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Database tools for a prosodic analysis of the Swedish dialects

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Abstract

A searchable database of speech samples from more than 100 Swedish dialects is being established for use in research and education. Each dialect is represented by at least 12 speakers. The recorded material comprises spontaneous speech as well as words and phrases elicited with a number of specific research goals in mind. This paper summarizes one of these goals, a prosodic typology for the Swedish dialects, and describes a database prototype designed as a tool in this research. Its use in accessing, representing and analyzing the relevant data is illustrated. A full project description is available in Reports from the Department of Phonetics Umeå University (PHONUM) 4, pp. 97-100 ; see also http://www.swedia.nu .

A prosodic dialect typology

Within the project *Swedish prosody* (Gårding, 1982) a prosodic dialect typology for Swedish dialects was developed (Bruce & Gårding, 1978). The ideological starting point of this typology is the communicative functions of the different contributions to the pitch contours from phrasing, focus and accentuation (accent I/accent II). The database used in the project Swedish prosody contained phonetically balanced utterances with a systematic variation of (besides accent I/accent II) placement of focus, final/non-final phrase position and simplex/compound words. A main feature of this typology was the pitch realisation of focus (Bruce, 1977). Another feature was the timing of the pitch accent gesture as critical for the distinction between accent I and accent II, and a third characteristic of the typology was the recognition of the pitch patterns of compounds as a criterion of prosodic dialect type

According to this modelling of intonation the pitch realization of focus was either an extra pitch gesture added after the word accent gesture in some dialects (EAST, WEST) or merely a wider range of the pitch accent gesture in other dialects (SOUTH, CENTRAL). The distinction between accent I and accent II (in the varieties of Swedish that have the difference) is, according to this model, a difference in the timing of the accent gesture (in an unfocussed position), so that the pitch gesture for accent I is earlier than for accent II independent of dialect. The timing of the accent gesture is a relevant parameter not only for the word accent distinction (accent I/accent II) but also for each of the word accents in an inter-dialectal comparison. In this way there appears to be a distinct order of the four dialect types from early to late timing: EAST, WEST, SOUTH, CENTRAL.

Yet another decision in the dialect typology is whether the pitch patterns of compounds are distinct from those of simplex words. While there appears to be no distinction in terms of the pitch patterns of compounds as opposed to simplex words in WEST and SOUTH, the secondary stress can be shown to be a relevant synchronization point of pitch gestures for EAST and CENTRAL. The secondary stress is a trigger of the focal accent pitch rise in EAST, while in CENTRAL it is a synchronization point for the pitch fall in accent II compounds.

A possible extension of the prosodic dialect typology is to recognize NORTH Swedish as a prosodic dialect type distinct from EAST Swedish. These dialects are prosodically similar in several respects, but the stress distribution in compounds is different particularly in the far north Swedish dialects. Whereas in most Swedish dialects compound words are characterized by two stresses, i.e., an early primary stress and a late secondary stress, many compounds in far NORTH Swedish have only one (primary) stress located in the final element of the compound.

To illustrate the importance of intonation for dialect identity and to test our prosodic dialect typology, we have made an attempt to simulate the different dialect types using resynthesis of intonation. A phonetically balanced and dialect neutral test utterance was chosen for the resynthesis: *de' e' en syntetisk dialekt som datatekniken fixat (It's a synthetic dialect that was fixed by computer technique)*. Variables in the intonation model were different timings of the accent gesture (several points on a scale early-late), simultaneous/separate focus gestures, and same/different pitch pattern for simplex and compound words. The following diagram shows the parameter values that have been chosen for the simulation of six different prosodic dialect types of Swedish.

	Accent	*Focus*	*Compound*
SOUTH	late timing	simultaneous	not distinct
CENTRAL	v. late timing	simultaneous	sec. stress relev.
EAST	early timing	separate	sec. stress relev.
WEST	central timing	separate	not distinct
NORTH	v. early timing	separate	final stress
FAR EAST	late timing	simultaneous	not distinct

(no acc I / acc II, timing of accent like in acc II)

No formal testing of the synthetic versions of the different dialect types has been undertaken so far, but the reactions among those exposed to the synthetic dialects show rather unanimously that the simulation of half of the dialects is successful while, for the other half, the simulation is still prosodically incomplete. Our interpretation of this is that we have at least a partial knowledge of the prosodic variation among Swedish dialects, but extended research is needed for a more complete understanding of this variation.

In the *SWEDIA 2000* project, our starting point is this intonational modelling of prosodic dialect types and later work in the area (cf. Engstrand, 1995; Engstrand, 1997; Riad, 1998). By using new data collected in the project we hope to be able to develop the prosodic dialect typology for Swedish dialects. An example of a hypothesis that will be tested on the *SWEDIA 2000* database is the idea that prosody, in particular accentuation and intonation, varies little within a major regional dialect area, while other phonetic features such as vowel quality is more variable locally within such a dialect area. The next section briefly describes the database tools currently available for evaluation of the above-mentioned prosodic schemes.

Database tools for a prosodic analysis of the Swedish dialects

The SWEDIA 2000 database[1] will be a searchable database from which sound files and accompanying information, in the form of label files, may be extracted. The database will

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[1] 'SWEDIA 2000' stands for *Phonetics and phonology of the Swedish dialects around the year 2000*, a collaborative research project involving the phonetics departments at Lund, Stockholm and Umeå.

contain segmental as well as prosodic data. At present, work is in progress to develop and refine its prosodic component. This section describes the current state of this aspect of the database.

The following word and sentence level parameters have been systematically varied in the prosodic part of the project's field recordings: focus accent, word accent, number of syllables in the word, and compound *vs.* plain words. In addition, there are the following non-linguistic parameters: speakers' age and sex, and location of the recording, i.e., the dialect.

Using the database, digitized phrases complying with any combination of these parameters can be extracted. A desired parameter combination is chosen by entering the appropriate information in a dialogue box. For example, a search may begin by identifying one of the recording locations available in the database. These locations are given either alphabetically or by province in the Recording Location dialogue box illustrated in figure 1 (in which 'Lappland' is the name of a Swedish province). For example, selecting 'Sorsele' as the interesting local dialect returns the Prosodic Parameter dialogue box shown in figure 2. From that box, selecting 'older', 'man', 'plain (i.e., simplex) word', '2 syllables', 'accent type 2' and 'focus' amounts to specifying the intersection between those parameters, i.e., a phrase containing a bisyllabic accent 2 word [tiːʊ] 'ten' with focal accent as produced by an elderly gentleman of the Sorsele dialect.

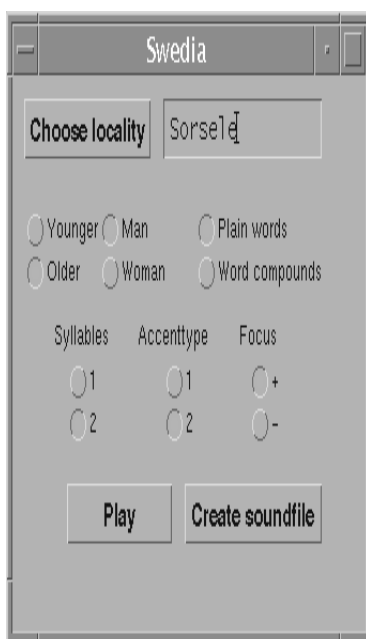Figure 1. Example of Recording Location dialogue box.

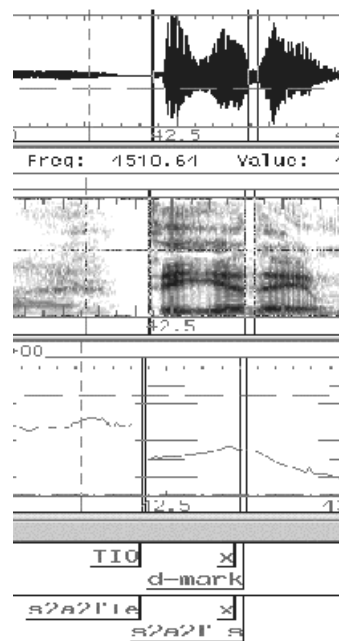Figure 2. A Prosodic Parameter dialogue box.

Figure 3. Speech waveform, broadband spectrogram, F0 contour and label window for the sequence [tiːʊ deː] (part of the utterance [tiːʊ deːmark] 'ten D-Marks'). The utterance was produced by a male Sorsele speaker with focus accent on the word [tiːʊ].

Once all the relevant selection criteria have been specified, there are, as shown, two options available for presenting the results; the phrases complying with these specifications can either be played back by the user, or they can be sent to a new file. Thus, clicking 'Create soundfile' will result in a file containing all instances of the selected phrases. The contents of this file can then be displayed for further analysis using accompanying broadband spectrograms or F0 plots as exemplified in figure 3. The accompanying label window will serve to identify the selected utterances.

Additional features will be added to later versions of the database. For example, transcriptions will be provided to reflect the progress made in the phonetic and phonological analyses of the dialect material.

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