

## **Prosodic variation in L2: a case of Germans speaking English**

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### **Abstract**

The present study investigates prosodic variation as realized by L2 speakers of varying pronunciation ability in comparison with native speakers of English. The results demonstrate the distribution of the rising contours on both the phonological (ToBI frequencies) and phonetic (values for six parameters of the F0 curve) levels. The rising contours and pitch accents have a wider distribution in German productions, and are therefore closer to the German prosodic pattern, as opposed to the native realizations. Another peculiarity concerns the F0 peak frequency parameter in L\*H accents as realized by the below-average informants. Their values are significantly different from those of the native and average speakers. Further phonetic differences are to be tested for consistency effects on the subsequent research stages.

Key words: prosodic variation, second language acquisition, language ability, F0 contour

### **Introduction**

Most modern theories of language acquisition suggest that L2 is a reduced system characterized by a basic variety (Klein and Perdue 1997) of language means, i.e. a limited set of exemplars (e.g. Lacerda 1995) which a speaker reproduces, once he or she has been exposed to them.

Thus, it was claimed, for example, that Finns vary within a narrower pitch range in Russian (Ullakonoja 2007) and Americans in Mandarin (Bent 2005) than the respective native speakers. A number of other investigations determined an opposite trend on this matter: more variation was found in the tonal structures of Americans speaking Japanese (Ueyama 2000), as well as in the vowel representation of Spanish speakers of English (Wade et al. 2007).

The absence of consensus on the issue of variation across L1 and L2 implies that the outcome largely depends on the languages and phenomena involved.

It would be therefore interesting to have a closer look at the prosodic subsystem, as it per se allows of a considerable degree of variation within its categories. Irrespective of the linguistic component, variation seems to have a relation to an individual's language ability, as it requires an expansion of

the basic variety, on the one hand, and accommodation to the L2 variation pattern, on the other.

A cross-linguistic study was conducted to test the above hypotheses, whereby a detailed analysis of F0 variation was carried out.

### **Method**

Data consisted of read speech samples produced by 30 native German speakers whose pronunciation ability had been initially defined as excellent, average and below average (12, 10 and 8 speakers in each group, respectively), based on the tests performed as part of the DFG funded 'Language Talent and Brain Activity' Project. Corresponding recordings by 12 native English speakers were available for comparison. The whole corpus was segmented into syllables, followed by an automatic extraction of F0 values for each syllable. The respective F0 values were parametrized using the PaIntE method (Möhler 2001), which describes the F0 curve in terms of five basic parameters: steepness of the rising and falling sigmoids; the alignment of the function within a syllable; amplitudes of the rising and falling sigmoids and the frequency of the F0 peak.

Finally, intonation events were labeled manually in accordance with the ToBI convention.

### **Results**

The initial extraction of global PaIntE parameters, i.e. without regard to the ToBI accents, yielded a clear peculiarity in the realization of the rising sigmoid by below-average German speakers, as compared to all the other subjects. This result was taken as an incentive to analyze the rising F0 contour in more detail.

Clear differences between the groups were evident already from descriptive statistical analysis. The rising F0 contour (high boundary) had a much wider distribution in German realizations than it was employed by the native speakers. The frequency was highest for the average group, followed by below-average speakers. Informants of excellent ability approached native-like performance, but their values were still much higher.

Given the fact that the speech samples were taken from a neutral text for reading, the German speakers' preference for a rising contour can be interpreted as a typical pattern in this type of speech.

Another peculiarity concerned the distribution of the 'rising' pitch accents L\*H and LH\* in pre-boundary position. These ToBI events were also more typical of German samples, with the highest percentages for the average and below-average groups and the lowest for the native speakers.

Table 1 demonstrates all of the above findings in percentage values.

Table 1. Distribution of rising contours and pitch accents.

Group	High boundary	L*H	LH*
below-average	37,6	16,7	1,7
average	48,8	17,4	1,5
excellent	31,3	10,4	3,0
native	10,2	6,1	2,6

As a next step we looked at the separate PaIntE parameters of L\*H and LH\* pitch accents to see if there were phonetic differences in their realization. The values for each parameter were normalized groupwise and substituted for the corresponding z-scores. Then we compared the samples by means of the Kolmogorov-Smirnov test. Whereas no significant differences were found for the LH\* accent, the p-values for each two samples, i.e. speaker groups, of L\*H events lay below 0.05 for at least a few parameters.

It is notable in this respect that the frequency of F0 peak was only significantly different for the below-average group opposed to the native and average speakers. This finding is also represented in the following boxplot: the values of the below-average informants stand out as most centred and scattered at the same time.

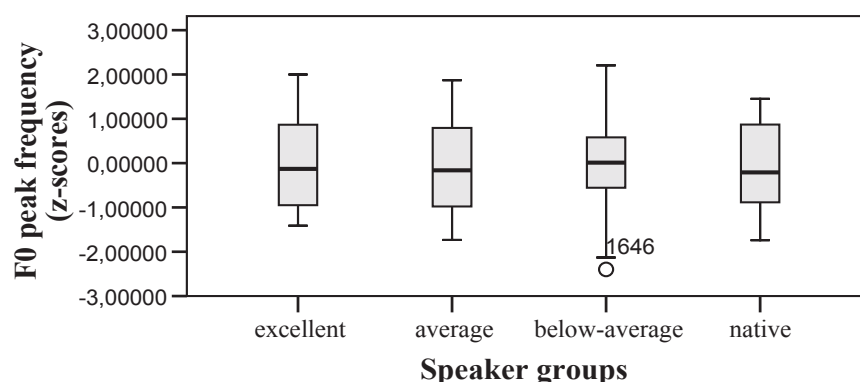


Figure 1. F0 peak frequency of L\*H accent.

## Discussion

The results of the present study confirm the initial hypothesis of a correlation between prosodic variation and language ability. Observable differences were found both in the distribution of ToBI categories and in the realization of individual F0 curve parameters. While phonological findings were expected and show a clear trend towards the native patterns in German productions (a wider distribution of the rising contours was described earlier

by Anderson (1979)), elaborate phonetic peculiarities of PaIntE parameters across the speaker groups require further exploration for consistency effects.

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