A Contrastive Study of Lexical Stress Placement in Singapore English and British English

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ABSTRACT

Singapore English (SE) and British English (BE) have been claimed to differ in lexical stress placement. Examples frequently cited in the literature involve polysyllabic words such as *hopelessly* and compounds such as *blackboard.* Such words are stressed word-initially in BE, but are said to be stressed word-finally in SE. In the present paper, we investigate the acoustic evidence for the suggested cross-varietal difference. Two observations lead us to explore the claim that SE and BE differ in lexical stress placement. Firstly, all observations about stress differences between SE and BE are based solely on auditory impressions by British English listeners. The acoustic evidence for the claim has remained unexplored. Secondly, it appears that the auditory evidence comes largely from realisations of test words in citation form, i.e. in nuclear, phrase-final position. In phrase-final position, however, we can expect phrase-final lengthening, and lengthening is a cue to stress, at least in British English. If Singapore English has more phrase-final lengthening than British English, then this effect may account for the suggested differences in lexical stress placement.

1. INTRODUCTION

Tongue (1974), Platt and Weber (1980), Tay (1982) and Deterding (1994) claim that Singapore English differs from British English in the location of lexical stress in polysyllabic words. In BE, words such as *hopelessly* are stressed on the word-initial syllable, but in SE, they are claimed to be stressed word-finally. Additionally, SE speakers are claimed not to make a distinction between phrasal and compound stress. In BE, the word *blackboard* is stressed on the first element when it is a compound but on the second when it is a noun phrase (*black board*). In SE, speakers are said to assign greater prominence to the second element of *blackboard* irrespective of whether the word is used as a compound or as a noun phrase. It appears, however, that these and other observations about stress differences between SE and BE are based to a large extent on the production of citation forms. Prosodically, a citation form (i.e. a lexical item produced in isolation) takes the shape of a single, short intonational phrase characterised by the same features as longer intonation phrases. Citations forms have minimally one accent, the so-called nuclear accent, and the phrase-final syllable exhibits phrase-final lengthening. The citation form of a word such as *hopelessly*, for instance, is likely to involve a falling nucleus on *hope*, and phrase-final lengthening on *ly*. The observation that stress differences between SE and BE are based on citation forms has implications for the claimed cross-varietal difference in lexical stress placement. Considering that research has shown that in BE a syllable immediately preceding a phrase boundary is lengthened (Cooper and Paccia-Cooper 1980) and that lengthening is a cue to stress, the cues to a boundary and to stress in SE may have been confounded in phrase-final position. If SE had more phrase-final lengthening than BE, then SE boundary cues might have been interpreted by BE listeners as cues to stress. This is the claim we tested in our first experiment. In this experiment, we compared the realisation of polysyllabic test items in nuclear, phrase-final position and in prenuclear, medial position.

2. STRESS PLACEMENT IN POLYSYLLABIC WORDS

2.1 The Experiment

Ten speakers from each variety were asked to take part in a production experiment. All speakers were undergraduates and postgraduates at Cambridge University, and the SE speakers had spent no more than one year in Britain. The subjects read lists of sentences in which polysyllabic words such as *hopelessly* were embedded in carrier phrases. The test words appeared (1) in nuclear, intonation phrase-final position and (2) in non-nuclear phrase-medial position. The data were digitised and processed in *waves+*. Two of the potential acoustic correlates of stress were measured: duration and F0. We hypothesised that the claimed stress difference between SE and BE would be the result of more phrase-final lengthening in SE than in BE, and would therefore emerge in nuclear, phrase-final position, but not in phrase-medial position.

2.2 Results for Duration

The dependent variable was 'relative syllable duration', and involved the difference between the phrase-final syllable and the penultimate syllable of test words, e.g.

-less and *-ly* in *hopelessly*. If the claimed difference in lexical stress placement originates in a cross-varietal difference in the degree of phrase-final lengthening, then the difference between the final syllable and the penult should be larger in SE than in BE in final position. In medial position, the relationship between the two syllables should be comparable in the two varieties. This prediction is illustrated in Figure 1 below.

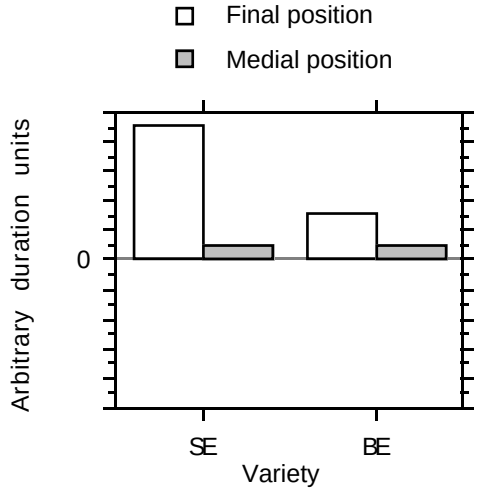

Figure 1: Prediction for difference in duration between final and penultimate syllables of test words in phrase-final and phrase-medial position for SE (left) and BE (right).

The results of our measurements are illustrated in Figure 2 below.

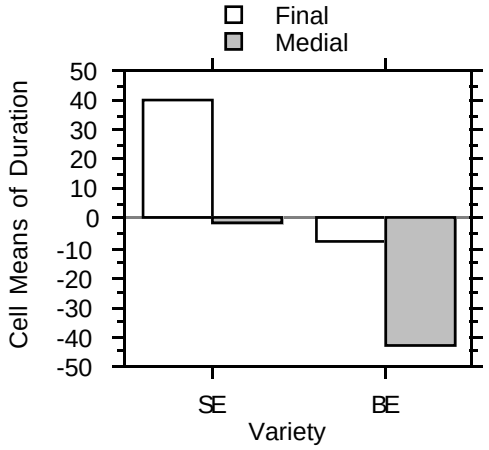

Figure 2: Difference in duration between final and penultimate syllables of test words in phrase-final and phrase-medial position for SE on the left and BE on the right.

Figure 2 shows that only the result for final position matches the prediction. We find more phrase-final lengthening in SE than in BE. In BE, the phrase-final syllable is shorter than the immediately preceding syllable, but this is the result of our test items (consider the distribution of segments in each syllable of e.g. *hopelessly*), and does not indicate an absence of phrase-final lengthening. This point becomes clear when we compare the results for BE in final and medial positions: in medial position, in the absence of phrase-final lengthening, the negative difference is even larger than in final position. In SE, the positive lengthening effect disappears in phrase-medial position also.

The data were subjected to an Analysis of Variance (repeated measures) with the dependent variable 'relative duration', between-factor Variety (SE, BE) and within-factors Position (final, medial) and Speaker (1,10). Significant main effects of Variety ($F[1,18]=23.69$, $p<0.001$) and Position ($F[1,18]=18.97$,$p<0.001$) emerged (no significant interaction). Additionally, significant differences between speakers emerged, but these were not the object of this analysis and were not explored further.

The results of experiment 1 do not support the hypothesis that the suggested stress difference between SE and BE can be attributed solely to phrase-final lengthening (i.e. there was no interaction between Variety and Position). They do, however, contribute towards an account of the claimed cross-varietal difference. The results show that there is only one section of the data in which we find that the phrase-final syllable is actually longer than the preceding syllable, and that is the data for intonation phrase-final position in SE. This finding may explain why BE listeners have suggested that there is a difference in lexcial stress placement in words such as *hopelessly* in citation forms.

2.3 Results for F0

The duration data show that an apparent difference in lexical stress placement appears to have a basis in cross-varietal differences in relative syllable length. Duration data alone, however, cannot show whether we should interpret such differences as an indication of cross-varietal differences in lexical stress placement. A possible diagnostic for stress location arises from F0. A characteristic which distinguishes stressed syllables in British English from unstressed syllables is that stressed syllables can be associated with accents, that is, pitch obtrusion, but unstressed syllables are not. Thus, accent placement can be a diagnostic for stress placement. In citation form, a word such as *hopelessly* is likely to exhibit a nuclear falling accent pattern which involves an F0 maximum on *hope* followed by a drop in F0 towards the end of the word. If *ly*, not *hope* is stressed in SE, then we can expect low F0 on *hope* and *less*, but a substantial fall in F0 from high on *ly*. We tested this by measuring F0 onset and F0 offset on each syllable of each test word. Figure 3 shows the results. The evidence does not suggest a cross-varietal difference in accent placement. In BE, the first syllable of the test words is associated with a high F0 target. In SE, this target is less obvious, but there is no evidence of a second high target or a substantial fall in

F0 on the last syllable either. Figure 3 illustrates this finding.

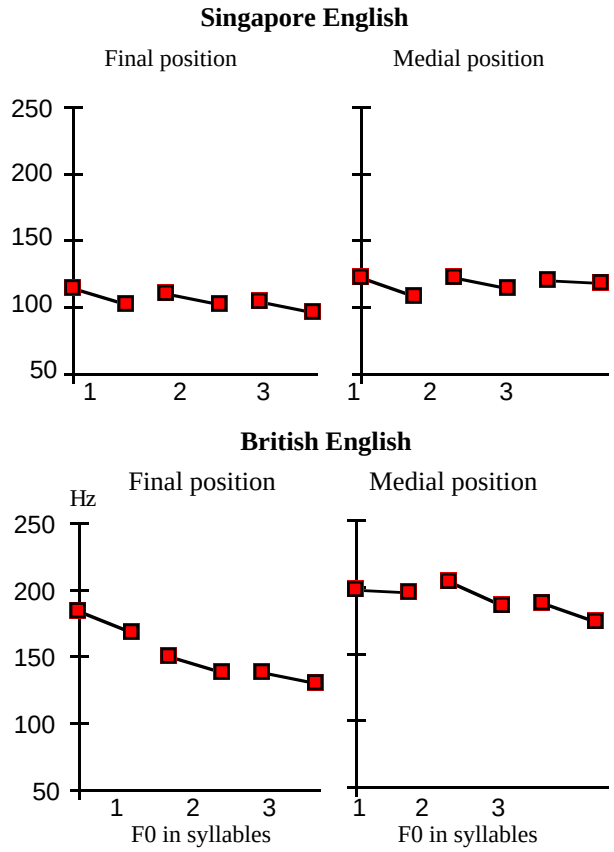

Figure 3: Mean F0 on- and offset on the three syllables of the test words. Note that all graphs are plotted on the same scale.

For the purposes of statistical analysis, the F0 range on each test item was calculated (F0 maximum on syllable 1 to F0 minimum on syllable 3). An analysis of variance (repeated measures, dependent variable 'F0 range', between-factor Variety (SE, BE), within-factors Position (final, medial) and Speaker (1,10)) revealed a significant main effect of Variety ($F[1,18]=7.45$, $p<0.01$ and Position $F[1, 18]=82.08$, $p<0.001$, but no significant interaction between variety and position (i.e. the F0 range on the test words was greater in BE than in SE, and larger in final than in medial position).

To sum up, the results of our first experiment shed light on the acoustic nature of the suggested cross-varietal difference in lexical stress placement. Both languages have phrase-final lengthening, but only in SE does the lengthening result in the last syllable of words such as *hopelessly* being longer than the preceding syllable. Secondly, in BE, we find a more substantial drop in F0 between the initial and the final syllable of test words, and this drop is associated with the difference between the stressed and following unstressed syllables. In SE, there is hardly any drop at all. Combined, these observations can account for the suggested difference in lexical stress placement: In SE, the final syllable is obviously lengthened, and there is less evidence of deaccenting in F0. In BE, the final syllable is not longer than the immediately preceding syllable, and clearly deaccented, i.e. much lower in F0 than the stressed syllable. Thus, our results suggest that SE and BE do not differ in lexical stress placement in polysyllabic words, but in the acoustic realisation of stress.

3. STRESS PLACEMENT IN COMPOUNDS AND PHRASES

3.1 The Experiment

BE speakers distinguish between compound and phrasal stress, but SE speakers are said not to. Our second experiment was designed to test this claim. A list of ten compounds which receive initial stress in BE were chosen and placed in nuclear phrase-final position in carrier phrases (acoustic correlates of the compound-phrase distinction are easier to interpret this position, and experiment 1 showed that the languages do not differ in phrase-final lengthening). Secondly, ten noun phrases were added, created by replacing the first elements of the ten compounds with an adjective (e.g. the compound *armchair* was replaced by the noun phrase *old chair*). Ten SE and ten BE subjects read the materials. Again, duration and F0 measurements were taken.

3.2 Results for Duration

With respect to syllable duration, the two varieties did not differ from each other significantly (see Figure 4). An analysis of variance (repeated measures, dependent variable 'relative duration', between-factor Variety (SE, BE), within-factors Grammar (compound, phrase) and Speaker (1,10)) revealed no significant main effects and no significant interactions.

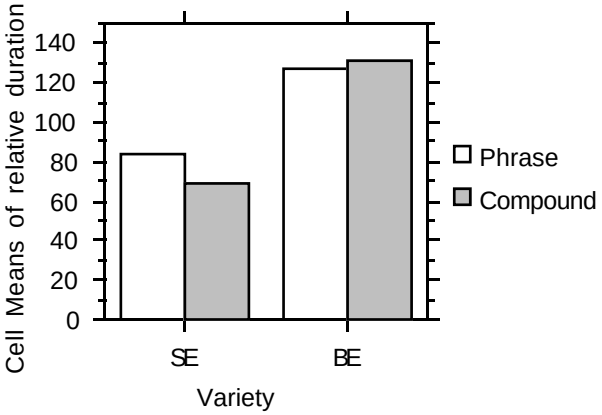

Figure 4: Difference in duration between the first and second element of compounds and phrases.

3.3 Results for F0

Again, F0 on- and offsets were measured on all syllables of the test words. Figure 5 shows that BE speakers make

a distinction between compounds and phrases in F0; compounds are characterised by a fall in F0 throughout the word, but in phrases, we find a step-up between the first and the second element. SE speakers do not make a comparable distinction: we find a step-up in F0 between syllable 1 and syllable2 in compounds and in phrases. An analysis of variance (repeated measures, dependent variable 'step-up in F0', between-factor Variety (SE, BE), within-factors Grammar (Compound, Phrase) and Speaker (1,10)) revealed a marginally significant main effect of Variety ($F[1,18]=4.27$, $p<0.05$) and a significant main effect of Grammar ($F[1,18]=31.68$, $p<0.001$). Additionally, there was a significant interaction between variety and grammar ($F[1,18]=41.4$, $p<0.001$).

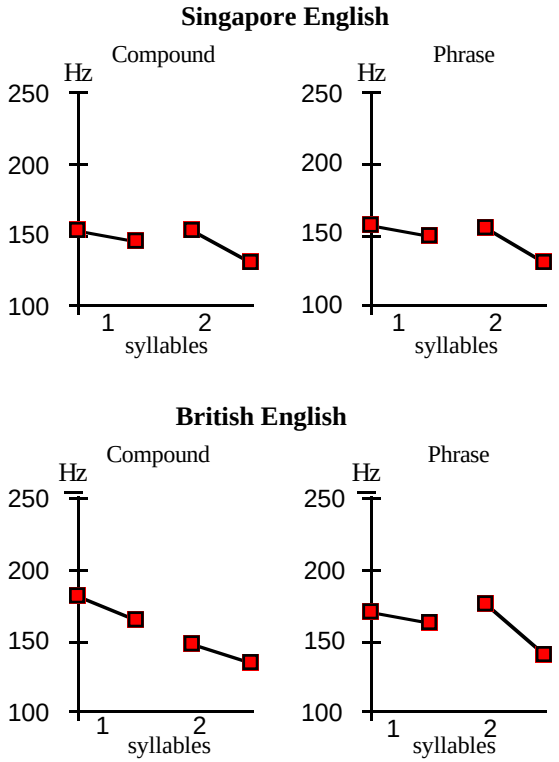

Figure 5: F0 on-and offset on first and second syllable of compounds and phrases

The results of our second experiment point towards a significant difference between SE and BE with respect to F0 patterns assigned to compounds and phrases. Unlike the results for duration, the F0 results reveal a clear difference between the two varieties. BE speakers assign different F0 patterns to compounds and phrases, but SE speakers do not. Since F0 is considered to be a primary cue to stress in nuclear position (Nakatani and Aston 1978), it is not surprising that British analysts have noticed that SE speakers do not distinguish between compound and phrasal stress even though the two varieties do not exhibit any differences in the durational domain.

4. SUMMARY AND CONCLUSION

This paper set out to provide an acoustic explanation for impressionistic observations made in the literature about differences in lexical stress placement between SE and BE. Our results suggest that the different stress patterns claimed to characterise polysyllabic words such as *hopelessly* or *manfully* are unlikely to be the result of differences in lexical stress placement. Duration relationships between syllables in the two varieties differed in quantity rather than quality, and in both varieties, accents were anchored to the first syllable. These findings suggest that the apparent difference in lexical stress placement may be the result of cross-linguistic differences in the realisation of vowels. In SE, successive vowels in syllables are more nearly equal than in BE, and the difference between long, short and reduced vowels is significantly less marked (Low, 1998). As a result, the final syllable of words such as *hopelessly* is very obviously longer than the preceding syllable in SE, but not in BE. It is this lengthening which is likely to have led previous analysts to posit that SE assigns final stress to phrase-final polysyllabic words which are stressed initially in BE.

The results from the second experiment confirm a suggested difference in stress placement between SE and BE. The varieties differ in their assignment of compound and phrasal stress; BE speakers distinguish between compounds and phrases, but SE speakers do not. The acoustic correlate of the difference can be found in F0, but not in duration.

5. REFERENCES

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