THE THESES OF THE PHD DISSERTATION

EÖTVÖS LORÁND UNIVERSITY
FACULTY OF HUMANITIES

Doctoral School of Linguistic Studies

FUNCTION AND REALIZATION OF HUNGARIAN DISFLUENCIES

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1. INTRODUCTION

Spontaneous speech is usually rich with disfluencies because of the simultaneous operations of the speech planning and the actual articulation. Since the 1950s, speech errors and disfluencies have been studied as a window into the processes of speech planning (Goldman-Eisler 1958, Fromkin 1973, Levelt 1989). Disfluencies can be studied from different angles and with different goals (Shriberg 2001). They usually express speech planning or execution problems, have a function in self-monitoring, and indicate that the speaker does not know how to continue or unable to recall a particular word. Disfluencies also serve as floor-holders when a speaker needs some additional time to plan the utterance but does not want to cede the floor to the interlocutor. They have a communicative function as helping people manage turn-taking, and align the speakers' mental state (Clark 1994, Brennan–Williams 1995, Clark–Fox Tree 2002).

Many studies have been done on the factors that might affect fluency rates like the speaker's age, gender, difficulty of topic domain, length of the utterance, relationship between speakers, etc. (Shriberg 1996, Yaruss et al. 1999, Bortfeld et al. 2001).

The topic of the dissertation is the functional and acoustic-phonetic analysis of two disfluencies, namely hesitation phenomena and filler words. The goal of the research was to find out whether the different functions of these disfluencies are escorted also by different articulation followed by different acoustic structure. In addition, a chapter of the dissertation, first time in Hungarian, reports data on the acoustic realizations of children's hesitation phenomena. We also investigated the assessment of hesitations based on questionnaire.

2. STRUCTURE OF DISSERTATION

The dissertation contains 14 chapters. The hesitation phenomena and the two filler words were analyzed from multiple points of view including their acoustic realizations, functions and correlations between these two. Hesitations were analyzed both in children's as well as in adults' spontaneous speech.

Chapter 1 is an introduction which sets out the definition of the subject and the general aim of this research.

Chapter 2 includes the analysis of the speech production process, models and various theories on the subject.

Chapter 3 paraphrases the characteristics of the spontaneous speech as well as the different types of texts. This chapter also lists some of the more important works on the subject in Hungarian.

Chapter 4 focuses on the analysis of the disfluencies in spontaneous speech. It deals with various questions in relation to the different types, frequency of disfluencies and the aims of previous research of the subject.

Chapter 5 goes into detail about the process of self-monitoring and self-correction including an overview of the different theories on the subject.
Chapter 6 details the aim of the dissertation and the main hypotheses. This is the first dissertation written in Hungarian that aims at providing answers to the question as to whether or not the hesitations of the spontaneous speech are realized with different acoustic structures depending on different functions. In addition, the dissertation aimed at the analysis of the disfluencies from multiple aspects in children's spontaneous speech (ages between 6 and 7). The third aspect of analyzing filled pauses was to gain information about their subjective assessment.
Chapter 7 will elaborate the general methodology of the research, the database and the subjects of this research.
Chapter 8 has four large parts to deal with the results of the analysis of the hesitations. The chapters consist of (i) the acoustic-phonetic analysis of hesitations in adults' spontaneous speech, (ii) that of children, (iii) the comparison between the two age groups, and (iv) the discussion of the results based on the data of the questionnaires in relation to the assessment of hesitation.
Chapter 9 deals with research on two filler words, their acoustic realizations related to functions.
Chapter 10 illustrates the conclusions in general as well as in relation to the specific subjects mentioned above.
Chapter 11 is a short summary of the topic and the results of the dissertation.
Chapter 12 lists the theses of the dissertation.
Chapter 13 shows the references.
Chapter 14 is an appendix which contains the questionnaire referred to in Chapter 8.

3. METHOD AND MATERIAL

Spontaneous narratives of the BEA Hungarian Spontaneous Speech Corpus were used for the research of adults' hesitations and fillers words. The material was 700 minutes long. We also recorded narratives from kindergarten children. The speakers were all native Hungarian-speaking subjects.
The digital recordings were submitted to acoustic-phonetic analysis (by Praat 4.04). The total duration of the hesitations and filler words, the frequency values of their first two formants were analyzed. The actual function of the hesitations and filler words was defined in each case on the basis of the context. To test statistical significance various methods were used, *t*-tests, analysis of variance (ANOVA), as appropriate (using SPSS 8.0 and 13.0). We made a questionnaire to obtain information on the assessments of hesitations by young adults. 80 subjects participated in the investigations.

4. ON THE ANALYSIS OF HESITATION PHENOMENA

Filled pauses are natural occurrences in spontaneous speech and they may turn up in any level of the speech planning process or in a number of functions. They indicate the uncertainty of the speaker, they provide time for the processes of self-monitoring and corrections and they play an important role in conversations – for example, indicating the intention to speak – as well as in speech perception (Levelt 1989, Fox Tree 2002). A number of factors influence the frequency of filled pauses in spontaneous speech: the age and the mental state of the speaker, the topic of the talk, the type of text, the length of the utterance, etc. (Bortfeld et al. 2001, Shriberg 1996).

In the present dissertation we have investigated – for the first time in Hungarian – (i) the types of acoustic-phonetic parameters of hesitations (filled pauses) and (ii) their function-dependent realizations.

The spontaneous narratives of the BEA Hungarian Spontaneous Speech Corpus were used in the research. The digital recordings were submitted to acoustic-phonetic analysis (by Praat 4.04). The total duration of the hesitations and the frequency values of the first two formants were analyzed. The actual function of the filled pauses was defined in each case on the basis of the context. To test statistical significance, various methods were used, *t*-tests, analysis of variance (ANOVA), as appropriate (using SPSS 8.0 and 13.0).

Our results show that the age of the speaker is a decisive factor in the frequency of hesitations. Children have produced 1.58 hesitations per minute, on average. This is about half of the average frequency of the adults (the latter was 3.82 hesitations/minute). Schwa is the most frequently pronounced hesitation phenomenon as observed with Hungarian speakers; 78.5% of all hesitations are schwas in the case of adults while they appear in 71.8% of all cases in the children's speech. The results show that there is a function division between the different types of hesitations in the Hungarian language. Hesitations containing more than one vowel do not occur in the vicinity of speech errors. The explanation for this occurrence is that the hesitations with more speech sounds require more complex planning strategies before pronunciation. However, speakers often use these complex forms to indicate the intention to speak (e. g. phatic marker) because of their longer durations.

Statistical analysis showed significant differences in durations depending on functions (irrespective of the speaker's age). The articulation of the schwa and the bilabial nasal in the filler function was completed in a shorter time than the articulation of these phenomena in the phatic marker functions (Figure 1 and 2).

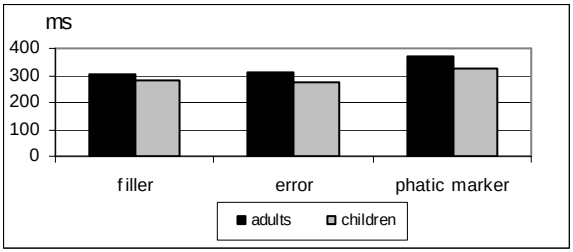

Figure1 Duration of schwa depending on function (means)

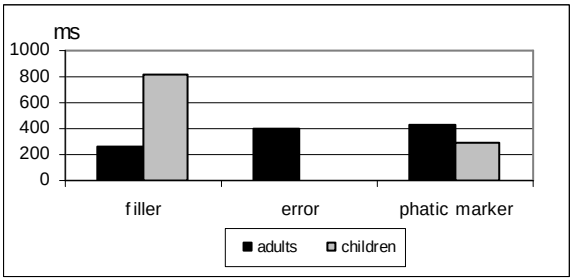

Figure2 Duration of nasal depending on function (means)

The frequency values of the first two formants of the schwa-realizations were also analyzed. The first formant of the schwa were the same in all functions (without any significant differences; see Table 1 for the values). This means that tongue height does not change during articulation according to functions.

The second formant values seem to be indicators of the new functions of the words under study, since they show clear differences depending upon function (Table 1); however, the difference is significant only in males' articulation.

Table 1 F2 values for realizations of the[ə] depending on function (means and standard deviations /SD/)

F2 values for realizations of the[ə] depending on function (Hz)						
function	filler		error		phatic marker	
	mean	SD	mean	SD	mean	SD
Males	1550.41	139.53	1522.25	154.47	1481.42	108.41
Females	1770.34	138.16	1726.33	189.71	1782.41	238.43
Children	1735.66	202.95	1674.78	220.90	1841.36	224.20

There were no significant differences in the F2-values depending on function in the females' and the children's articulation; however there is a tendency indicating highest second formant values in the phatic function.

We have analysed the native speakers' attitude toward hesitation phenomena using a questionnaire which were filled in by 80 young adults. Subjects thought their own hesitations to be occurred rarely in spontaneous speech. However, according to the data in the literature, hesitation is one of the most frequent disfluencies in the young adults' speech (cf. Gósy 2003, Markó 2004). In fact, young adults produce more hesitations than they think they do in everyday communication. There are two possible answers for this seemingly contradictory fact. On the one hand, it is possible that the speakers' self-monitoring does not perceive as much filled pauses as they really occur in spontaneous speech. Subjects might not admit their frequent hesitations for some purpose (unknown for the investigator), on the other hand. Therefore, we can conclude that hesitation is somehow stigmatized by the young people.

The subjective data of the questionnaire revealed that filled pauses are the results of the speakers' lexical activation problems. Speakers try to activate the target word that is momentarily unaccessable for them during producing filled pauses. However, there are other reasons for using filled pauses like (i) the difficulty of the conceptual planning, (ii) some sort of thought selection problems or (iii) the speakers' psychological state in the actual speech situation.

5. ON THE ANALYSIS OF *TEHÁT* AND *ILYEN*

Spontaneous speech contains various kinds of disfluencies, including the use of fillers. They carry interactional meaning and they are indicative of covert speech planning problems: they signal that speech control is faltering, even though the speaker does not produce an overt error (Howell and Au-Yeung 2002). Fillers are imbued with interactional meaning: they have implications for turn-taking practices, and they raise interesting questions about how current speakers signal (and current listeners recognize) e.g. completion of various kinds, including syntactic, prosodic and pragmatic completion. The use of fillers may also suggest that the speaker does not know how to continue, or is unable to recall a particular word. When people begin to overuse a word in the filler function, the new function may therefore affect the articulation of the word in the given function, while its articulation in its original function remains unaltered.

This paper will report on two words in present-day Hungarian that are apparently undergoing a process of development, with an increasing number of speakers using them as fillers. One of them is the conjunction *tehát*, which has two meanings ('consequently' and 'that is'), while the other one is the pronoun *ilyen* ('like this' and 'such as') which can also have determiner function. The present study was designed to test the hypothesis that the articulation of the word *tehát* in

the filler function will be different from its articulation in its traditional conjunction functions and the articulation of the word *ilyen* in its filler and pronoun functions.

Twenty spontaneous narratives from BEA, the Hungarian Spontaneous Speech Corpus were selected for the research. The speakers were native adult speakers of Hungarian (9 females and 11 males) from Budapest (ages ranging from 22 to 30). The recorded narratives, with a total duration of 533 minutes were submitted to analysis by Praat 4.04. The duration of the words and the frequency values of the first two formants of the vowels ([ɛ, aː, i] were analyzed. The material selected contained 535 occurrences of the words *tehát* (341 from males and 194 from females) and 195 occurrences of the word *ilyen* (128 from males and 67 from females). The function of each word in spontaneous speech corpus was defined by analyzing the actual context. Different functions were identified for the word *tehát*, namely two conjunctions ('consequently' and 'that is'), filler and the phatic marker. Two different functions were identified for the word *ilyen*, that of filler and that of pronoun (meaning 'like this' or 'such', Table 2).

Table 2 Total number of the words *tehát* and *ilyen* according to functions in the corpus

Gender	Number of words					
	Functions of *tehát*				Functions of *ilyen*	
	filler	'consequently'	'that is'	phatic marker	pronoun	filler
Females	106	16	48	24	21	46
Males	207	28	77	29	39	89
Total	313	44	125	53	60	135

In the majority of cases, the original phonological form of *tehát* appears in spontaneous speech as a single closed syllable (in 90.66% of all cases). The word *ilyen* tends to retain both of its syllables (in 93.3% of all cases).

Statistical analysis showed significant differences in duration depending on function both for males and females (Table 3).

Table 3 Duration according to function (means and standard deviations /SD/)

Function	Duration (ms)					
	females		males		all subjects	
	mean	SD	mean	SD	mean	SD
Filler	177.96	57.10	174.70	66.41	175.80	63.34
Conjunction 'consequently'	246.93	72.63	217.07	85.31	227.93	81.37
Conjunction 'that is'	226.08	65.85	232.93	81.05	230.30	75.37
Phatic function	311.04	114.79	296.48	83.31	303.07	98.08

The articulation of the word *tehát* in the filler function was completed in a shorter time than the articulation of *tehát* in both the conjunction and the phatic marker

functions, irrespective of the number of syllables. In the two conjunction functions, irrespective of meaning, *tehát* showed no significant differences in duration: its values fell between the values of the filler and of the phatic marker functions.

The frequency values of the first two formants of the realizations of the phoneme /a:/ were analyzed in both the monosyllabic and the disyllabic forms. The first formants of the vowels corresponding to the phoneme /a:/ in the word *tehát/tát* showed slight differences depending on function: the values were higher in the conjunction functions irrespective of gender, while they were lower in filler and phatic marker functions. This finding indicates that the first formants in the vowels are becoming neutralized in the filler function. Analysis of variance confirmed the there is a significant difference of the first formant values depending on function. There was a significant difference between the F1 values for fillers and conjunctions in the males' pronunciation, while there are significant differences between fillers and conjunctions as well as between conjunctions and the phatic marker function in the case of females (Table 4).

Table 4 F1 values for realizations of the phoneme /a:/ depending on function (means and standard deviations /SD/)

Function	First formant frequency values (Hz)			
	females		males	
	mean	SD	mean	SD
Filler	641.34	121.70	601.22	68.07
Conjunction 'consequently'	753.62	101.29	651.17	68.66
Conjunction 'that is'	685.70	108.27	622.97	62.03
Phatic function	648.62	124.81	619.03	53.60

The second formant values seem to be also indicators of the new functions of the words under study, since they show clear differences depending upon function (Table 4). There are significant differences of the second formants between fillers and conjunctions in females' articulation. However, no such difference was found between the other functions. This means that the second formant frequencies do not show wide variation either between the two conjunction meanings or between the filler functions and the phatic marker functions. The males' data are somewhat different. The second formant frequencies provide a more marked indication of function. The analysis revealed significant differences in almost all functions. No significant difference could be confirmed, however, between the functions of filler and phatic marker and between the two conjunction meanings ('consequently' and 'that is'). In sum, the actual vowel quality of /a:/ in *tehát/tát* is determined primarily by the second formant values (Table 5) and to a lesser degree by the first formant values.

Table 5 F2-values for realizations of the phoneme /aː/ depending on function (means and standard deviations /SD/)

Function	Second formant frequency values (Hz)			
	females		males	
	mean	SD	mean	SD
Filler	1816.04	136.46	1492.20	90.34
Conjunction 'consequently'	1932.00	116.31	1557.21	109.41
Conjunction 'that is'	1906.00	103.68	1595.96	119.42
Phatic function	1843.12	100.75	1485.75	77.54

The vowels in the filler and the phatic marker functions in both the females' and the males' articulation tend towards neutralization, while those in the conjunction function approach the characteristic formant structure of the Hungarian vowel [aː].

Articulation is transformed into comparable values related to the distances of the phonetic patterns analyzed in the different functions. The measures support our previous findings that articulation in the two conjunction functions is almost the same, and, in a similar way, articulation in the filler and phatic marker functions are again close to each other. However, articulation in the conjunction functions shows a marked difference from that in the filler and phatic marker functions.

The duration of the word *ilyen* shows significant differences depending upon its two functions). In the function of filler, it is longer than in the function of pronoun (Table 6).

Table 6 Duration of *ilyen* depending on function (means and standard deviations)

Function	Duration (ms)					
	females		males		all subjects	
	mean	SD	mean	SD	mean	SD
Filler	244.26	79.11	220.22	75.10	228.41	77.05
Pronoun	194.61	93.29	196.17	54.08	195.63	69.53

The formants of the stressed vowel ([i]) were alike in all cases (with no significant differences; see Table 6 for the values). The same insignificant result was found with the first formants of the realizations of the phoneme [ɛ] both with females and males. This means that tongue height does not change according to the new function with either vowel.

Table 7 Formant values for realizations of the phoneme /i/ and /ɛ/ depending on function (means and standard deviations /SD/)

Vowel and gender	Formant frequency values (Hz)							
	filler				pronoun			
Females	F1		F2		F1		F2	
	mean	SD	mean	SD	mean	SD	mean	SD
[i]	438.58	60.06	2353.93	187.95	427.95	49.62	2330.66	183.06
[ɛ]	655.84	95.91	1879.04	198.80	621.90	92.47	1902.19	233.60
Males								
[i]	363.77	46.48	2108.11	157.82	352.10	48.03	2123.65	171.73
[ɛ]	596.68	57.88	1687.27	144.34	585.87	57.02	1794.07	136.99

Second formants of the unstressed vowel ([ɛ]) showed no significant difference with females. However, pronunciation of the unstressed vowel [ɛ] by males showed variations depending on function.

6. CONCLUSIONS

The aim of the dissertation was to investigate the functions and the acoustic realizations of two types of disfluencies, the hesitation phenomenon and the filler. Research was done by means of analyzing 700-minute spontaneous speech sample. On the basis of the findings the following points of conclusion can be drawn.

1. Hesitations show different kinds of realizations and they have many functions in spontaneous speech (intention markings, correction of speech errors, etc.). The most frequent forms of hesitations are schwas in Hungarian. They show function-dependent realizations which were confirmed by the durational values and the second formant values of the vowels.
2. There are two variables – the speaker's gender and the contextual position of the silent pauses – that influence the durations of the silent pauses preceding and/or following hesitations. Silent pauses preceding filled pauses are longer than those following them. The male speakers show longer silent pauses in the vicinity of the hesitations than do the female speakers.
3. Children's hesitation phenomena are different from those of the adults. The durational and formant frequency differences are rooted in the age differences and show developmental characteristics.
4. Synchronous language change is taking place in spontaneous Hungarian speech. The word *tehát* used as a filler has an extremely high frequency in present-day Hungarian. In the case of *tehát* articulation depends on its function, which was confirmed by analyses of word duration as well as first and second formant frequencies. Most fillers are monosyllabic, characterized by short duration and a

schwa-like vowel. Phatic markers (are characterized by relatively long duration and a schwa-like vowel. The duration of conjunctions is longer than that of fillers and shorter than that of phatic markers. Although the word *ilyen* also shows function-dependent variation in its durational patterns, the differences between formant frequencies in the vowels are not so convincing.

5. Hesitations and fillers have common functions in spontaneous speech: (i) they (may) mark the speakers' problems in speech planning process, on the one hand, and the self-monitoring process, on the other hand; (ii) they have specific functions in the discourse; and (iii) their acoustic-phonetic patterns show similar function-dependencies.

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