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**DISFLUENCIES IN THE SPONTANEOUS SPEECH OF VARIOUS AGE
GROUPS: DATA FROM HUNGARIAN**

SUMMARY

A general ageing of the organism, including hormonal, psychological, and cognitive changes, affects the person's speech production, too. The slowdown of mental operations and of the speech organs may affect the fluency of speech, but relatively few papers are specifically devoted to disfluencies in old people's speech, and the various authors disagree concerning frequency data.

In the present paper, we examine disfluencies of young and old speakers from the point of view of their frequency and temporal features. The results show that in natural spontaneous narratives, when the task did not involve any particular mental effort, disfluencies occurred in roughly equal numbers with both age groups. In a speech situation made mentally more demanding, we attested such phenomena more frequently in our young subjects' speech. There are differences between the two age groups both with respect to the types and temporal features of disfluencies.

Key words: *disfluencies, elderly, frequency, temporal features, spontaneous narrative, recall*

INTRODUCTION

One of the terms used to refer to the twentieth century was "the century of the elderly", given that life expectancy has grown to almost twice the figure that characterised the time prior to the 1900s. Due to a parallel fall in birth rates, as well, modern societies increasingly "get older". According to a 2008 estimate by Eurostat, each person above 65 in the European Union will be counterbalanced by just two working age persons (between 15 and 64 years) by 2060

(<http://ec.europa.eu/social/main.jsp?langId=en&catId=502&newsId=419&furtherNews=yes>); the present proportion is 4 : 1. In Hungary (www.demografia.hu), 16.6% of the population is older than 65 years at present; this percentage is expected to grow to 30.3% by 2050. People carry on in their jobs for increasingly longer (this is also shown by the general intention within the European Union to shift the legal age of retirement upwards), they are actively present in society for a longer time. Along with the increase of people's lifetime, keeping up the quality of life is just as important, part of which is the retention of appropriate communicative abilities. That is why it is especially important for us to get an accurate idea of the way elderly people speak.

A general ageing of the organism, including hormonal, psychological, and cognitive changes, affect the person's speech production, too. A number of papers have confirmed that articulatory rate and speech rate get slower with increasing age, sound durations increase, articulation becomes less accurate, changes occur in VOT and voice production, etc. (cf. Balázs, 1993; Petrosino et al., 1993; Russel et al., 1995; Ryalls et al., 1997; Menyhárt, 2000; Watson & Munson, 2007; Nishio & Niimi, 2008; Torre & Barlow, 2009). The most general characteristic of old persons' speech production processes is that word access becomes more difficult (Kemper, 1992), leading to an increased frequency of occurrence of the TOT ("tip of the tongue") phenomenon, of errors in word finding and of false starts, as well as to longer pauses. In a series of experiments, the TOT phenomenon was investigated in a natural setting: participants had to keep a diary of their own difficulties in word activation for four weeks. Older speakers produced a higher number of TOT phenomena than younger ones, especially in recalling proper names (mainly in accessing names of persons who they met rather infrequently) (Burke et al., 1991). Similar results were obtained in tests performed under laboratory circumstances, too. Horváth (2006) studied word activation processes of ten native Hungarian subjects aged 66–84 and ten aged 23–37. The participants were given definitions and their task was to utter the relevant word as fast as they could. The target words included nouns, verbs, adjectives, as well as proper names (of celebrities). The performance of the older subjects fell behind that of the younger group both in the number of correct activations and in reaction time. They exhibited the poorest results in activating proper names (in this category, successful activation occurred in a mere 38% of the cases with older subjects, with a mean reaction time of 6065 ms), while they

performed the most successfully in activating common nouns (66% correct activations, mean reaction time 3369 ms). Young subjects also had the most difficult time recalling proper names; but in their case, the best results in noun activation (71% successful activations in 1348 ms on average) and the poorest results in proper name activation (58% correct activations in 1348 ms on average) were less far from one another.

The slowdown of mental operations and of the speech organs may also affect the fluency of speech, a fact that may result is an increase of the frequency of disfluency phenomena. Disfluencies of speech are cases in which the fluency of speech is broken without any contribution to its contents. On the other hand, disfluencies provide us with a window into the processes of speech planning (Goldman-Eisler, 1958; Fromkin, 1973; Levelt, 1989). Disfluencies are due to a discord between speech planning and speech execution, they may suggest planning uncertainties on the part of the speaker, or else they may result from processes of self-monitoring. In other words, disfluencies may occur when the speaker does not quite know how to carry on, when she does not find the appropriate word or grammatical form, when she becomes uncertain of the next word or its pronunciation, or when she detects an error during self-monitoring and corrects it (Maclay & Osgood, 1959; Lallgee & Cook, 1969). Disfluencies play an important role in conversation by marking boundaries of turns; they help the speaker keep the floor or yield it (Clark, 1994; Clark & Fox Tree, 2002).

Disfluencies include some (not all) silent pauses, as well as hesitations, repetitions, restarts, lengthenings, pauses within words, and filler words. Hesitations, a.k.a. filled pauses, mostly involve uttering the neutral vowel [ə] in Hungarian, but they may also occur as [m], [əm], [əh], etc. (cf. Horváth, 2010). Lengthening, occurring quite often in spontaneous speech, normally suggests a difficulty in activating the mental lexicon, but it may also signal the fact that the speaker has difficulty in finding the appropriate grammatical form. The international literature often classifies lengthening as a type of hesitation (Giannini, 2003; Peters, 2003), thus emphasising the similarity between those two types of disfluency. Another type whose function is similar to that of hesitation in that it helps resolve disharmony involves filler words, that is, words or phrases that do not fit into the contents of the utterance. Repetition means a second occurrence of (at least) a whole word, whereas in the case of restart, a partially uttered word is followed by a full occurrence of the same word. Repetition may involve a single word, but also a longer portion of the utterance (Horga, 2008). Pauses-within-words may occur anywhere in the word and may suggest either planning difficulties of various levels or result from self-monitoring, depending on the exact place within the word where they occur (Gósy, 2008).

Relatively few papers are specifically devoted to disfluencies in old people's speech, and the various authors disagree concerning frequency data. In comparing the speech production of young vs. old speakers, some authors come to the conclusion that there are no differences in the frequency of disfluency

phenomena between the two age groups (Duchin & Mysak, 1987; Leeper & Culatta, 1995), whereas others report that they have found more disfluency phenomena in old speakers' production (Yairi & Clifton, 1972). In a study involving seven mentally intact native speakers of English, aged 100 to 103, the same types of disfluency have been attested with the same frequency among those above 100 as among 70–80–90-year-old speakers: that is, with growing age, the fluency of speech does not change in that age range (Searl et al., 2002).

Menyhárt (2003) analysed disfluencies and errors of native Hungarian speakers in three age groups: children (9 to 12; mean age: 10;5), middle-aged adults (22 to 45; mean age: 32), and aged persons (60 to 90; mean age: 77). The results suggest that disfluencies were significantly more frequent in children's speech than in the other two age groups; on the other hand, no difference was found between the speech productions of middle-aged adults and old speakers. Proportions of the various types of disfluencies were also similar across age groups, with silent pauses and hesitations being the most frequent.

In an earlier study of our own, we analysed young vs. old speakers' speech production in two speech situations with respect to speech planning processes (disfluencies and errors) (Bóna, 2010). In natural spontaneous narratives, it was primarily in terms of articulation rate and speech rate that the two age groups differed; in the aggregate frequency of pauses, disfluencies and errors, no such difference has been attested. What is more, such phenomena were more often attested in young speakers' narratives than in those of older speakers. On the other hand, pauses were slightly more numerous/longer in old subjects' speech than narratives spoken by young subjects. In another task that was made mentally more demanding, the speech of both age groups became slower (both in articulation rate and in speech rate), with young people's performance more heavily slackened than old people's. Pauses became more frequent overall, but without any significant difference across age groups. However, the ratio of pauses relative to full speaking time increased more in the case of young speakers. In this task, too, disfluencies occurred more often with young speakers, but proportions of the individual types of disfluency changed: old speakers exhibited more errors (especially ones involving lexical access) than young speakers did, as well as more than they themselves did in the other speech situation.

Differences between young and old speakers with respect to disfluency phenomena can also be explained by language change, in particular, by changes in speech planning processes and language use. Gósy & Gyarmathy (2008) compared some sixty-year-old speech recordings of the Hegedűs archive (a Hungarian speech data base from the 1950s) with recordings of present-day speakers. The results reveal that present-day speakers' recordings contain more disfluencies than those of speakers from an earlier period. Filler words, lengthenings, and pauses-within-words occurred to a similar extent in both corpora, whereas hesitations and repetitions are significantly more frequent with present-day speakers. For the study, the authors selected speech productions of

persons between 25 and 80 years of age, meaning that their study gives us a general picture of the two periods, irrespective of actual speakers' ages. In sum, when today's seventy-year-olds were young, people spoke differently than they do today.

In the present paper, we examine disfluencies of young and old speakers from the point of view of their frequency and temporal features. Our hypothesis is that disfluencies would occur in similar numbers in the two age groups, but some types would be more frequent with older speakers and some other types would be more frequent with younger ones. This is expected to be the case due to the differences in the habits of language use of the two groups (cf. Gósy & Gyarmathy, 2008). We hypothesise furthermore that in a more difficult speech situation phenomena suggesting uncertainty and self-monitoring would be attested more densely. The articulation rate and speech rate of the subjects participating in our present investigations were analysed in an earlier paper (Bóna, 2010), and it was found that older speakers spoke in a significantly slower tempo. Hence, we expected differences in the timing of disfluencies, too: both in the overall durations of disfluencies and in the editing phases of repetitions and restarts.

METHODS

Subjects

For the present study, we selected speech recordings of ten old (70 to 85) and ten young (20 to 32) female speakers from BEA (Hungarian Spoken Language Database, cf. Gósy, 2008). All subjects selected for the present study had unimpaired hearing (appropriate to their age), and had no known mental problem or speech error. In selecting them, their level of education was also taken into consideration: each age group contained three speakers with a university diploma and seven with secondary school qualifications.

Material

BEA (Hungarian Spoken Language Database, cf. Gósy, 2008) contains roughly one-hour speech recordings from more than 200 speakers at present. Recordings were made with each subject in several situations and speech styles: all recordings contain an interview and an expression of the speaker's opinion on a current issue (spontaneous narratives), a three-participant conversation, the speakers' recall of the contents of two heard texts, reading aloud, as well as sentence repetitions. The recordings were made digitally, under constant circumstances, in the same location (in a soundproof chamber). The subjects volunteered for the task.

Given that our earlier study (Bóna, 2010) showed that in a more difficult speech situation the performance of both age groups changes but in different ways, we selected spontaneous narratives and recalls of heard texts from BEA for the purpose of the present investigation. In the spontaneous narratives analysed

here, the speakers talked about their jobs and hobbies, as well as about topics that they did not have to specifically reflect upon, therefore it was very rarely that the interviewer had to help them with some questions. We analysed an approximately three-minute sample from each speaker's narrative.

In the other, more difficult task, in recalls, the subjects heard two texts: a passage of popular science of 174 words, and a historical anecdote of 270 words. After hearing each text, they had to recount them in a monologue form, as exactly recalling their contents as they possibly could. In reconstructing a heard text, irrespective of its genre, speech planning processes are quite different from the case of spontaneous speech. On the one hand, the speakers do not report freely formulated ideas/stories, that is, the contents are predetermined; on the other hand, the success of their performance largely depends on their speech comprehension and the workings of their memory (Gósy, 2010).

Procedures

We analysed a total of 122 minutes of speech recordings, roughly an hour in each age group. This means approximately 6 minutes of speech per speaker.

Using Praat 5.0 software (Boersma & Weenink, 1998), we annotated disfluencies (hesitations, lengthenings, repetitions, restarts, pauses-within-words) and defined and collected the filler words in each recording. The identification of lengthenings was done by the present author's perception taking into consideration the duration of the surrounding vowels. We studied the frequency of the individual types, we measured the durations of hesitations, lengthenings, and repeated items. We analysed editing phases, that is, the duration of error detection and repair planning (cf. Levelt, 1989), of repetitions, restarts, and pauses-within-words. We performed statistical analyses of the data by SPSS 13.0 software (one-way analysis of variance).

RESULTS AND DISCUSSION

We attested a total of 2121 disfluencies in the speech productions; 1082 in our old subjects' material, and 1039 in young speakers' speech. In both age groups, disfluencies were more frequent in the more difficult task: in old speakers' narratives, they occurred every 8.7 words, and in their recalls every 6.3 words; in young speakers' narratives every 8.8 words and in their recalls every 4.7 words. In accordance with data from the literature, the most frequently occurring type of disfluency was hesitation (Gósy, 2003a; Horváth, 2010); however, lengthenings and filler words also occurred in large numbers.

We found significant differences in the occurrence of individual types of disfluencies depending on both age and speech type: in the more difficult task, the ratio of lengthenings and repetitions was larger in old subjects' speech, whereas it was the ratio of lengthenings and hesitations that grew in the speech of young subjects (Fig. 1).

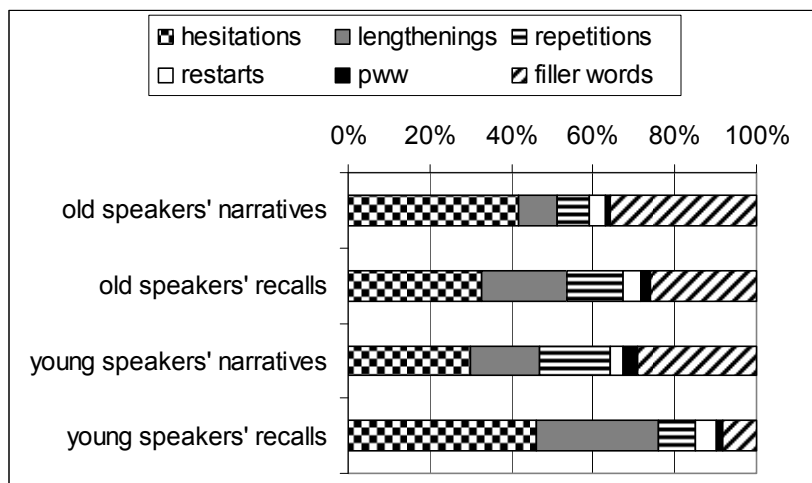


Figure 1. Percentages of types of disfluencies in the various types of speech (pww = pause within word)

Slika 1. Postoci tipova disfluentnosti u različitim tipovima govora (pww = stanka unutar riječi)

This suggests that older speakers were more uncertain in speech planning in the recalls (as shown primarily by the higher number of lengthenings) but monitored their own production better (we can conclude that from the larger ratio of repetitions). The growing numbers of restarts and pauses-within-words might show that, in this task, the older speakers probably had more word finding problems than in the narratives. In the case of young speakers, the ratio of speech planning uncertainties (lengthenings and hesitations) grows in the recalls, whereas the effect of self-monitoring (the ratio of repetitions) decreases.

In what follows, we will present acoustic-phonetic particulars of each type of disfluency in turn.

Hesitations

The frequency of hesitations was found to be 20.8 words/hesitation in the narratives of old subjects, and 19.3 words/hesitation in recalls; in the case of young subjects, 29.4 words/hesitation in the narratives and 10.1 words/hesitation in recalls. That is, old subjects hesitated more than young subjects did in their narratives, while they hesitated a lot less in the more difficult task than the young subjects did. The mean duration of old subjects' hesitations was 381 ms, irrespective of task, that of young subjects was 344 ms, again irrespective of task. The hesitation durations of old subjects were scattered in a wider band (41–3547 ms, st. dev. 304 ms) than those of young subjects (58–1108 ms, st. dev.

176 ms). We attested a significant difference in hesitation durations between the two age groups: $F(1, 871) = 4.803$; $p = 0.029$.

Hesitations may occur in the speech process either on their own, or accompanied by a silent pause. On the basis of data from the literature, the most frequently attested case is where hesitation is followed by a silent pause; in such instances, the duration of the filled pause is not enough for performing the necessary processes of planning or correction (cf. Horváth, 2010). We calculated the ratio of hesitations with vs. without a silent pause in the speech production of the two age groups. As can be seen in Fig. 2, in young subject's narratives the occurrence of combined pauses is more frequent than in old subjects' narratives, whereas in the recalls case, combined pauses occurred in similar numbers with both age groups. In the case of narratives, this means that old subjects' hesitations were significantly longer than young subjects' hesitations, but the durations of filled pauses were a lot more often sufficient for resolving the speech planning difficulty and carrying out the necessary corrections than in the speech of young subjects.

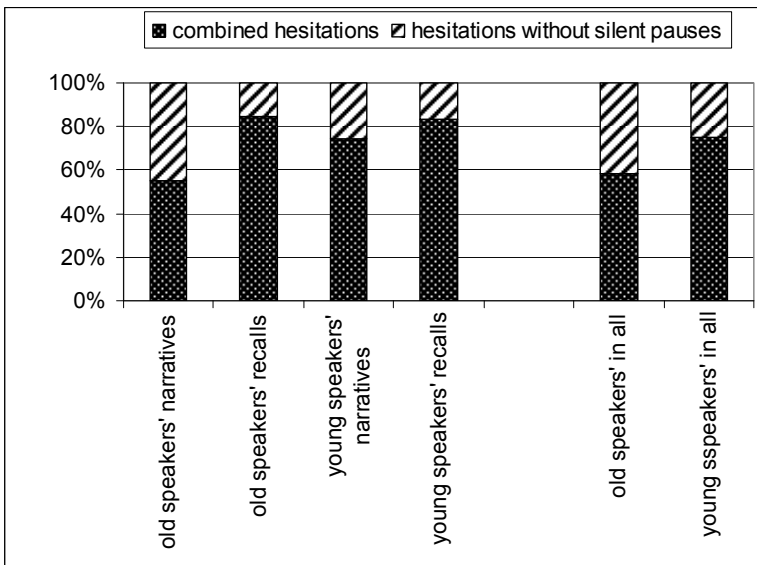


Figure 2. Percentages of combined hesitations (silent and filled pauses) and hesitations without silent pauses

Slika 2. Postoci složenih oklijevanja (tihu i zvučne stanke) i oklijevanja bez tihih stanke

Lengthenings

In old subjects' narratives, lengthenings occurred once per 88.9 words, in their recalls once per 30.6 words; in young subjects' narratives there was one

lengthening per 51.2 words and in their recalls one per 15.7 words. In accordance with data from the literature on Hungarian (Gósy, 2003a), they involved definite articles the most often, and occurred more frequently on vowels than on consonants. However, in old subjects' speech, consonant lengthenings were more frequent by 12% than in young subjects' speech. Old subjects' lengthenings concerned vowels in 68.9% and consonants in 31.1% of the cases, whereas the young subjects exhibited vowel lengthening in 81.9% and consonant lengthening in a mere 18.9% of all cases.

Given that old speakers speak significantly slower than young speakers do (cf. Bóna, 2010), and that the occurrence and/or perception of lengthening highly depends on the duration of the surrounding sounds (Bóna, 2007), we assumed that the average duration of lengthenings attested in old subjects' production would be significantly longer than that of young subjects' lengthenings. That is, we expected that old subjects would produce lengthening in a lot fewer cases, but when they did, the objective length of the sounds involved would surpass young speakers' similar sounds since the surrounding (non-lengthened) segments would be longer to begin with in the case of old speakers. However, this was not borne out by statistical analysis, the average duration of lengthenings was almost identical across age groups (in the case of old subjects: 323 ms, in the case of young subjects: 319 ms); one-way analysis of variance did not detect any significant difference between the data of the two groups. This result may be caused, among other factors, by quality differences between the groups of sounds lengthened. In the speech production of old subjects, lengthenings more often occurred on consonants (e.g. [m, n, z]) whose duration, when not lengthened, is shorter than that of [ɔ] or [ɛ] (cf. Olszy, 2006); in the speech of young subjects, on the other hand, lengthenings of the latter two vowels occurred more often. In the case of sounds with a shorter specific duration, less increase in duration is sufficient for a perception of lengthening; this may be part of the reason why there was no difference in the absolute duration of lengthenings between the two age groups.

Repetitions

We found repetitions in old subjects' narratives every 112.6 words, in their recalls every 45.8 words; in young subjects' narratives every 51.2 words, and in their recalls every 51.2 words. In 17.7% of old subjects' repetitions, the speaker repeated a lexical item more than once: repetitions were found with two, three, and even five or six occurrences of the same item; in young speakers' material, the ratio of multiple (double) repetitions was 4%. These were analysed separately.

Multiple repetitions usually occurred when the speakers had some planning difficulty, or in the case of recall, a problem in reconstruction what they had heard. In the following example, the subject tried to recall a piece of popular science, but finally she had to give up. (In the Hungarian examples, numbers stand for silent pauses in ms; parenthesised numbers indicate the duration of

hesitations. In the English rendering, we tried to mimic the disfluency phenomena occurring in the Hungarian text but omitted the duration figures; squares stand for silent pauses.)

- (1) *valami ilyesmiről volt szó 493 és akkor ez mit hozott ki mi lett belőle 423 öööö (651) 99 érdekess kutatási dolog dee 207 ez ezt **úgy úgy** 773 **úgy** nem tudom*
 ‘it was something like this □ and then what did this bring out what did it turn into □ [ə:] □ interestinnng research thing buuut □ this this **so so** □ **so** I don’t know’

Multiple repetitions also occurred in cases where, in the initial part of the interview, the speaker was still not sure what to say at all:

- (2) *öö (436) akkor eddig 436 ööh (315) hát **én én én** ugye ezerkilencszáz-harminchétben születtem tehát hetvenegy éves vagyok*
 ‘[ə:] then so far □ [ə:h] well **III** right was born in 1937 that is I am 71 years old’

In the case of single repetitions, we measured both instances to find out whether the first or the second instance of the repeated item was longer. Repetitions occur when the speaker becomes unsure of what to say next or when (s)he detects an error in his/her own speech but wishes to keep up the impression of speaking fluently. If the speaker is able to correct the error spotted in the speech planning process during the editing phase, the second occurrence will be shorter. If, on the other hand, the speaker thinks about what to say or if (s)he has a problem of lexical access, the second occurrence will be longer (cf. Gyarmathy, 2009).

In each age group, we found a single instance where the duration of the two occurrences was exactly the same. Of course, there were several further cases in which there was only a very little difference (20–30 ms) between the tokens but this difference was invariably larger than the smallest perceptible duration. In the group of old subjects, the first occurrence was longer in 58.1% of the cases and the second one was longer in 40.1% of the cases. (The missing 1% is the ratio of the case where the two instances were exactly of the same length.) In the group of young speakers, these proportions were quite different. In 80% of the cases, the first occurrence was longer, and in 19.2% the second one was longer (the case of identical durations accounted for 0.8% of all cases here). The durations of repeated items exhibited significant differences in both age groups when the first occurrence was longer (old subjects: $F(1, 106) = 8.937$; $p = 0.003$, young subjects: $F(1, 190) = 78.160$; $p \leq 0.001$); where the second occurrence was longer, it was only in the group of young subjects that we found a significant difference ($F(1, 44) = 10.006$; $p = 0.003$).

The reason for cases where the second occurrence was longer may have been the difficulty of lexical access. In the following example, the old speaker has difficulty accessing the expression *genetikai másolat* ‘genetic copy’, as shown by the pauses, the lengthening and the repetition. The repeated definite article is also lengthened; its first token is 362 ms, and its second token is 421 ms long.

- (3) *nálunk például nem engedélyezik aa 457 mm (300) 198 mh (206) 836 ez a mm (328) 206 búzának aa 340 aa mm (360) 242 mmh (555) 407 öö (441) genetikai másolatát*
 ‘here for instance they don’t permit thee □ mm □ mh □ this mm □ wheat’s **thee** □ **thee** mm □ mmh □ [ə:] genetiic copying’

In another example, the relatively long (406 ms) editing phase was, again, insufficient for planning, so the second occurrence of the definite article is longer than the first. The old speaker had to summarise the passage of public science; this example is the beginning of the summary, when the subject tries to collect her thoughts. The long pauses, the hesitation, the lengthening, the restart, the filler words and the repetition all witness her mental effort. The speaker even comments on this: she says she found the text long (and probably also difficult).

- (4) *hát ez nagyon hosszú volt 823 úgyhogy 137 ez most ömm (497) szerintem úgy nagyjából a e erről a 406 a géén 445 növényzetről szólhat ugye úgy gondolom*
 ‘well this was very long □ so then □ this now [əm:] I think roughly the this of this **the** □ **the** geene □ it may be about plants right I think’

We analysed the length and structure of editing phases. The average length of old subjects’ editing phases was 295 ms (0–1857 ms; st. dev. 367 ms), while that of the young subjects was 560 ms (0–4514 ms; st. dev. 757 ms). That is, old speakers spent a lot less time on editing, probably ensuring the fluency of their performance by that means. We found a significant difference between the duration of editing phases employed by old and young speakers ($F(1, 211) = 9.637$; $p = 0.002$). In both age groups there were several repetitions where there was no editing phase (0 ms); in such cases, the repair operation took place during speech planning owing to the faultless operation of the self-monitoring process, or else the duration of the item to be repeated was enough for the resolution of the planning uncertainty. This happened in the old group in 26.9% of all repetitions, while in the young group, in 9.2%. In repetitions by old speakers we did not find any editing phase longer than 2000 ms, whereas in the young speakers’ material, there were eight cases (6.7%) in which the editing phase was more than 2000 ms long.

Editing phases can take one of three forms: silent pauses, hesitations, and combinations of the two. The proportions of those three types were similar in the two age groups (Table 1).

Table 1. Percentages of types of editing phases (100% = number of repetitions where no editing phase can be detected)
Tablica 1. Postoci tipova faza ispravljanja (100% = broj ponavljanja u kojima nije bila zamijećena niti jedna faza ispravljanja)

	Silent pauses	Hesitations	Combined pauses (silent and filled pauses)
Old speakers	76.5%	1.4%	22.1%
Young speakers	78.9%	2.8%	18.3%

Combined editing phases were the longest; in the old group, they were 631 ms on average (219–1857 ms); in the young group, their mean length was 1541 ms (518–4514 ms).

We also looked at what kinds of words were repeated. 88.5% of old subjects' repetitions and 93.6% of young subjects' repetitions involved function words. The repeated item was usually a single word, but in some old subjects' performance we also found cases of repetitions of multi-word sequences, as in the following example:

- (5) *például mikor négyet ültettek egy cserépbe 458 ott ez nagyon jól 299 mm (377) nagyon jól meg lehetett figyelni*
 'for instance, when they planted four into the same pot □ there this they could **very well** □ mm **very well** observe it'

Restarts

In old subjects' narratives, restarts occurred once in 225.1 words, in their recalls, once in 137.5 words. In young subjects' narratives, they occurred once in 275.8 words, and in their recalls, once in 93.9 words. In old subjects' materials, we found three cases (7%) of multiple restarts (as in *é 73 é 45 édesapám* 'my fa □ fa □ father'); in young speakers' samples, there was only one such case (2.3%). The average length of editing phases in the case of restarts was 194 ms (0–1859 ms) for old speakers, and 210 ms (0–1351 ms) for young ones. According to a one-way analysis of variance, the two groups exhibited no significant difference here, unlike in the case of repetitions. This was probably due to the smaller number of relevant items. In both age groups, we found restarts where there was no editing phase (0 ms); this happened in 30.2% of old subjects' restarts and in 20.9% of young speakers' restarts. In the material of young speakers, we found a single hesitation within the editing phases of restarts; whereas in old subjects' performance, (partly) filled pauses occurred in 18.6%

(8 items, seven of which were combined pauses). The rest of the editing phases were silent pauses.

Restarts take place when the speaker loses self-confidence in the process of lexical access. In general, articulations stops short after 1–3 sounds, and then uttering the given sequence starts again (Gyarmathy, 2009). In both age groups, most restarts concerned a single sound (62.8%), while 88.4% of old subjects' restarts and 90.7% of young speakers' restarts remained within the range of 1–3 sounds. In (6), articulation stopped after two sounds, and in (7), after three. This is followed by a new, full occurrence of the word at hand.

(6) *a növények azok 95 öö (603) érzékelik aa 52 aa a környezetüket és ugye ve 57 versengenek*
 'the plants they □ [ə:] sense these □ their surroundings and I guess they co □ **compete**'

(7) *de ez csak akkor merült föl hogyha azonos 92 öö (203) 57 **anya** 179 **anyanövénytől** származtak ezek a palánták*
 'but this only arose when it was the same □ [ə:] □ **parent** □ **parent plant** that these young plants came from'

There were, however, also cases in which articulation stopped after the first sound of a word, but then the speaker started again, not only with this word, but with the whole noun phrase (e.g., *a falak e 129 a falak erősítésén* 'on reinforcing the walls'). In several cases, articles were included in restarts; in these instances, the duration of the repeated article contributed to the time available for lexical access. In the following example, restart appears to take a relatively short time (122 ms) for the editing phase, but in fact, the speaker merely begins to pronounce the article within a relatively short time (and then lengthens it), and it takes a relatively long time before the sequence is pronounced in full (emboldening indicates the editing phase).

(8) *és öö (160) a szul **122 aa öö (397) szultánnal** 68 egyezséget 428 kötnének*
 'and [ə:] with the sul □ **thee [ə:]** sultan □ they would reach □ a compromise'

A majority of restarts concerned function words in both age groups (55.8% with old subjects, and 60.5% with young ones).

Pauses within words

Within-word pauses occurred in old subjects' narratives once in 675.4 words, in their recalls once in 275.1 words; in young subjects' narratives once in 239 words, and in their recalls once in 312.9 words. Pause-within-word phenomena were classified into three subtypes. The first included examples where the speaker paused between stem and inflectional suffix; this revealed an

error in grammatical planning: the speaker was unable to access the appropriate grammatical form in time (e.g., *korosztály 667 nak* ‘age group-dat.’; *hív 100 ják* ‘call-3pl’; *fogyatékosok öö (416) kal* ‘handicapped ones-with’). In one of our young subjects’ speech, we found an exceptional case where selecting the correct suffix proved to be so difficult for the subject that she paused twice within the same word: *növénye 207 k 322 kel* ‘plant-s-with’. The second subtype involved phenomena where the speaker paused inside a word, not necessarily at a morpheme boundary, suggesting uncertainty in articulatory implementation (e.g., *ke 296 ttöt* ‘two-acc.’; *a 155 z* ‘the’; *rokon 72 ságban* ‘in kinship’; *ke 127 dvezett* ‘showed favour’). Finally, the third subtype contained compound words or preverb-verb complexes in which the speaker paused at the boundary between the two constituents. This means that a difficulty occurred in lexical access (e.g., *vissza 583 mm (266) 74 tekintve* ‘looking back’; *vár 110 öö (275) védőket* ‘defenders-acc. of the castle’; *meg öö (292) 656 adják* ‘they return it’). These subtypes were distributed unequally across age groups: old subjects paused within words primarily due to problems in lexical access, whereas young ones did so primarily in cases of uncertain grammatical planning (Fig. 3).

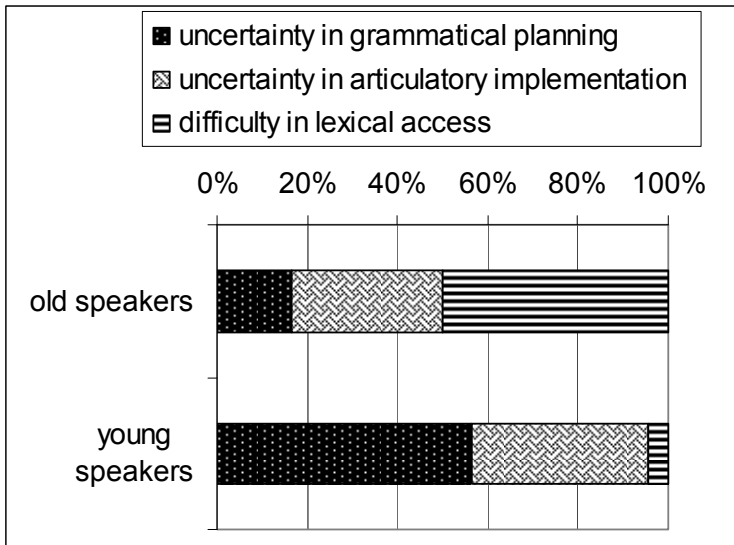


Figure 3. The distribution of types of pauses within words
Slika 3. Distribucija tipova stanki unutar riječi

We looked at whether it was old or young subjects who kept longer pauses within words. Old subjects paused on average for 326 ms (34–948 ms); and young ones for 370 ms (72–793 ms). Statistical analysis revealed no

significant difference between the two age groups (probably due to the small number of tokens).

However, a specific correlation was found between the position and length of pauses, depending on age. (In an earlier study, Mária Gósy found that stem-internal pauses were the shortest, pauses between stem and inflection were longer, and pauses between compound constituents were the longest; 2003b). Lexical access proved to be the most difficult for old subjects, hence in their case the mean length of compound-internal pauses was the highest: 374 ms (55–948 ms). The second most frequent type involved articulatory difficulties with a mean pause length of 303 ms (34–500 ms); the mean length of the least frequent type, involving difficulty of grammatical planning, was 187 ms (135–238 ms). With young subjects, grammatical uncertainty pauses were the most frequent and the longest: 402 ms (100–667 ms). The average of articulation-based pauses was 335 ms (72–793 ms); and there was just a single pause between constituents of a compound: this was 272 ms long (Fig. 4).

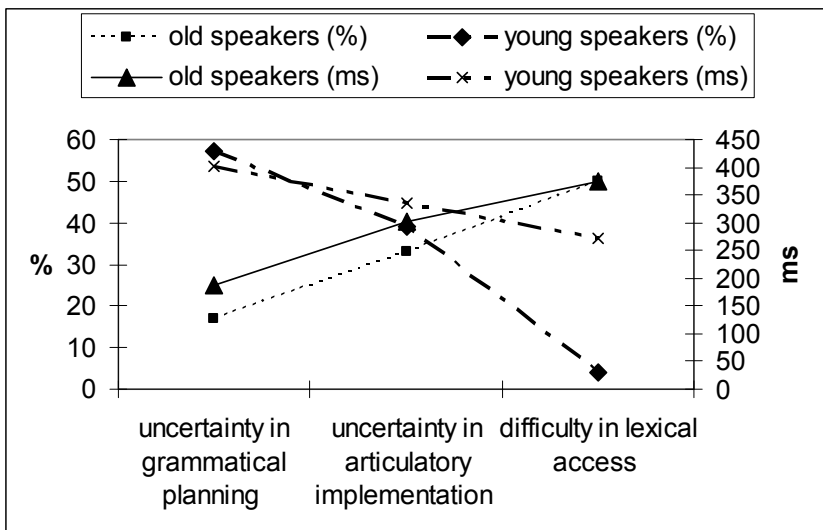


Figure 4. Correlations between the number and mean duration of types of pauses

Slika 4. Korelacije između broja i prosječnog trajanja tipova pauza

Filler words

In old subjects' narratives, filler words occurred once in every 24.1 words, in their recalls once in 24.4 words; in young subjects' narratives, once in 30.1 words, and in their recalls once in 56.3 words. The distribution of individual filler words by age groups is shown in Fig. 5.

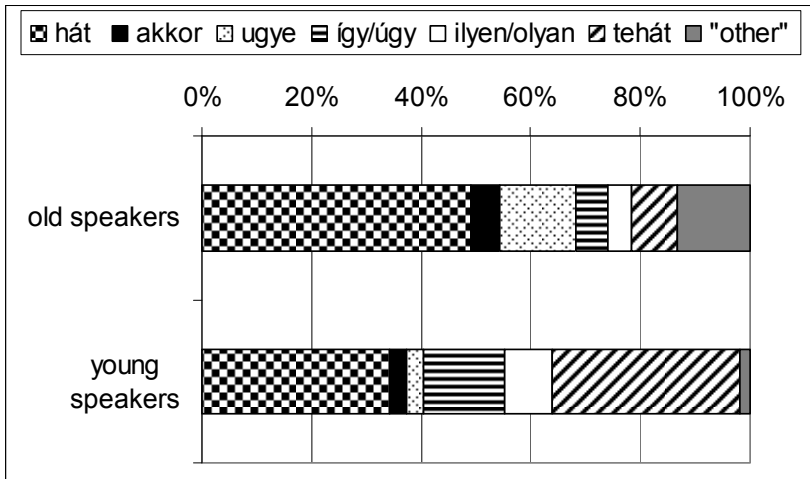


Figure 5. Ratio of occurrence of filler words in the two age groups (*háť* ‘well’, *akkor* ‘then’, *ugye* ‘I guess’, *így/úgy* ‘like’, *ilyen/olyan* ‘kind of’, *tehát* ‘so’; the category “other” includes e.g. *mondjuk* ‘say’, *na most* ‘well now’, *valahol* ‘somewhere’, *szóval* ‘so’)

Slika 5. Omjer pojavljivanja umetnutih riječi u dvije dobne skupine (*háť* ‘pa’, *akkor* ‘onda’, *ugye* ‘pretpostavljam’, *így/úgy* ‘kao’, *ilyen/olyan* ‘neka vrsta’, *tehát* ‘tako’; kategorija “other” uključuje, na primjer, *mondjuk* ‘recimo’, *na most* ‘pa sad’, *valahol* ‘negdje’, *szóval* ‘tako’)

Our study of the types of filler words confirmed Dér & Markó (2010)’s claims who analysed the occurrence of *háť* ‘well’, *így* ‘like’, *ilyen* ‘kind of’ and *úgyhogy* ‘so’ in various age groups. They found that the frequency of *háť* increases with growing age, while that of *így* decreases (they found medium strong, significant correlation for both items). Our study further revealed that young speakers are far more prone to use *tehát* than old speakers are. With respect to *tehát* and *ilyen*, Gósy and Horváth found that these words are generally shortened and reduced when used as filler words. Thus, in spontaneous speech, including their occurrences in the present study, they often sound *tát* and *jen*, respectively (Gósy & Horváth, 2010).

Of course, large individual differences were found in the use of filler words, just like with respect to any other type of uncertainty-based disfluency. There were speakers who often hesitated, with others, we attested a large number of repetitions, and there were others whose speech exhibited hardly any disfluency of any type at all.

Discussion

The results show that there are differences between the two age groups both with respect to the types and temporal features of disfluencies. Several kinds of reasons can be assumed to underlie those differences. On the one hand, there is a difference in the general (cultural) attitude to speech between the two generations of speakers (even though their level of education was identical). As was already mentioned in the Introduction, Gósy & Gyarmathy (2008), comparing sixty-year-old recordings from the Hegedűs archive with present-day speech recordings, found that people in general spoke differently when today's seventy-year-olds were young from the way they speak today. Therefore, the less frequent occurrence of hesitations in our old subjects' speech may (partly) be attributed to that generation gap.

In accordance with the conclusions of the same paper, we can also assume that young speakers are less keen on self-monitoring or care less about their speech appearing to be fluent. This may explain the fact that the editing phases of repetitions and restarts are consistently longer with young subjects. Old speakers unintentionally keep their editing phases very short in order to keep up fluency; but such short editing phases are often not long enough for monitoring and/or correction. This makes the second occurrence of their repeated items longer than the first twice as frequently as in young speakers' case, and often leads to multiple repetitions, too. Old speakers' tendency for uncertainty and/or for overinsurance may also be signalled by the fact that repetitions with no editing phase were three times as frequent in their speech as in that of young subjects. Their aspiration for fluency, coupled with their slower articulatory movements, may furthermore have caused their hesitations being longer than those of the other group of subjects.

Although pause-within-word phenomena occurred rather infrequently, they call our attention to an important difference between the two age groups. These phenomena have also confirmed that old speakers have more difficulty in and need more time for lexical access; whereas with young speakers accessing the appropriate grammatical form (inflection) is more problematic.

With respect to differences in the occurrence of specific filler words, we may conclude that habitual usage may simply differ across periods and across age groups.

CONCLUSIONS

Our hypothesis concerning frequency of occurrence was partly confirmed: in natural spontaneous narratives, when the task did not involve any particular mental effort, disfluencies occurred in roughly equal numbers with both age groups. In a speech situation made mentally more demanding, we attested such phenomena more frequently in our young subjects' speech, a fact that may have several reasons. First, older speakers' slower speech rate gave them more time for speech planning and self-monitoring processes, thus they did

not "need" disfluency phenomena while speaking. And second, young subjects were more intent on recalling the text they had heard as exactly as possible, whereas old subjects often departed from it, adding their own memories and reflections. Accordingly, old subjects, even though the number of disfluencies grew in their recalls, too, tended to speak fluently in this speech situation. It is also important to note that in our earlier study, analysing the speech of the same speakers, we found more errors in old subjects' speech than in that of young speakers (Bóna, 2010). The other hypothesis was confirmed: there are differences between young speakers and old speakers with respect to the types of disfluencies.

In this paper, we studied a segment of the speech planning characteristics of old vs. young speakers. Further research is necessary with respect to age-bound specifics of speech planning processes, involving not only disfluencies and temporal features but also the complexity of grammatical forms, the level of elaboration of ideas, as well as text cohesion, and their interrelations.

Given that old age speech problems (i.e., various kinds of dementia, aphasia, etc.) can only be classified reliably if we fully explore "old speech" as a natural consequence of ageing, knowing as much as possible is of utmost importance.

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DISFLUENTNOSTI U SPONTANOM GOVORU RAZLIČITIH DOBNIH SKUPINA: PODACI IZ MAĐARSKOG

SAŽETAK

Opće starenje organizma koje uključuje hormonalne, fiziološke i kognitivne promjene utječe i na govornu proizvodnju. Usporavanje mentalnih procesa i govornih organa može utjecati na fluentnost govora. Ipak, malobrojni su radovi posvećeni disfluentnostima u govoru starijih ljudi, te se različiti autori ne slažu oko podataka o učestalosti.

U ovom smo radu istražili disfluentnosti mladih i starih govornika s obzirom na njihovu učestalost i vremenske obrasce. Rezultati su pokazali da su u prirodnom spontanom govorenju, u slučajevima kada zadatak nije podrazumijevao bilo kakav mentalni napor, disfluentnosti bile podjednako učestale u objema dobnim skupinama. Tijekom mentalno zahtjevnijeg spontanoga govora pokazalo se da upravo mladi govornici imaju učestalije disfluentnosti. Podaci su također pokazali da postoje razlike između dviju dobnih skupina s obzirom na tip i vremenske obrasce disfluentnosti.

Ključne riječi: *disfluentnosti, starija dob, učestalost, vremenski obrasci, spontano govorenje, prisjećanje*

