms of gender analysis (Figure 2), when the differences could be seen a little more strongly.
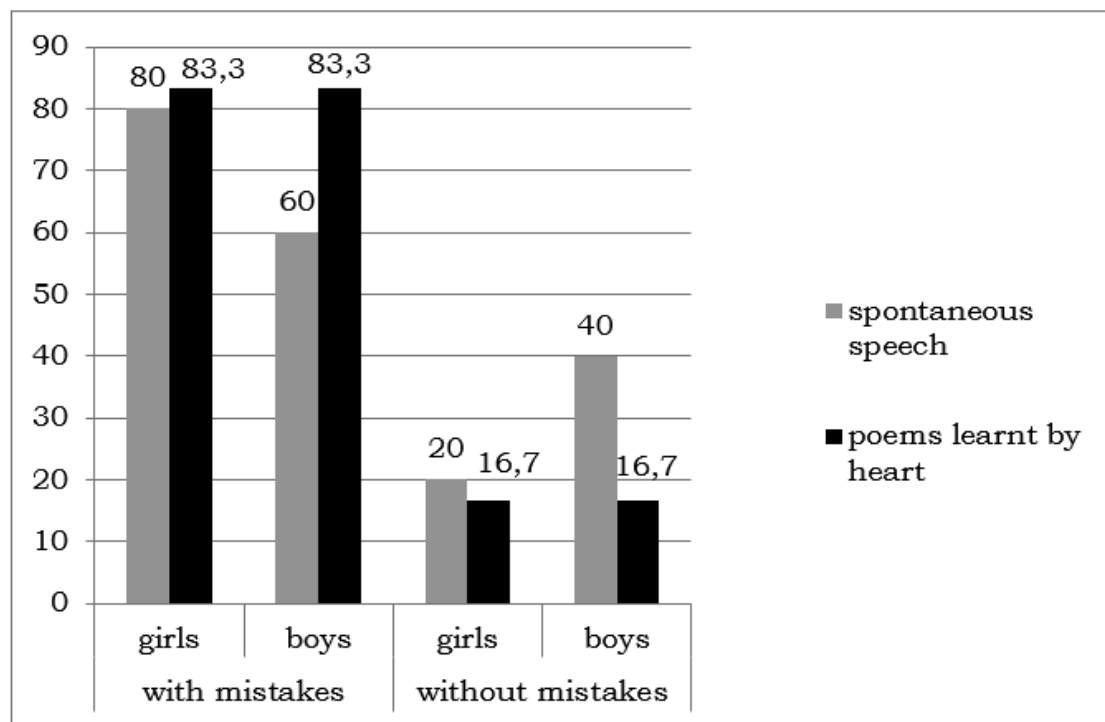
Figure 2
The ratio of girls and boys with and without mistakes (%)

Among the students without mistakes there was no difference regarding the ratio of girls and boys in reciting the poem. In spontaneous speech, the ratio of boys without incorrect lexemes was twice that of the girls' ratio. The difference was also proved by statistical analysis (One-Sample T test: $t(3)=3.523$, $p=0.039$). Among the students with mistakes, the boys' number was much lower in spontaneous speech compared to the number of girls. Again, there was no difference among the girls and boys in reciting the poems. On the basis of the data obtained it is worth concluding that during the spontaneous speech planning, both finding the appropriate concept and the linguistic form is difficult for the teenagers (especially for the girls) taking part in this experiment. Reciting the poem learnt by heart without mistakes is more complicated for them in spite of the fact that the planning process has been done for them. It is also important to remark that the errors may be related to a weak memory. This possible statement is also in-

dicated by the number of mistakes per students, which showed differences between the two situations, as in spontaneous speech the number of mistakes per student was 3.18, but in reciting the poem it was a little bit higher, 4.28.

Substitution errors were analysed in terms of similarity, comparing the false lexemes to target ones (Figure 3).
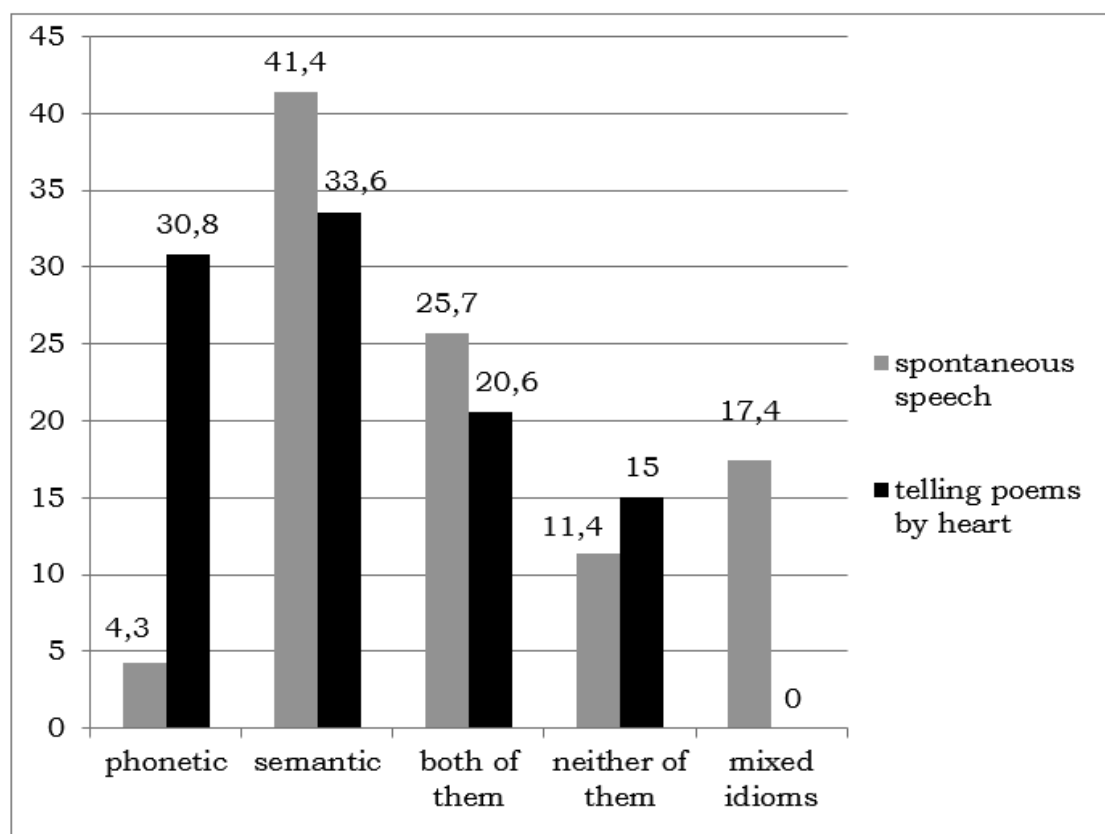

Figure 3

The types of incorrect lexemes regarding the interrelation between the false and target words (%)

In spontaneous speech the highest ratio of false lexemes occurred where there was a strong semantic similarity to target words like in this example: *Eminem is a famous musician□ rapper.* The second highest ratio of false lexemes occurred when a semantic and a phonetic similarity can be seen be-

tween the false and target lexemes (w*e write them on □ write them out CD-s and look at them*). The third highest ratio of false lexemes occurred in relation to mixed idioms. This kind of order of mistakes can be seen in earlier studies (Fromkin 1999, Horváth-Gyarmathy 2010). In the poems learnt by heart there was a similar tendency especially in terms of semantic similarity and in the case of semantic and phonetic similarity, however the ratios were a little bit lower than in spontaneous speech. Some strong differences were also found between the two examined situations. In reciting the poem, the ratio of false lexemas showing phonetic similarity to target ones was much higher than in spontaneous speech (If all can eat (in Hungarian : *ehe*t)/if all can take (*vehet*). There were no instances of mixed idioms. On the basis of the data obtained, it is worth concluding that the selection of lemmas can be the most difficult aspect for the students in both styles of communication. In other words, they might have difficulties during the selection of the appropriate lexeme regarding its meaning, connotations, style, and its syntactic pattern independent of the style of communication. The high ratio of those incorrect lexemes which have both semantic and phonetic similarity to the target ones can indicate the problems with both the lemma and the lexeme components. It means the students have difficulties not only with the meaning of the lexeme but also with its morphology, or phonology, again independent of the style of communication. The high ratio of those false lexemes which have phonetic similarity to target ones in reciting the poems learnt by heart suggests difficulties in remembering the exact phonetic representation of words occurring in the learnt text in spite of the lemma containing semantic information being accessed by the students. This finding was also proved by statistical analysis (One-Sample T test: $t(1)=3,134$, $p=0,035$). Further, it is important to remark that the high ratio of false words which have a strong phonetic similarity to target ones can show the influence of rhyme on lexical access which has been found and emphasized in other studies (Rapp and Samuel 2002).

The analysis of the word classes of both the false and target lexemes (Figure 4) also showed similar tendencies in the examined situations.
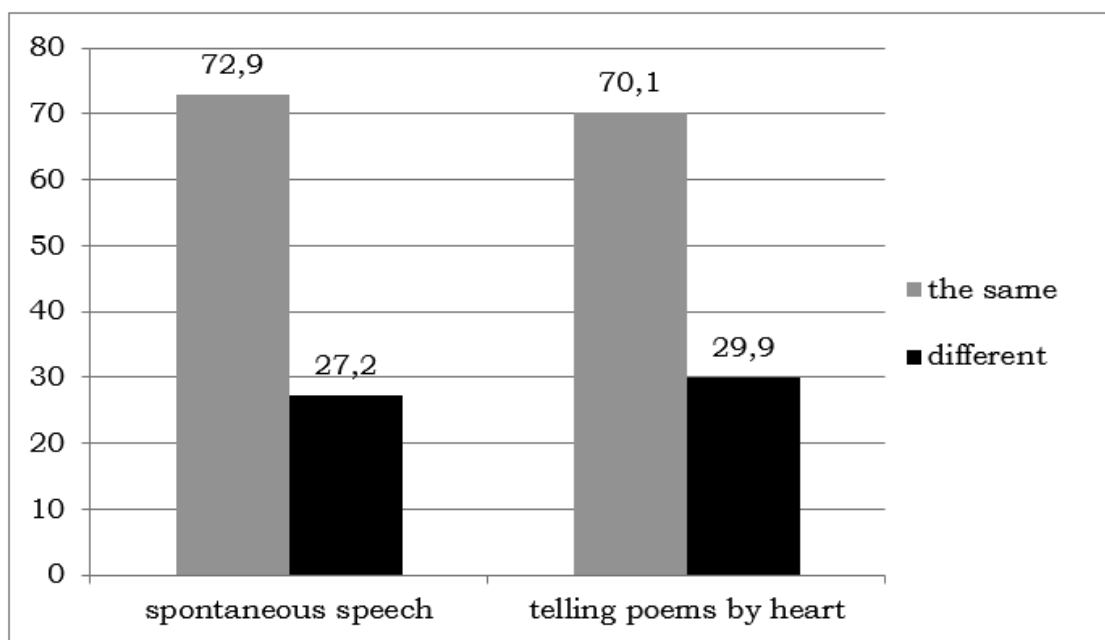

Figure 4
The word classes of the false and target lexemes (%)

Both in the spontaneous speech and in the poems, the words tend to be exchanged with other words of the same syntactic class in most cases, as also seen in other studies, where the target word and the error word were of the same grammatical category in 99% of the cases (Fay and Cutler 1977). The question is, what is the ratio of content and function words belonging to the same part of the speech in the examined situations?

The exchange errors where the false and the target lexeme belonged to the same syntactic class/part of the speech, were analysed separately, as were those which had different syntactic classes. When the parts of speech of the false and the target lexemes were the same (Figure 5) the most common exchange errors in spontaneous speech were the nouns among the con-

tent words, and the pronouns among the function words. In
the poems the ratio of noun exchanges were also the highest
among the content words, but the highest among the function
words were verb prefixes, however there was also a larger dif-
ference between the ratios. The ratio of adverb exchange errors
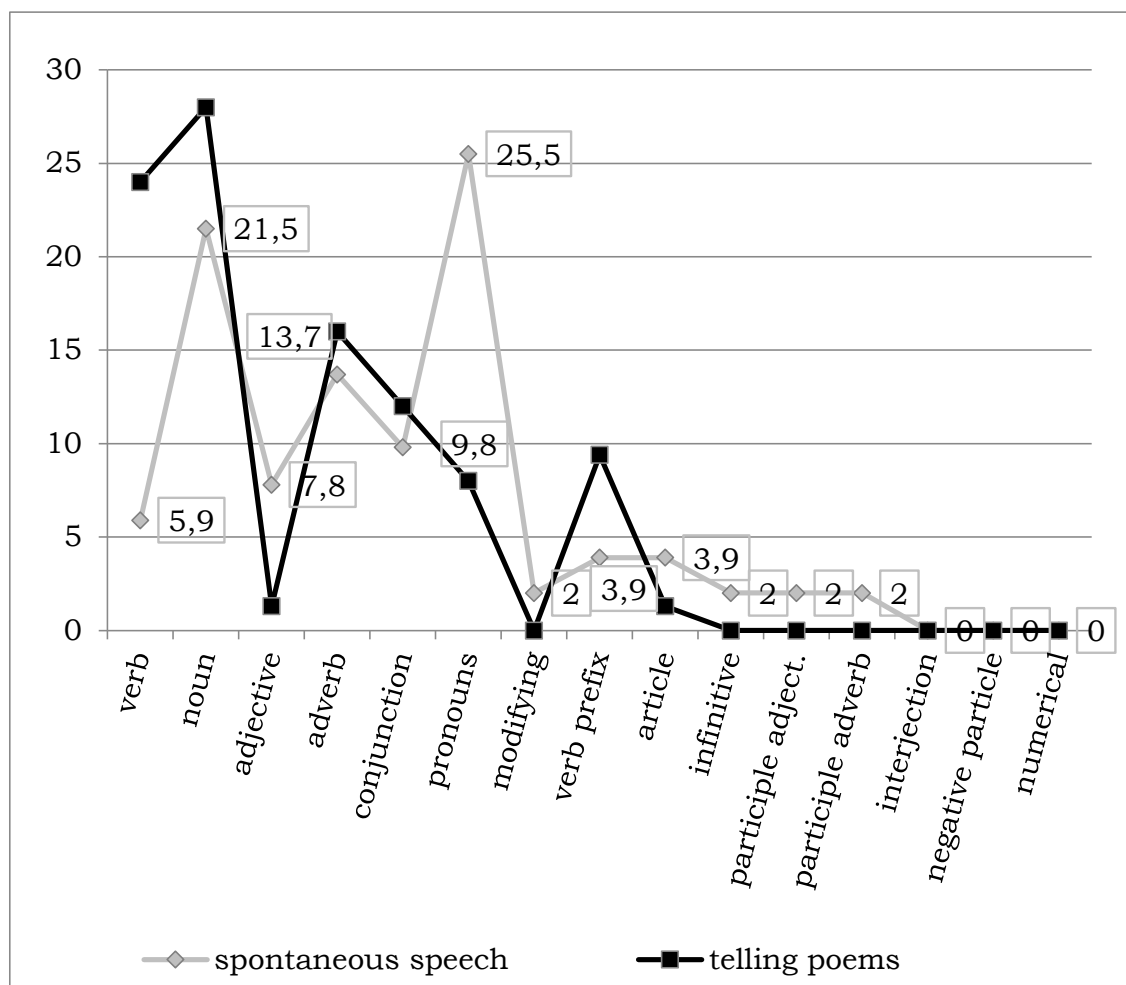like mistakes from content words was roughly the same in
both communication styles.

Figure 5
The ratio of parts of speech – when the false and
target lexemes belong to the same syntactic classes

When the syntactic class of false and target lexemes were different (Figure 6) in spontaneous speech the ratio of mistakes was the highest regarding nouns, adverbs and participles from content words, but the ratios were much lower than in the previous case. Among the function words, the highest ratio of mistakes was again from pronouns. In the poems, the ratio of adverbs was the highest regarding the content words, but the ratio of interjections among function words. (This kind of categorization was based on the speech part of target lexemes).

Comparing all the data obtained regarding communication style and syntactic classes of target and false lexemes at a time it is worth emphasizing that false lexemes as the word exchanging errors can occur among content words in a higher extent independent of the style of communication. The ratio of errors among function words also was high, and it can depend on the type of syntactic class of target and false lexeme. The ratio of mistakes from content words like nouns was also independent from the situation, however the ratio of mistakes of function words depends on that one when the syntactic class of false and target lexemes is equal. When the syntactic class of target and false lexemes is different, both content and function words' mistakes can depend on the style of communication.

The analyses of the number of false and target lexemes' syllables (Figure 7) showed the opposite tendency between the two kind of situations.

In spontaneous speech, the number of false and target lexemes was different in two thirds of cases, contrasting with reciting the poem learnt by heart, when the number of syllables of the two words were the same. The number of false and target lexemes can be in close interrelation with the planning process of the examined situations. In spontaneous speech, to find the semantic information is much more difficult for the students than to remember the phonological information, whereas by contrast in the situation of reciting the poem learnt by heart remembering the correct phonological form of the lex-

emes learnt and stored in the mind is much more difficult, however the number of syllable of words might have the strong effect on the lexical access (cf. Rapp-Samuel 2002).
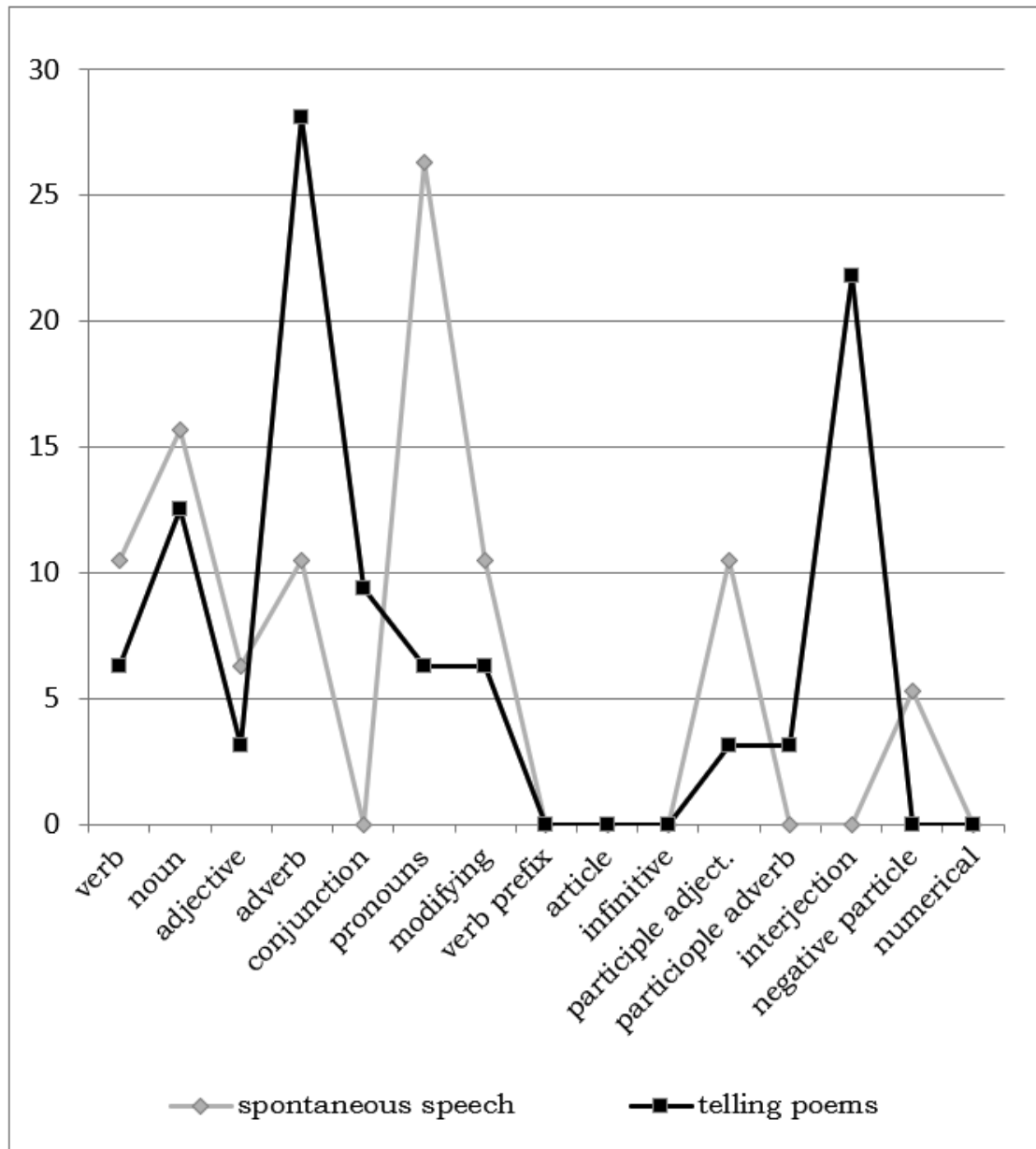

Figure 6
The ratio of parts of speech – when the false and
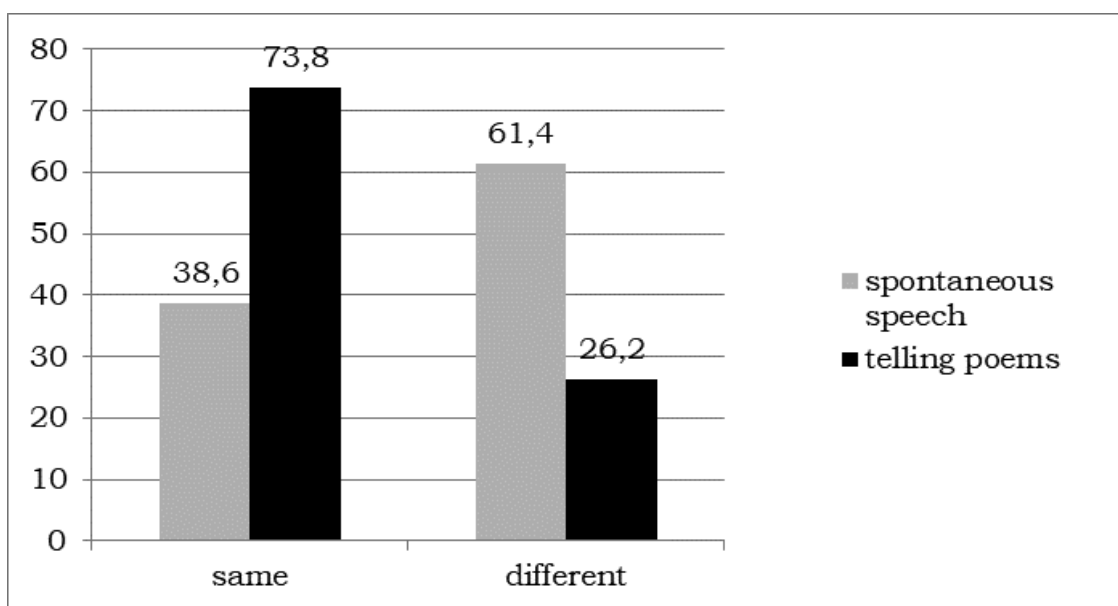target lexemes belong not to the same syntactic classes

Figure 7
The number of syllables of false and target lexemes

Those substitution errors were analysed separately in terms of the similarity when the number of syllables between the false and target lexeme is different (Figure 8).

The types of false lexemes were similar to those which were found in the analysis concerning the whole corpus in both situations. In spontaneous speech the highest ratio was of those false lexemes where there was a semantic similarity to the target ones and the lowest number was when there was a phonetic similarity between the two words. A similar tendency was found in the poems learnt by heart. However, the ratios of various types were a bit higher than in spontaneous speech except the ratio of semantic similarities where there was the opposite tendency. The ratio of false lexemes when there was a phonetic similarity between the false and target lexemes was also higher than in spontaneous speech. The data obtained confirmed the previous hypothesis, that during the spontaneous speech activating the lemma was rather difficult for the students taking part in the study. This was underlined by the ratio of mixed idioms as well. In reciting the poem learnt by

heart, the main problem was for them to activate the phonetic information of the given word and sometimes both the punctual semantic and phonetic information of the given word.
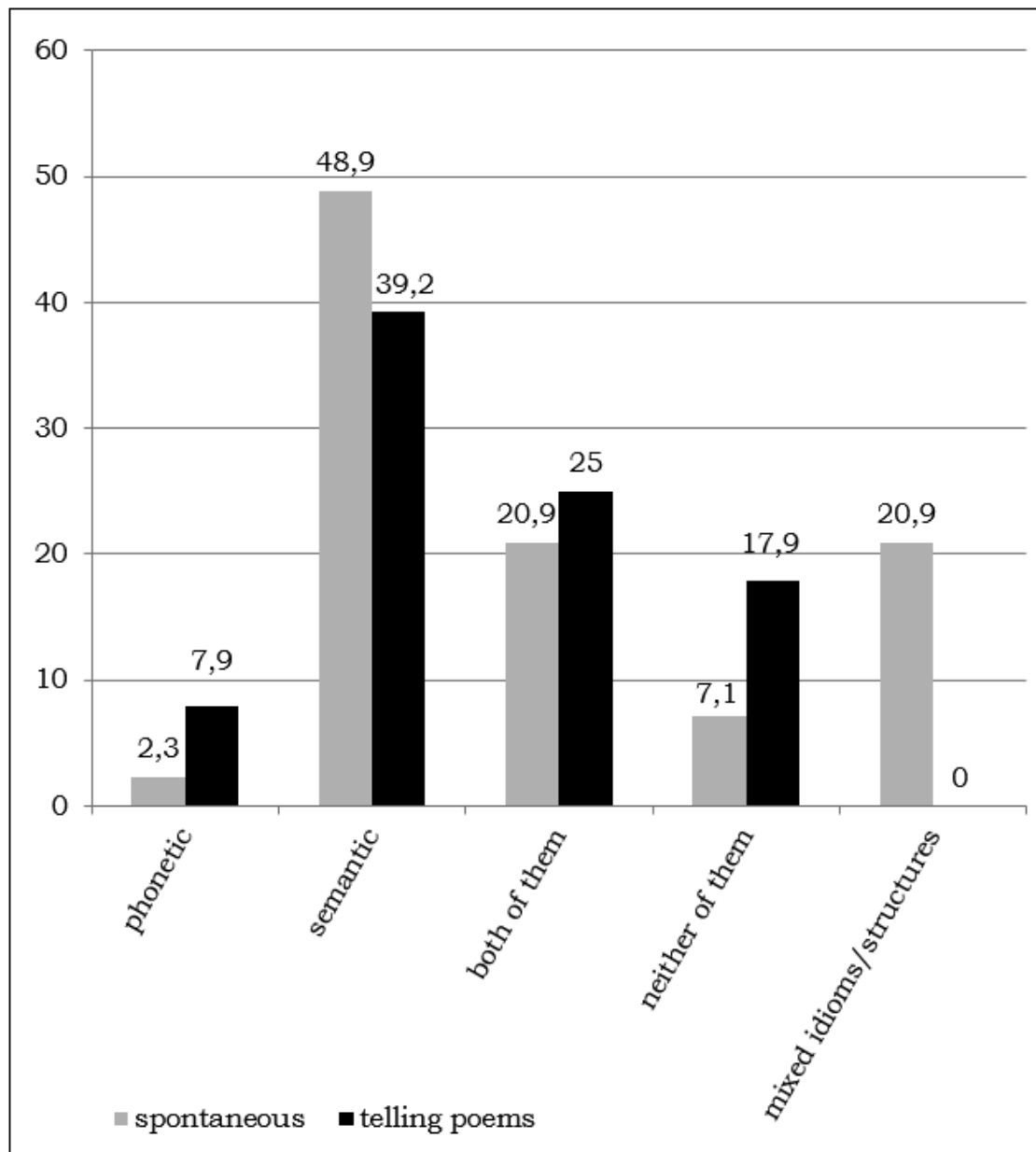

Figure 8
The interrelation of false and target lexemes when
the number of syllables is different (%)

4.   Discussion

In this paper the aim was to analyse the lexical access process in different communication styles in terms of lexeme substitution errors both in quantitative and qualitative aspects.

The hypothesis was that these kinds of lexeme substitution errors can occur in both spontaneous speech production process and in the process of reciting a poem learnt by heart, but not to the same extent. It was also thought that these kind of errors could be described by common and different characteristic features because of the different planning process in the two examined situations.

The hypothesis was completely confirmed by the analysis as the substitution errors occurred in both of the examined teenagers' communication styles, however the ratio and the types of errors depended on the situation. As the ratio of incorrect lexemes was higher in telling the poem than it was in spontaneous speech and the gender analysis only showed an influence on the ratio of errors in spontaneous speech, it seems appropriate to conclude that reciting the poem learnt by heart can be a much more difficult task for teenagers than to think of a concept and find the appropriate linguistic form of it in spontaneous speech production. It means that to retrieval the accurate learnt and stored lexemes, that is to remember their phonological representation and meanings, is much more complicated for them than the lexicalisation (that is the process of turning the semantic representation of words into the phonological specification). The high number of exchange errors of lexemes in reciting the poem learnt by heart might be connected to with the students' weak semantic memories as well, in spite of the different planning process comparing it to the spontaneous speech. It was also proved by the types of false lexemes, regarding their interrelation with the target ones, as in spontaneous speech, that there were more numbers of types when the semantic similarity was found between the false and target lexemes. Conversely in the poems learnt

by heart the high number of the false lexeme types occurred when the phonetic similarity was found between the two lexemes. As a result, in spontaneous speech the mistakes may occur more often on the level of lemma, however in reciting the poem, the mistakes may occur more often on the level of lexeme. In reciting the poems, the strong effect of rhyme on the lexical access was also proved as in most of the cases the number of syllables of false and target lexemas was the same. This would suggest that lexical access can be influenced by a combination of form and meaning, independent of the style of communication, so the lexical retrieval in spontaneous speech and in poems learnt by heart have some similar characteristics.

The analysis of syntactic classes of target and false lexemes showed that the retrieval problem can describe mainly the function words independent of the style of communication and it can occur especially during the lexical access in terms of nouns. This result and the data obtained regarding the same syntactic class of false and target lexemes in both of the examined situations can prove that most substitution errors can occur in the selection of semantic information in the different styles of communication. The high ratio of mistakes regarding the function words and the fact that they can occur independent of the communication style, can prove that function words can be stored not only as function words in the lexicon but also in other ways.

5.   Conclusion

In terms of pedagogical aspects it is worth emphasizing the extension of teenagers' vocabulary continuously progresses with the development of the words' meaning. This process is necessary for the children in primary school but also for the older students in the secondary school, especially in the age of modern technology and digital tools, when the students' oral communication is less and they read less. The procedure of

their vocabulary extension needs a lot of types of exercises which include the development of their verbal memories. It is also important to remark upon the role of memoriters (e.g. poems) both in primary and secondary school in order to develop the students' semantic memories.

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