

ON FINNISH PLOSIVES

Lea-Liisa Lahti

INTRODUCTION

The voice onset time has been used in several studies as a measure for comparing different series of plosives: voiced, voiceless and aspirated. The purpose of this paper is to study Finnish plosives and compare the results with other data.

Lisker and Abramson (1971) find that voiceless unaspirated plosives are very common in languages. Finnish has only one series of plosives, voiceless unaspirated. There is an opposition between /t/ and /d/ in medial position, but it is fairly marginal. Thus the plosives in Finnish follow the tendency in languages, which should be reflected in a very short voice onset time (nearly \emptyset). This is tested in this investigation.

PROCEDURE

Subjects

In this investigation a group of 5 Finnish male students studying at the University of Lund were used as informants. All of them speak Standard Finnish without any strong dialectal colouring. They come from the southern or southwestern part of Finland.

Speech samples

Four disyllabic words were embedded in a frame sentence *Sanopa...toistamiseen/uudestaan*. The choice of the last word was determined by the final segment of the test word, so that *toistamiseen* followed after a vowel, *uudestaan* after a consonant. The test words occupy a position in which they receive the sentence stress. The stress in Finnish words lies on the first syllable. To minimize coarticulatory effects the adjacent segment was always /a/.

Three of the words have an initial plosive /p, t, k/ and the

V O T msec	p-	t-	k-
KR	9	14	28
JS	12	10	20
JN	8	16	24
JP	8	10	28
EE	12	12	36

mean=	9.8	12.4	27.2	Grand average = 16.47 msec
n=	5	5	5	n = 15
S=	2.61	5.93	10.04	S = 8.72 msec

Table 1. The voice onset time of the Finnish voiceless plosives (in msec).

fourth has a medial /d/, the only position that /d/ can have in Finnish words. These cases cover the whole inventory of Finnish plosives. The test sentences were randomized within a list of 30 sentences. The informants were instructed to read the whole list three times in a normal, unemphatic way.

Experimental equipment

The recordings took place in an acoustically treated room at the Phonetics Laboratory of the Department of Linguistics, Lund University, using a unidirectional microphone and a high quality tape recorder. The frequency response of the tape recorder was flat within ± 2 dB, from 30 Hz to 14000 Hz. The signal to noise ratio was 63 dB.

The appropriate input level was adjusted for each informant. The tape speed was 19 cm/sec.

The test material was analyzed on a PV-10 Voiceprint sound spectrograph.

Acoustic analysis

The voice onset times (VOT) of the plosives were measured by

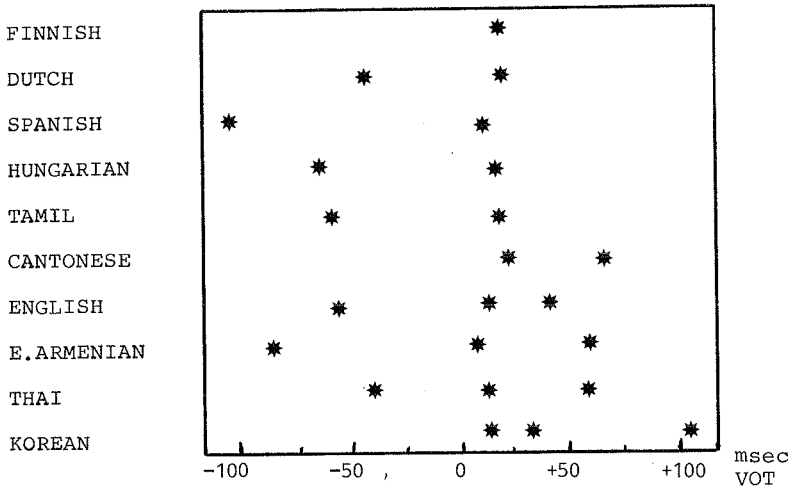


Table 2 Mean VOT of Finnish stops in wordinitial position compared to mean VOT of stops in sentence initial position, after Lisker & Abramson (1971).

hand on the wideband spectrograms of the test sentences according to the procedures used by Lisker and Abramson (1971), i.e. the time interval from the release of the plosive to the onset of glottal vibration in the following vowel. The words analyzed were: *pata*, *taka*, *kapat*, *sadan*. Mean VOT values and standard deviations were calculated in milliseconds.

RESULTS

The results for the voiceless plosives are presented in Table 1. The average VOT was shortest for /p/ and longest for /k/. As a whole, the Finnish voiceless plosives have an average VOT of 16.5 msec ($S = 8.72$).

We leave /d/ out of consideration, because it can only occur in medial position. It gave an average of -30.4 msec ($S = 10.04$).

DISCUSSION

These results can be compared with those presented by Karl Suomi (1980):

	p	t	k	
K.S.	9	11	20	msec VOT
L.L.	9.8	12.4	27.2	

and note that they agree with each other.

If we place the grand average of the Finnish voiceless unaspirated plosives on the scale presented by Lisker and Abramson (1971), we can see that it lies very close to the zero point compared to the other nine languages on the scale, all representing languages with two or three series of plosives (Table 2), thus supporting the hypothesis.

We can speculate as to the reason for the short VOT in Finnish. The short voice onset time and brief burst are the result of the timing of the laryngeal and the supraglottal activities, the vocal folds being adducted immediately after the release of the stop. One can find a similar tendency towards short VOTs in child language, retarded speech, aphasic speech, dysarthry and other speech pathologies (Macken & Barton, 1980; Blumstein et al., 1977; Lehiste, 1965). These similarities suggest that the voiceless unaspirated plosives can be regarded as the primary unmarked group of plosives and that this type can be expected in languages with only one series of stops.

The Finnish plosives raise problems in language teaching not only when a series of voiced plosives is to be learnt (e.g. in Finland Swedish), but also when the voiceless plosives of the target language have both aspirated and unaspirated allophones (e.g. Swedish, English etc.). Suomi (1980) has discussed the problems caused by the system of Finnish plosives when teaching English to Finnish speaking persons. When teaching languages with an even more complicated system of plosives to Finnish speaking persons there is probably a short-cut to mastering the distinctions. Effective practice in aspirating the voiceless series rather than special training in voicing the voiced plo-

sives gives better results in keeping these series apart. This has been tried with success.

This investigation will serve as a pilot study for a larger scale investigation of interference from Finnish on the Swedish spoken by Finns.

REFERENCES

- Blumstein S A , Cooper N E , Zeurif E B , Caramazza A (1977).
The perception of voice-onset time in aphasia. *Neuropsychologia* 15:371-83
- Macken M A and Barton D (1980). The acquisition of the voicing contrast in English: a study of voice onset time in word-initial stop consonants. *Journal of Child Language* Vol.7, Nr. 1
- Lehiste Ilse (1965). *Some Acoustical Characteristics of Dysarthric Speech*. Basel
- Lisker L and Abramson A (1971). Distinctive features and laryngeal control. *Language* 47:767-785
- Suomi, Karl (1980). *Voicing in English and Finnish Stops*: Publications of the Department of Finnish and General Linguistics of the University of Turku. Turku