

## Teasing apart lexical and phrasal stress in Hungarian and German

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One of the most challenging areas of prosody is the relationship between its phrasal (i.e., intonation-related) and lexical components. Few studies have sought to systematically tease apart phrasal and lexical aspects of prosody [6, 7, 2, 5], and even fewer have undertaken cross-linguistic comparisons [1], furthermore for Hungarian there has only been one study investigating lexical stress [4]. We report results of two parallel production experiments designed to dissociate lexical and phrasal stress in Hungarian and German. These two languages have different prosodic and, in particular, stress systems: Hungarian stress is fixed on the word-initial syllable, whereas German exhibits a more variable stress pattern, further more, while in German lexical items bearing phrasal stress can appear in several syntactic locations, in Hungarian the position of these elements is fixed.

In our experiments, for German (8, 7) subjects produced sentences in which we systematically manipulated the presence or absence of phrasal stress on a target word by inserting focus particles in half of the sentences. Lexical stress was controlled by using seven minimal stress pairs as target words, with lexical stress falling either on the first or second syllable. In the Hungarian experiments subjects (7, 5) produced seven verbs as target items in different syntactic positions in imperative sentences: (i) in sentences with phrasal stress placed on the verb, (ii) in negated sentences where phrasal stress fell on the neg-word, while the target syllable still received word level stress, and (iii) the verb with a prefix, which removes the target syllable from the position of word level stress placement.

The following measurements were taken: syllable duration (Dur; seconds) as shown in Figure 1, vowel intensity relative to the median intensity of the carrier sentence (relInt), vowel SPLH-SPL (dB), a measure of high-frequency emphasis [3], and f0 maximum and range (semitones re. speaker median) during the target vowel. The data were analyzed using Linear mixed effects models (fixed effects: phrasal/lexical stress; random effects: subject, item). Table 1 summarizes the results for Hungarian and German, with check marks indicating whether the factors lexical stress (L), phrasal stress (P), or their interaction (L\*P) reached significance for any of the acoustic variables. Results for German are also broken down by syllable position in the target word.

Our results show that phrasal level stress affects the widest range of features associated with modification by stress placement, while lexical level stress affects a comparatively limited set. It is also interesting to note the cross linguistics similarities and variation. In both languages, phrasal level stress had the most salient affects, however, to varying degrees. While in German phrasal level stress affected all surveyed features, in Hungarian the effect was limited mainly to duration and f0 maxima. It is also interesting to note that while lexical stress is clearly observable in German, it is not so in Hungarian where word initial syllables not bearing phrasal level stress did not significantly differ from syllables not associated with word level stress. The observed differences between Hungarian and German are likely attributable to the difference in predictability of stress placement between the two languages: in Hungarian it is fairly predictable, while in German it is more variable. We can thus conclude that marking of prosodic units is language specific, and that it is influenced by other prosodic features of the

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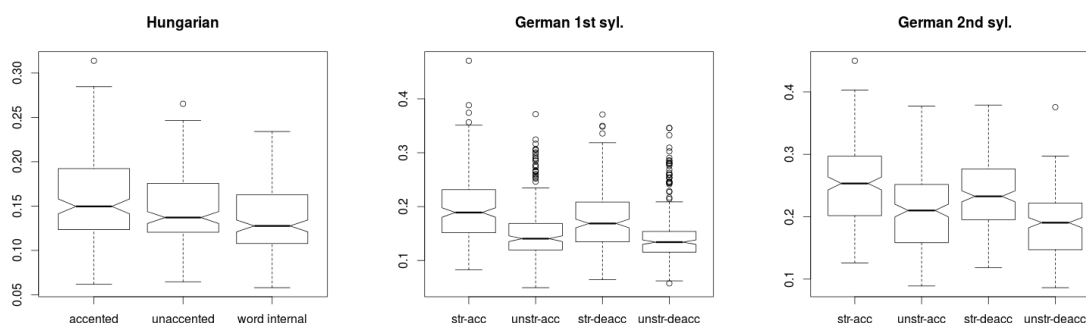
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given language, such as the predictability of stress placement.

Table 1: Results. See text for details.

Language	Hungarian			German					
	1st syl			1st syl			2nd syl		
Factor	L	P	L*P	L	P	L*P	L	P	L*P
Dur		✓		✓	✓	✓	✓	✓	
relInt					✓			✓	
SPLH-SPL		✓		✓	✓		✓	✓	
maxf0		✓			✓		✓	✓	✓
F0range								✓	

Figure 1: syllable duration for target syllables in Hungarian and German



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