

## The acoustic grounding of lexical stress in Polish: A developmental perspective

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In this presentation, we address the issue of acoustic grounding of lexical stress in child and adult Polish. The study is based on spontaneous speech of three Polish-speaking children (aged 2;6, 3;3 and 3;8) as compared with the speech of their parents. The focus is on three basic acoustic parameters which are considered the most reliable metrics for stress placement but whose relative weighting is language-specific (e.g. Fry 1955, Morton and Jassem 1965, Lehiste 1970, Beckman 1986): intensity, fundamental frequency and duration. The material consists of 1044 vowels, grouped into stressed and unstressed sets, excised from 420 words of two or more syllables (70 words for each speaker). Each child word is paired with its adult equivalent pronounced by the child's parent so that potential differences in acoustic cues in child and adult Polish could not be ascribed to differences in vowel sets (their spectral qualities), segmental context and word length. A direct comparison of stressed and unstressed vowels in different words being impossible, the vowel tokens within a given word are normalized with the use of various ratios such as semitones for the F0 parameter, relative intensity measure in decibels for sound pressure, and duration ratio. Measurements are done using Praat (Boersma and Weenink 1992-2007). The statistical classification of stress placement (*qua* discriminant function with multiple variables) shows that in both child and adult Polish, the basic acoustic parameters appear to form the same hierarchy with regard to their reliability in differentiating stressed from unstressed syllables: intensity > F0 > duration. (The results for adult Polish seem to contrast with those reported in previous instrumental studies but agree with earlier impressionistic findings; see Dogil and Williams 1999 and the literature cited therein.) Importantly, the stressed and unstressed vowels are classified successfully within words, although 'word stress' parameters are simultaneously entangled in various other relations on the sentence-level.

The Polish findings are interpreted against previous research on the development of phonological rhythm and the acquisition of lexical stress in English (e.g. Allen and Hawkins 1980, Klein 1984, Pollock *et al.* 1993, Archibald 1995). In particular, we look at duration and show how its (un)reliability as a stress cue can be connected with a more general problem of segmentation and speech timing in children (e.g. Nittrouer *et al.* 1989, Kent 1976, Kent and Forner 1980, Snow 1997). We also discuss briefly the psycholinguistic validity of uni-dimensional approaches to rhythm relying on a coarse (consonantal-vocalic) segmentation of speech and making use of exclusively temporal rhythm metrics such as %V (the proportion of intervocalic intervals) or  $\Delta C$  (the variability of consonantal intervals), e.g. Ramus *et al.* (1999). In our view, such approaches largely reduce rhythm to an epiphenomenon of syllable structure complexity, and are unable to take account of rhythmic prominence expressed in terms of cues other than duration.

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