

probably quite different, despite the fact that their pitch accents have phonetic similarities which in this paper have been subsumed under the same descriptive labels.

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Local Speaking Rate and Perceived Quantity: An Experiment with Italian Listeners

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Abstract

We have shown in earlier studies that the local speaking rate influences the perception of quantity in Estonian, Finnish and Norwegian listeners. In the present study, Italian listeners were presented the same stimuli. The results show that the languages differ not only in the relative position – preceding or following – of the units that have the strongest influence on the perception of the target segment, but seemingly also in the width of the reference frame.

1 Introduction

Earlier investigation using Estonian, Finnish and Norwegian listeners has shown that local speaking rate affects listeners' perception of quantity (Krull, Traunmüller & van Dommelen, 2003; Traunmüller & Krull, 2003). The results were compatible with a model of speech perception where an "inner clock" handles variations in the speaking rate (Traunmüller, 1994). However, there were language dependent differences. The most substantial of these was the narrower reference frame of the Norwegians when compared to the Estonians and Finns.

The Estonian quantity system is the most complex one. In a disyllabic word of the form $C_1V_1C_2V_2$ (such as the one used as stimulus) V_1 and C_2 are the carriers of the quantity distinction: V_1 as well as C_2 , both singly and as a VC unit can have three degrees of quantity: short, long and overlong. Seven of the nine possible combinations are actually being used in Estonian phonology. C_1 and V_2 act as preceding and following context and is a cue to the local speaking rate. Finnish has two quantity degrees, similar to Estonian short and overlong. In a $C_1V_1C_2V_2$ word all four possible V_1C_2 combinations are used. In Finnish, as in Estonian, the duration of V_2 is inversely dependent on the quantity degree of the preceding units. In Norwegian, on the other hand, only V_1 carries the quantity degree, while C_2 is inversely dependent on the quantity of V_1 . There are only two phonologically different possibilities: short or long V_1 .

In all three languages, it is a *following* unit of context that exerts the strongest secondary influence on the perception of the quantity degree. The question arises: is this generally valid also for other languages? Are there any other contextual factors that make a segment important for quantity perception, apart from relative position? The answer to these questions can perhaps be found by investigating Italian listeners' reaction to the same stimuli. In Italian, it is the duration of C_2 that is considered as the most decisive for the distinction between $C_1V_1:C_2V_2$ and $C_1V_1C_2:V_2$ – e.g. *papa* and *pappa* – while the duration of V_1 is considered to be inversely related to the duration of C_2 when the vowel is stressed (Bertinetto & Vivalda, 1978).

This paper addresses the question of whether and how the reaction of Italian listeners to the same stimuli differs from that of Estonians, Finns and Norwegians. Where will Italian listeners place the boundary between [t] and [t:]? Which part(s) of the context will influence the perception of C₂?

2 Method

The stimuli were obtained by manipulating the duration of selected segments of the Estonian word *saate* [sa:te] ('you get'), read by a female Estonian speaker. The word was read both in isolation and preceded by *ja* ('and') or followed by *ka* ('also'). The [a:] and the [t] were shortened or prolonged in proportionally equal steps as shown in Figure 1 (for the segment durations of the original utterance and other details, see Traunmüller & Krull, 2003). The durations of the [s] and the [e] were also manipulated up or down together with *ja* or *ka* when present. The arrangement of stimuli in series is shown in Figure 1. The selection of stimulus series was made according to which combinations could be possible in Italian. 20 students at the University of Pisa listened to the stimuli.

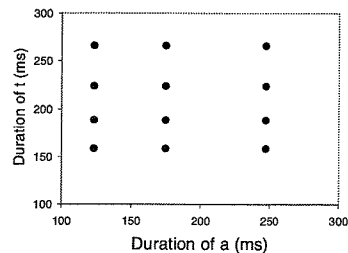


Figure 1. Duration of the segments [a] and [t] in the stimuli without [ja] and [ka]. There were three series of stimuli that differed in the duration of the [a], while the stimuli within each series differed in the duration of the [t].

3 Results and discussion

Figure 2 shows the effect of changes in segment duration on the perception of quantity for Italian listeners. For comparison, results from earlier investigations with Estonian, Finnish and Norwegian listeners have been added.

As could be expected, increasing the duration of the [t] had a strong positive effect on the perception of the *sate-satte* distinction, while increasing the durations of neighboring units practically always had an opposite effect. The strongest negative effect on the perception of the [t] duration for Italian listeners resulted from lengthening the immediately preceding [a]. The role of *ja* and *ka* was less obvious. Changing the duration of [jas] had a certain effect on the perception of [t] in *ja saate*, while the duration of [s] alone in *saate* and *saate ka* had no importance. Similarly, change in the duration of [eka] had an effect, but not that of [e] alone in *ja saate* and *saate*. This can be explained by the durational variability of an utterance-final vowel in Italian.

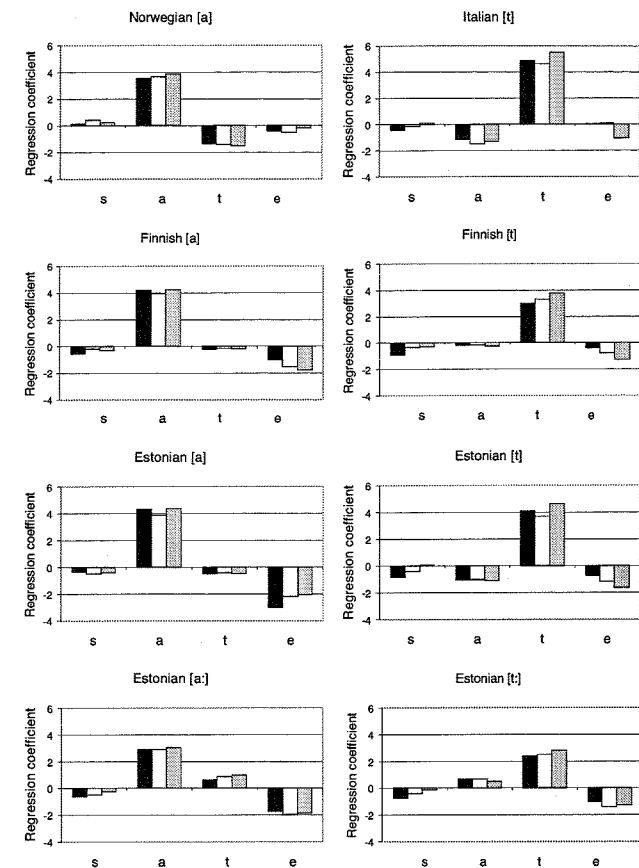


Figure 2. Weights of the durations of segments as contributors to the perceived quantity of [a] or [t], expressed in probit regression coefficients. Context: *ja saate* (black columns), *saate* (white columns), and *saate ka* (grey columns).

The relatively strong effect of [jas] as compared with [s] alone may be difficult to explain, but the same tendency appeared among Finnish and Estonian subjects. The [ja] could not be interpreted as a separate word by Italian listeners. Therefore [jas:te] was more likely to be interpreted as one word, stressed on the second syllable. In this case the first [a] stands out as longer than expected in an Italian word. In spite of that, changes in the duration of [jas] influenced the perception of [t]. That the [s] of *saate ka* had no negative effect at all may be due to its distance to the end of the utterance in relation to the length of the reference frame. The word-final [e] in *ja saate* and *saate* had practically no effect on the perception of [t], probably due to the fact that the duration of an utterance final vowel is highly variable in Italian. However, changes in the duration of [e] had a substantial effect when followed by [ka], in *saate ka*, which supports this assumption since in this case, there would not be so much free variation in the duration of the [e].

A comparison with the results of Estonian, Finnish and Norwegian speakers revealed several differences. For Finnish listeners, the negative effect of changes in the duration of [a] on the perceived quantity of [t] was not statistically significant. In Finnish, the [a] is itself a possible carrier of quantity distinction and is therefore not treated as 'neighboring context'. (A similar effect of [t] can be seen when [a] is the target). This is true also for Estonian. In the case of the distinction between short and long [t], Estonian listeners behaved very much like the Italians. However, when distinguishing between long and overlong, the lengthening of the preceding vowel had a *positive* effect on the perceived quantity of [t:]. The reason for this is the unacceptability of the combination of long vowel and overlong consonant in Estonian: [t:] can be perceived as overlong only when the preceding vowel is either short or overlong. The same effect is seen in the case where [a:] was the target.

Comparing the results of Italian listeners' perception of [at] with that of the Norwegians' revealed symmetry in the response patterns. In Italian, the consonant is the target which carries the quantity distinction while the duration of the preceding vowel is inversely related to it. This durational compensation can only be observed under sentence stress (Bertinetto & Loporcaro, 2005). In Norwegian, it is the other way round: the vowel is the target and the duration of the following consonant inversely related to it. In the present case, the negative effect of [a] for the Italians and that of [t] for the Norwegians were of similar size.

A comparable effect of an inverse duration relation can be noted in the responses of Estonian and – in a slightly weaker degree – Finnish listeners. Here it is the duration of the vowel in the following syllable that is inversely related to the duration of V₁, C₂ or V₁C₂. As a result, changes in the duration of [e] had a strong negative effect on the perceived quantity of [a] and/or [t]. The data clearly show that segments whose duration can vary due to linguistic or paralinguistic factors carry a lower weight (cf. the influence of [a] on [t] or vice versa in the two Fennic languages and utterance final [e] in Italian).

To conclude, Italian listeners reacted generally in the same way as did Estonians, Finns and Norwegians: changing the duration of the target segment itself had a strong positive effect while changes in the durations of some neighboring segments had a weaker, negative effect. If segment durations are to be measured by an "inner clock" whose pace depends on the speech listened to, it is necessary to assume language specific reference windows. That of Norwegian listeners must, clearly, be assumed to be shorter than that of the Fennic listeners (Traunmüller & Krull, 2003). The length of the reference frame of Italian listeners is also shorter than that of the Fennic speakers, but the data seem to indicate that it is longer than that of the Norwegians. While the Italians' location of their reference frame is clearly different from that of the Norwegians if considered with respect to the target segment, the center of the reference frame appears to be located close to the [a]/[t]-boundary in representatives of all four languages.

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A Case Study of /r/ in the Västgöta Dialect

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Abstract

This paper concentrates on the study of five young male speakers of the Swedish Västgöta dialect. First, the classic phonological /r/ distribution between back and front /r/ was tested to see whether the old descriptions of the dialect were valid for this group. Second, the individual variation between the phonetic realizations was studied to see if it was possible to distinguish between the five speakers solely on the basis of their /r/ distribution. This was done by aural and spectrographic comparisons of /r/ in stressed and unstressed positions for each speaker. Three /r/ categories were identified. Two speakers seem to have a classical distribution of uvular /r/, two others use only the front version. The last speaker used the front variant except in one focused instance. These results lead to some speculations on changes occurring in the dialect. The speakers' individual variation was studied by describing their /r/ realizations with phonological rules. This was done successfully and the five speakers were rather easily distinguishable solely on the basis of their /r/ productions.

1 Background and introduction

1.1 Hypotheses

This pilot case study mainly has the goal to investigate two hypotheses:

1. The classic descriptions or rules are not valid for this group of five young male speakers.
2. It is possible to separate five speakers phonologically based solely on their production of /r/ in stressed and unstressed positions.

The first hypothesis is simply investigating a possible dialectal change by using diachronic recordings and comparing the use of /r/. The second hypothesis is a pilot case study investigating whether between-speaker variation for /r/, whether it is sociophonetic or dialectal change, is enough to separate or individualize five speakers with the same sex, age and similar dialectal background.

1.2 The phoneme /r/

The phoneme /r/ was chosen because of its reported intra- and interspeaker variance (Viergegg & Broeders, 1993). The phoneme has been subject to several studies for English, both concerning its phonology (Lindau, 1985) and acoustic properties (see Espy-Wilson & Boyce, 1993; 1999). The Swedish studies are mostly concentrated on the dialectal area descriptions, such as Sjösted's (1936) early dissertation on the /r/-sounds in south Scandinavia and Elert's (1981) description of the back uvular [r] geographical frontier. In a recent study by Muminovic & Engstrand (2001), they found that approximant variants outnumbered fricatives and taps while trills were uncommon. Aurally, they identified four place categories and these were also separated acoustically except for back and retroflex /r/.