

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 (Vierregge & 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 [ʀ] 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/.

1.3 /r/ in the Västgöta dialect

What is the Västgöta (or Göta) dialect? There are several variants. A quite common, but still rough description is that the dialect contains four major variants: the Vadsbo, Skaraborg, Älvsborg (except for the Mark – Marbo and Kind – Kindbo) and Göta-Älv variants. In one major study by Götling (1918), he suggests around 450 different variants. However, there are several different features that connect them all. One of these dialect features is the distribution of the two /r/ allophones [r] and [ʀ] which both appear in different positions. The allophones [r] and [ʀ] are combinatory variants of the phoneme /r/ in the dialect. The general classic rules can be described using SPE notation (Chomsky & Halle, 1968), choosing [r] as the underlying representation:

Rule 1. /r/ → [ʀ] / # _

The phoneme /r/ is pronounced uvular in morpheme initial position.

Ex. [rø:r] and ['he:l,rø:r]

Rule 2. /r/ → [ʀ] / V _ V()
[+stress]

The phoneme /r/ is pronounced uvular in medial position, i.e. after an unstressed syllable and preceding a stressed vowel.

Ex. [dø'rekt]

Rule 3. /r/ → [ʀ] / V _ V()
[+stress] - { # / V }

The phoneme /r/ is pronounced uvular in final position after a short stressed vowel, or medial followed by an unstressed vowel.

Ex. [dø:r:] and ['bar:a]

Teleman (2005) hypothesizes about the development of the allophonic use being related to the geographical border for the use of 'thick' (retroflex flap) versus 'normal' /l/. However, Malmberg (1974) reports a similar allophonic use of /r/ in Puerto Rican Spanish and it is also used in Brazilian Portuguese which might give other indications (Torp, 2001). Other common features in the dialect, both grammatical and phonological, are not considered in this paper, but there are several (for examples see Norén et al., 1998).

2 Method

First, older (between 1950-1970) recordings from the Swedish Institute for Dialectology, Onomastics and Folklore research (the CD Västgötadialekter <<http://www.sofi.se>>) were used as references to confirm the general/classic descriptions of /r/ distribution in the Västgöta variants. Five young male (aged 20-30) speakers from the Swedia dialect database were then analyzed (<<http://www.swedia.nu>>). The recordings for the Swedia database were done with a portable DAT recorder and small portable microphones carried on subjects collar or similar. The situation was adjusted as well as possible to an informal talk where the subjects told a story or memory. The mean length of each recording was approximately one minute. All instances of /r/ were extracted using the software Praat (Boersma & Weenink, 2005).

Table 1. Number of /r/ and variants per young male speaker and older reference recording used for diachronic comparison.

Speaker	N /r/ instances	N [r]	N [ʀ]	Older Reference Recording
Öxabäck	38	32	6	Torestorp
Östad	10	10	0	Humla & Lena
Torsö	17	15	2	Skara
Floby	29	29	0	Floby
Korsberga	35	34	1	Korsberga

Young males aged 20-30 were chosen as a group because they exist as such in the Swedia database and because they stand for 62% of the convicted criminals in Sweden last year (<<http://www.bra.se>>) and since the second investigation has forensic implications (Rose, 2002) this group was preferred as a pilot case group.

3 Results and discussion

3.1 Diachronic dialectal comparison for /r/

As can be seen in Table 1 above the speakers from Östad and Floby consequently use the alveolar allophone as no instances of uvular [ʀ] were found. The speakers from Öxabäck and Torsö follow the classical rule using uvular [ʀ] word (possibly morpheme) initially. No instances of [ʀ] were found in other positions though. For the speaker from Korsberga, only one instance of [ʀ] was found. The instance was observed word initially in the focused word <riktigt> pronounced ['ritʰtʰ].

First of all, [ʀ] does not exist at all after short stressed vowels in the material. Secondly, only two speakers frequently use it word/morpheme initially. That the uvular is disappearing is only a speculation because of the sparse data, and maybe this is an effect of the formal recording situation leading to a sociophonetic variation. However, the distribution of /r/ is as follows using broad phonological categories:

Category 1. /r/ → [ʀ] / # _

/r/ is pronounced with uvular variant [ʀ] morpheme (or word) initially by the Öxabäck and Torsö speakers.

Category 2. /r/ → [r]

/r/ is always pronounced with an alveolar variant [r] for the two speakers from Östad and Floby.

Category 3. /r/ → [r] or possibly [ʀ] / # _ (+focus)

The Korsberga speaker uses an alveolar variant, but has a uvular variant [ʀ] word initially when /r/ occurs in a focused syllable.

3.2 The individual variation between the speakers

The [ʀ] instances for the two speakers in category 1 above contain the word <rätt>, which makes the natural starting point for comparison. The two speakers can then be separated as the speaker from Öxabäck uses a fricative phone articulated as a velar [Y] while the speaker from Torsö uses a uvular trill [ʀ].

Comparing the two speakers in category 2, the alveolar version was naturally compared since there was no use of a uvular variant. By closer aural examination of the two speakers it was obvious that the speaker from Östad in 7 out of 10 cases used an alveolar trill [r]. In the three other cases the severely reduced sounds, in unstressed positions, were pronounced as

approximant [ɹ]. The speaker from Floby never produced a trill, but shifted between a tap [ɹ] (in stressed position) and an approximant [ɹ].

As the Korsberga speaker was alone in his use of a uvular in focused position there is no need to separate him further. His uvular variant is pronounced as a trill though, while the alveolar variants are either tapped or approximant.

4 Conclusions and future work

The uvular [ɹ] is less used in the Västgöta dialect, at least in the sparse data used for this study. This might mean that it has transformed into an already existent alveolar after short stressed vowels and is slowly disappearing as a word (or morpheme) initial as well.

By aural and spectrographic examination leading to a narrow transcription and phonological rules, it was easy to separate the speakers. More research on how well a larger group can be separated using this method is recommended. Several aspects of interspeaker variation were left out using a small amount of data. Including more acoustic measurements, such as spectral studies of /t/ for different speakers, should also be investigated in the future.

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Preliminary Descriptive F0-statistics for Young Male Speakers

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Abstract

This paper presents preliminary descriptive statistics for 109 young male speakers' fundamental frequency. The recordings were taken from the Swedia dialect database with speakers from different geographical areas of Sweden. The material consisted of spontaneous speech ranging between seventeen seconds and approximately two minutes. F0 mean, median, baseline and standard deviation distributions in Herz are described using histograms. It is suggested to use median instead of mean when measuring F0 in for example forensic cases since it is more robust and not as affected by octave jumps.

1 Background and introduction

1.1 Why young male speakers?

Young males aged 20–30 were chosen as a group because they exist as such in the Swedia database (<<http://www.swedia.nu>>) and because they stand for 62% of the convicted criminals in Sweden last year (<<http://www.bra.se>>), which was important due to the forensic implications of the descriptive statistics.

1.2 F0 and forensic phonetics

The within-speaker variation in F0 is affected by an enormous amount of factors. In Braun (1995), she categorizes them as technical, physiological and psychological factors. Tape speed, which surprisingly still is an issue for forensic samples, and sample size are examples of technical factors. Smoking and age are examples of physiological, while emotional state and background noise are examples of psychological factors. However, fundamental frequency has been shown to be a successful forensic phonetic parameter (Nolan, 1983). To be able to study differences it is suggested to use long-term distribution measures such as arithmetical mean and standard deviation (Rose, 2002). The duration of the samples should be more than 60 seconds according to Nolan (1983), but Rose (1991) reports that F0 measurements for seven Chinese speakers stabilised much earlier, implying that the values may be language specific (Rose, 2002). Positive skewing of the F0 distribution is typical (Jassem et al., 1973) and an argument for considering a base value (F_b) for F0 (Traunmüller, 1994). This base value is also described here together with mean, median and standard deviation for the whole group. There are no Swedish statistics on F0 found after Kitzing (1979), where he reports a mean of 110.3 Hz and a standard deviation of 3 semitones (in Traunmüller & Eriksson, 1995a) for 51 male speakers ranging between 21–70 years of age.

2 Method

The software Praat (Boersma & Weenink, 2005) was used to collect F0 data from 109 young male speakers (20–30 years old). The recordings were taken from the Swedia database