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DIFFERENTIATION OF VOWEL LENGTH BY RELATED BILINGUAL CHILDREN

1. Introduction

Estonian and Finnish are genetically and typologically closely related languages. Their mutual acquisition as a second or foreign language has often been considered easy. Still, they show differences that cause problems to language learners. The prosodic systems are quite different, which primarily appears as a higher overall and more varying fundamental frequency of speech in Estonian. Other differences in prosody are the variable location of primary stress of words and the interplay of quantity features with stress patterns.

The peculiar pattern of vowel shortenings by Estonian adult learners of Finnish aroused an interest toward the present theme. O.-M. Kultalahti (1996) lists the most problematic features to adult Estonian learners of Finnish, and she claims that the shortening of vowels in post-stress syllables ranks as the most common one. To our knowledge, no measurements on the theme have been made, though. O.-M. Kultalahti explains the interference by Eckman's theory of MDH markedness. In terms of that, features with highest problem value are the highly marked ones which the source language lacks. In line with the general theory, the presence of a marked feature presupposes the existence of the unmarked features in the system as well. In harmony with the theory, a speaker of Estonian, with no *m a r k e d* occurrences of long vowels in the post-stress syllables in her language, will meet problems in the production of such in Finnish.

In this study, we direct some attention to the durations of vowels in post-stress positions in the productions of bilingual Estonian-Finnish children. The issues are: What are the durational patterns produced by a bilingual child for vowels in Finnish post-stress (the second, tertiary-stressed) syllables?, and How does the age of the child affect the acquisition of vowel duration?

2. On phonological and phonetic differences between Estonian and Finnish

2.1. Quantity differences in standard Estonian and Finnish

The two languages have different quantity systems of both consonants and vowels. Estonian has three lengths (short, long, and overlong), whereas Finnish has two (short and long). According to a classical grammar, the Estonian vowels follow

three phonological lengths: short, long, and overlong. A number of scholars (Remmel 1975; Viitso 1978; 1979; 1981; Eek 1977) postulate even four lengths (see closer Hint 1997), and exemplify it by the duration difference between the suffixless partitive case and the illative case (with an impression of longer duration): *kooli* 'school' partitive vs. *kooli* 'school' illative.

Table 1

The quantity distinctions of Estonian and Finnish

	Estonian		Finnish	
<i>koli</i> 'trash'	Q1	<i>tule</i> 'come!'	Q1	<i>tule</i> 'come!'
<i>kooli</i> 'school' gen.	Q2	<i>tuuled</i> 'winds'	Q2	
<i>kooli</i> 'school' part.	Q3	<i>tuult</i> 'wind' part.	Q3	<i>tuulee</i> 'it blows'

The distinction of /long/ vs. /overlong/ in Estonian is roughly corresponded only by the /long/ quantity in Finnish, and its use causes problems of identification and production. The quantity distinctions are acquired by Estonian children early, and M. M. Vihman (1997 : 218) maintains that the second and third quantity (Q2 and Q3) would be differentiated as part of the growth of grammatical categories as early as the second year. The acquisition of the quantities has not caused further problems to bilingual children either (Oksaar 1971 : 340; Hassinen 1996 : 278; 1997 : 151–152).

The vowel quantities in Estonian and Finnish differ also with respect to word stress and different vowel phonemes. The occurrence of /long/ and /overlong/ vowels is restricted: these lengths may only occur in primary-stressed positions. In post-stress syllables only vowel phonemes /i u e a/ occur. The eight vowel phonemes of Finnish may all occur as /short/ and /long/ in any word-stress position.

2.2. The distinctive function of quantity

Vowel (and consonant) quantity has a distinctive function in both Estonian and Finnish. In certain paradigms quantity has a grammatical significance (cf. *kooli* gen., *kooli* part., *kooli* ill.). In Finnish, an unstressed vowel may often function as a morpheme element. A verbal 3rd person sg. is signaled as a lengthening of the stem vowel. A long vowel element in an unstressed syllable also occurs in the 1st infinitive of verbs with stems on /a/ or /æ/ (*laula-a* 'to sing', *lentä-ä* 'to fly'). In everyday spoken language long vowels develop with monophthongization (*istua* 'to sit' > *istuu*; *korkea* 'high' > *korkee*), a process which seems rather productive. A long unstressed vowel occurs frequently in verb and noun inflection, e.g. the passive voice (*mennään* 'go' pres. of the passive voice) and 3rd infinitive illative (*nukkumaan* 'sleep'). Very frequent forms are also the part. sg. (*omena-a* 'apple' part. sg.) and illatives (*talo-on* 'house' ill. sg., *kenki-in* 'shoes' ill. pl.) of certain nouns. Four of these form groups (3rd pers. sg. pres. of the passive voice, part. sg., ill. sg and pl.) are productive in any speech context. Their essential role in grammar and running speech requires a good command of the features as early as possible in the learning process.

J. Toivainen (1996) has shown that a monolingual Finnish child acquires the part. sg. (*leipää* 'bread', *kalaa* 'fish', *koiraa* 'dog'), the 3rd pers. sg. pres. (*leikkii* 'play', *nukkuu* 'sleep', *ottaa* 'take'), the pres. of the passive voice (*katsotaan* 'look', *luetaan* 'read'), and the ill. sg. forms as its first inflectional formatives. A common thing to them is a long vowel element in the unstressed syllable. A Finnish child is accordingly supposed to produce long vowels in unstressed positions pretty early. In J. Toivainen's (1996 : 50) opinion, the vowel length would have a connotation of

continuity, unfinishedness, partitiveness, and deficiency. The forms as such are quite demanding (e.g., the personal suffix may be represented by any vowel phoneme, conditioned by the stem vowel), and mere imitation cannot offer the sole explanation of early child language occurrence. In its second year, with the acquisition of the forms, the child scarcely can possess a cognitive capability to enable it to choose the /long/ vowel, to denote the mentioned abstract properties. The actual durations of Finnish /long/ post-stress vowels have not been studied by acoustic measurements.

3. Object of study and material

The speech production of bilingual children living in Finland, others from bilingual Estonian-Finnish families, others from monolingual Estonian families, is the object of the present study. The bilingual families have practised one-person/one-language strategy in their daily language usage. The mothers are Estonian and fathers are Finnish. How consistent the use of the mother tongue is, differs from family to family. The children obtain Finnish day-care daily. The families live in the Savo dialect area, and a fair degree of dialect is spoken by the fathers. In the monolingual Estonian families in Finland, only Estonian is used, but the children get along in the Finnish environment. They understand Finnish and know some simple answering phrases. Occasionally, these children are in Finnish-speaking day-care, with different baby-sitters.

The material of the study consists of C-cassette recordings made in situations of free play and controlled watching of a picture book. The recordings stretch over ages 1;2–5;0. The recordings have been transcribed in a broad Fenno-Ugrian transcription. The vowel durations of two children's productions were measured for this presentation. These individuals come from a bilingual Estonian-Finnish family. They are girl H and boy M.

4. The method of measurement

The duration measurements were made by means of the Multi-Speech 1.0 version of the CSL program. The durations of the vowel in the 1st syllable, the intervocalic consonant element, and the 2nd syllable vowel were measured (e.g., *tullee* '(he) comes': *u + ll + ee*). Diphthongs and long vowels were not classified separately in the measurements. A total of 82 words uttered by two children were analyzed. In the analysis we concentrate on the word structure (C)VC(C)VVC, i.e., the word structure with a short 1st syllable vowel and a long 2nd syllable vowel. The part of material with a long vowel element in the first syllable was left outside analysis in this study because of the scarcity of items recorded as yet.

The early age period measurements were made from recordings at the age when the first occurrences of Finnish partitive, illative, and 3rd person sg. come out, but the forms do not show stability of acquisition (ages 1;10 to 2;5). Another sample is from an age when the children under follow-up have acquired the forms and use them productively.

5. An analysis of the form repertoire

By auditive observation, it could be concluded that the three-way quantity differentiation is well under way of acquisition. Mixed forms of the two languages do not generally occur. The first occurrences of long vowels in post-stress syllables

come from the age 1;10 on in the speech of both boy M and girl H: *antaa* 'gives', *ajaa* 'drives', *menee* 'goes'. The principle of forming the verbal 3rd person sg. is acquired by these children at 2;1. The first partitive forms produced by girl H come at 2;0, e.g. *ruokaa* 'food'. More occurrences of partitive turn up at the age of 2;3: *pappaa* 'grandpa', *kirjaa* 'book'. The children cannot be considered to have command of it no earlier than at 2;5. Before this stage, avoidance is used, or also partitive pl. ending is used instead.

The illative case comes out from girl H at 2;0 (*kotiin* 'home'), but from boy M as late as at 2;6. By the age 2;0, the 3rd person sg. and part. sg. have generally developed, but the illative case is taken into use considerably later. With reference to the children studied, bilingual Estonian-Finnish children acquire the forms with a long vowel later than monolingual Finnish children.

J. Toivainen (1980 : 181; 1994 : 31–32) and P. Nieminen (1991 : 85) argue that a Finnish child produces forms that require long vowels in unstressed positions from its early months of the second year. An Estonian-Finnish bilingual child tends to avoid these forms and to activate their use not earlier than the age 2;6. The 3rd pers. sg. pres. of verbs is substituted for by Estonian-Finnish mixed forms with the Estonian *b*-suffix (*nukku-b* 'sleeps', *otta-b* 'takes'). Also in the partitive case mixed forms are met with: the Estonian partitive *-t* turns up in *kukka-t* 'flower', *nalle-t* 'teddy'. The use of plural is realized at this phase, too: Finnish pl. *-ja*, e.g. *kaksi auto-ja* 'two cars', *kukki-ja* 'flowers', and Estonian pl. *-si*, e.g. *auto-si-a* 'cars'. The production of the Finnish illative case proves most unstable (Hassinen 1996 : 104, 108).

6. Results of duration measurements

At the early age period (1;11 to 2;5), 9 to 14 occurrences of long vowel in the second syllable were measured for the two informants, boy M and girl H. In the 14 productions by boy M, the differentiation process of the two quantities cannot be seen to show itself. The average duration of the first syllable /short/ vowel was 236 ms and that of the second syllable /long/ vowel 226 ms. The two duration variations have equal spreads from 112 ... 119 ms to 368...375 ms. The overlap of the duration values is total.

Girl H's 9 productions show a somewhat different pattern so as to give the duration values 250 ms for the first syllable /short/ vowel and 341 ms for the second syllable /long/ vowel. Even though the first syllable vowel duration is relatively long as compared with adult short vowel values (62...87 ms according to J. Lehtonen 1970 : 127–128), she appears to lengthen the second syllable long vowel by an average factor of 36%. There is found a cluster of cases with second syllable vowel durations over 400 ms, representing an essential lengthening, and indicating a more or less conscious effort to lengthen the segment.

To find a pattern behind the great variation, we set two arbitrary limits of observation: (1) whether the second syllable vowel duration has a minimum of 50% duration excess over the first syllable vowel duration, and (2) whether the second syllable vowel duration exceeds 200 ms. Table 2 shows how the material meets the two conditions. It is to be observed that the utterances by girl H fulfil them more often. Four of the nine cases by girl H meet the 50% lengthening condition versus one out of 14 cases by boy M. The 200 ms condition is met in eight utterances by girl H versus eight of 14 by boy M. The performance of girl H can possibly be considered to approach more towards a pattern where effort is taken to add to a durational prominence of the second syllable.

Table 2

Cases of utterances by girl H and boy M which meet the 50% lengthening and the > 200 ms condition. Age period 1;11 to 2;5

Subject	V in second syllable > 50 % longer than V in first syllable	V in second syllable > 200 ms
boy M	7 %	57 %
girl H	44 %	89 %

In the age period 3;0 to 4;4, the essentials of the durational patterns of the two informants' utterances remain. The average durations for 1st and 2nd syllable are the same (158 ms) in boy M's utterances, but an overall shortening of vowel durations is observed (226...236 ms to 158 ms). A shortening of the durations is also seen in the utterances by girl H: the first syllable vowel duration average was 194 ms at this age period (vs. younger: 250 ms) and the second syllable vowel average was 222 ms (vs. younger: 341 ms). Surprisingly enough, the average duration difference between the first and second syllable vowels in girl H's utterances has shrunk to bare 28 ms (Table 3).

Table 3

Cases of utterances by girl H and boy M which meet the 50% lengthening and the > 200 ms condition. Age period 3;0 to 4;4

Subject	V in second syllable > 50 % longer than V in first syllable	V in second syllable > 200 ms
boy M	14 %	31 %
girl H	14 %	45 %

The proportion of cases where the 50% added duration limit is exceeded does not show a drastic rise as computed from the duration values of boy M's vowels: three cases of 21 do meet the condition. Corresponding cases in girl H's material actually show a decrease: three cases out of 22 meet the condition (cf. younger period: 4/9). The absolute durations of the two informants' second syllable vowels are produced over the observation threshold 200 ms no oftener with age here (Table 3). An apparent process of aiming at shorter (and more adultlike) overall durations will push the limit further off from the realized second syllable durations.

An essential feature of the age period is that the differentiation of distinctive vowel lengths is rather unstable and generally not attained. A notable feature is the development of girl H, whose durations showed promising sprouts of differentiation in the early period. At this period, she may be in a process of finding her way through the interference caused by a risen level of consciousness of the encounter of the two systems. A hint of this type of process is obtained from a quite frequent occurrence of mixed morphology, e.g. *tule-e-b* 'comes', with both Finnish and Estonian 3rd pers. sg. suffixes.

7. Conclusion

The differentiation of phonemic vowel length in utterances by two bilingual child informants, girl H and boy M, was studied. The duration measurements showed great variation for both first syllable /short/ vowel and second syllable /long/ vowel. The durations of the second syllable vowel produced by girl H appeared as considerably longer than the short 1st syllable vowels at the younger age period, and an initial development of length distinction could be discerned. In the later age period, the duration difference diminished, and the two durations (1st syllable short vowel and 2nd syllable long vowel) roughly overlap. This progress via underdiffer-

entiation may be an index (though not definitely recognized) of a chaos in the system, when the two different length systems meet in the cognition of the language learner.

The other learner individual, boy M, shows a different pattern of realizations of duration. The two age periods do not seem to differ with respect to how well he differentiates the 1st syllable /short/ vowel from the 2nd syllable /long/ vowel. The cases where the 2nd syllable /long/ vowel exceeds the 1st syllable /short/ vowel to a required extent are rare. His quantity development is realized as an overall shortening of the average vowel durations from 230 ms to 158 ms between the two periods. An impact of the Estonian language could be hypothesized to have drawn the 2nd syllable vowels below a reasonable duration of a /long/ vowel in a majority of cases as late as at the 4 years age.

The two learner individuals may have initiated their quantity acquisition with different premises. A speculation of two possible early childhood bilingual acquisition strategies, the one with parallel but distinguished systems for the two languages, and the other with non-distinguished language substance for the two languages, may not be groundless here. The two learners' language material from quite early (1;2 years) utterances offer hints of the very difference (see further Hassinen 1996 : 81). The early efforts of differentiation by girl H are in harmony with this strategy difference.

REFERENCES

- E e k, A. 1977, Uemaid uurimistulemusi eesti foneetikas. — KK, 406—415.
 — 1983, Kvantiteet ja rõhk eesti keeles II. — KK, 153 — 160.
- H a s s i n e n, S. 1996, Virolais-suomalainen simultaaninen kaksikielisyys — kielten sekamuodot. — Suomenoppijan kieli tutkimuskohteena, Oulu (Suomen ja saamen kielen ja logopedian laitoksen julkaisuja 5), 75—114.
 — 1997, Virolais-suomalainen simultaaninen kaksikielisyys — kielten sekamuodot. Lisen-
 siaatintyö, Oulu (Manuscript).
- H i n t, M. 1997, Viroko neljän kvantiteettiasteen sävelkieli? — M. H i n t, Eesti keele astevahelduse ja prosodiasüsteemi tüpoloogilised probleemid. Typological Problems of Estonian Grade Alternation and Prosodical System. Viron kielen astevaihtelun ja prosodisen systeemin typologiset ongelmat. Типологические проблемы чередования ступеней и просодической системы в эстонском языке, Tallinn—Helsinki, 194—231.
- K u l t a l a h t i, O.-M. 1996, Tunnusmerkisyys virolaisten suomenpuhujien vaikeuksien selittäjänä. — Suomenoppijan kieli tutkimuskohteena, Oulu (Suomen ja saamen kielen ja logopedian laitoksen julkaisuja 5), 15—45.
- L e h t o n e n, J. 1970, Aspects of Quantity in Standard Finnish, Jyväskylä (Studia Filologica Jyväskyläensia VI).
- N i e m i n e n, P. 1991, Äidin ja lapsen kommunikaatio ja lapsen kielen omaksuminen, Tampere (Acta Universitatis Tamperensis A 323).
- O k s a a r, E. 1971, Zum Spracherwerb des Kindes in Zweisprachiger Umgebung. — Folia Linguistica 4, 330—358.
- T o i v a i n e n, J. 1980, Inflexional Affixes Used by Finnish-Speaking Children Aged 1—3 Years, Helsinki (SKST 359).
 — 1994, Suomi ja viro lapsen ensikielenä. — Ensikielenä suomalaiskieli, Turku (Turun yliopiston suomalaisen ja yleisen kielitieteen laitoksen julkaisuja 46), 29—41.
 — 1996, Suomen kielen omaksuminen ja kielioppi. — Suomalaiskielten omaksumista tutkimassa, Turku (Turun yliopiston suomalaisen ja yleisen kielitieteen laitoksen julkaisuja 53), 46—53.
- V i h m a n, M. M. 1997, The Acquisition of Accent: A Framework for the Study of Estonian Prosodic Development. — Estonian Prosody: Papers from a Symposium. Proceedings of the International Symposium on Estonian Prosody, Tallinn, Estonia, October 29—30, 1996, Tallinn, 203—221.
- W i i k, K. 1982, Savolaistyypinen puolipitkä vokaali ja yleisgemmaatio. — Kielitieteellisiä lastuja 2, Turku, 22—27.