ENGLISH PHRASAL STRESS TARGETS MULTIPLE, OPTIONAL LENGTHENING SITES

Alice Turk, Snezhina Dimitrova

Department of Linguistics and English Language, University of Edinburgh;
Department of English and American Studies, Sofia University "St Kliment Ohridski"
turk@ling.ed.ac.uk, snezhinad@hotmail.com

ABSTRACT

Durations of syllables in phrasally-stressed English 4-syllable words like *democratic*, with primary stress on the penultimate syllable and secondary stress on the first syllable, were compared with their counterparts in words without phrasal stress. These comparisons showed considerable variation in lengthening patterns across subjects, where two subjects showed reliable lengthening on only a single syllable in the phrasally-stressed words (primary-stressed syllable for one subject, final syllable for the other). The other two subjects reliably lengthened the first syllable, the primary-stressed syllable, and the final syllable, with the greatest magnitude of lengthening on the primary-stressed syllable. Taken together, these results suggest that the initial secondary-stressed syllable, the primary-stressed syllable, and the final syllable are all distinct but optional lengthening sites in English.

Keywords: phrasal stress, lengthening, duration, accent.

1. PURPOSE

In this study we determine the syllables lengthened by phrasal stress in 4-syllable English words like *democratic*, with primary stress on the penultimate syllable, as well as secondary stress on the first syllable. Our primary interest is to test the hypothesis that phrasal stress targets multiple lengthening sites, including the main stress syllable, final syllable, and a secondary-stressed syllable, as opposed to a single, multisyllabic lengthening domain.

2. BACKGROUND

Phrasal stress lengthens more than just the main stress syllable in English words (Turk & Sawusch, [1], Turk & White [2]). In disyllabic words with main stress on the first syllable (e.g. *bacon*), both the main stress syllable and the following unstressed syllable are lengthened by more than 10%, at least for some speakers. Smaller but significant lengthening effects (of approximately 5%) are observed on initial syllables (e.g. the first syllable of *enforce*), and on syllables that immediately follow a main stress syllable across a word boundary, e.g. on *en-* in *BAKE enforce* . One interpretation of these findings is that most of the effects of lengthening can extend over a multisyllabic domain (the Continuous Domain hypothesis), beginning with the main stress syllable and extending until the end of the word, with additional, smaller effects that start earlier than the main stress, and that can spill over into a following word when the main stress syllable immediately precedes a word boundary. Another interpretation (the Multiple Site hypothesis) is that phrasal stress lengthens multiple, distinct sites within the phrasally-stressed word, including the main stress syllable and the word-final syllable, with the possible addition of the initial syllable (which shows smaller effects).

Dimitrova, Turk and Sugahara [3] tested the phrasal stress lengthening behaviour of 4-syllable words with main stress on the first syllable (e.g. *presidency, dedicated*) in an effort to tease these two possibilities apart. Their results showed distinct lengthening sites on the first and final syllables in words like *presidency* (with main stress on the first syllable, all other syllables unstressed), with subtle, insignificant lengthening on the second syllable in these words. Although these results for e.g. *presidency* support the Multiple Site hypothesis, with lengthening sites on the main stress and final syllables, results for e.g. *dedicated* appeared at first glance to be more consistent with the Continuous Domain hypothesis. For these words, pooled data showed significant lengthening on all four syllables, with most lengthening on the first syllable, with less and less lengthening as the word boundary approached.

However, some subjects failed to lengthen either the second or fourth syllables in these words. One possible way of reconciling the results for words with and without secondary stress would be to posit three distinct lengthening targets, i.e. on 1) the primary-stressed syllable + optional following syllable, 2) the secondary-stressed syllable, and 3) on the final syllable.

The purpose of the current paper is to provide a further test of these hypotheses, by studying the effect of phrasal-stress-related lengthening on secondary stressed syllables (e.g. *de-* in *democratic*) where these are separated from both the main stress syllable and the final syllable.

3. METHOD

3.1. Subjects

Six Standard Scottish English speakers without hearing or speaking difficulties served as subjects. Data from 3 females and 1 male were analysed for this paper.

3.2. Materials

Materials consisted of eleven 4-syllable English words with secondary stress on the first syllable and primary stress on the penultimate syllable. These were: *democratic, condescending, confidential, Minnesota, Manitoba, confiscation, persecution, suffocation, substitution, duplication, dedication.* Subjects read two repetitions of each word in two different types of carrier sentence pairs, where the first sentence in each pair was a background sentence designed to elicit primary phrasal stress in a particular position in the target utterance, i.e. on either 1) the target word, or 2) a word preceding the target word, so that the target word would be de-accented. The following examples (Table 1) illustrate our elicitation technique for the target word *democratic*.

Table 1: Example background/target sentence pairs for the target word *democratic*.

Phrasal stress on the target word:

The newest laws are more authoritarian again.

The newest laws are more democratic again.

Target word de-accented:

The newest policies are more democratic again.

The newest laws are more democratic again.

Utterance pairs were pseudo-randomized (by card shuffling); subjects read through two repetitions of the entire data set with different randomisations for each repetition.

3.3. Measurements

Syllables were identified using the Maximal Onset Principle, and were measured using criteria described in Turk, Nakai & Sugahara [4], where consonants were judged to begin at the onset of constrictions, and to end at constriction release. Vowels were judged to begin at the release of a preceding consonantal constriction, and to end at the onset of constriction for a following consonant, and thus included the VOT of a preceding aspirated stop, when one occurred. Where measurements were difficult or unreliable, data points were discarded, along with the corresponding data point from the compared condition.

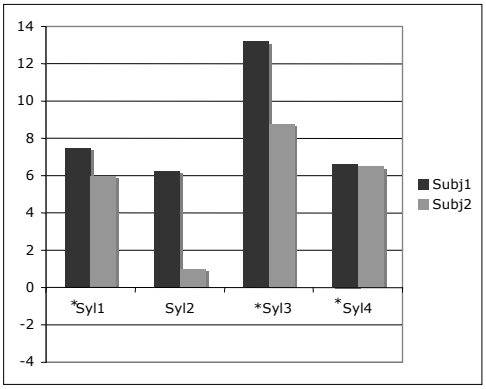
3.4. Analyses

Data were analysed separately for each subject using paired samples t-tests to compare syllable durations in words with vs. without phrasal stress.

4. RESULTS

Results are shown in Figures 1-3. Two of the four subjects showed significant phrasal-stress-related lengthening on the first, third, and fourth syllables, with the greatest magnitude of lengthening on the third, main stress, syllable (Figure 1).

Figure 1: Mean percentage lengthening on each syllable in the four-syllable words with secondary stress on Syllable 1, and primary stress on Syllable 3, for Subjects 1 and 2. Significant absolute lengthening effects are indicated with *.



One subject showed significant lengthening only on the third syllable (Figure 2), and one subject showed significant lengthening only on the fourth syllable (Figure 3).

Figure 2: Mean percentage lengthening on each syllable in the four-syllable words with secondary stress on Syllable 1, and primary stress on Syllable 3, for Subject 3. Significant absolute lengthening effects are indicated with *.

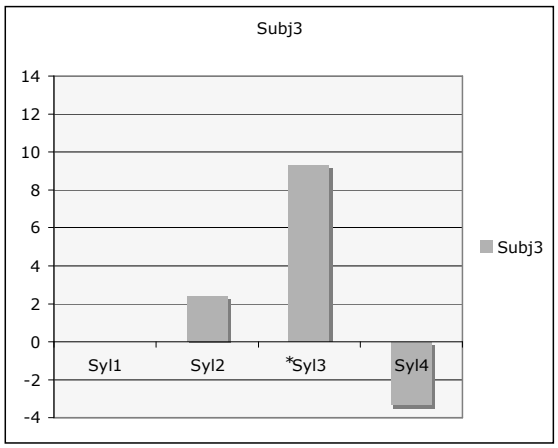
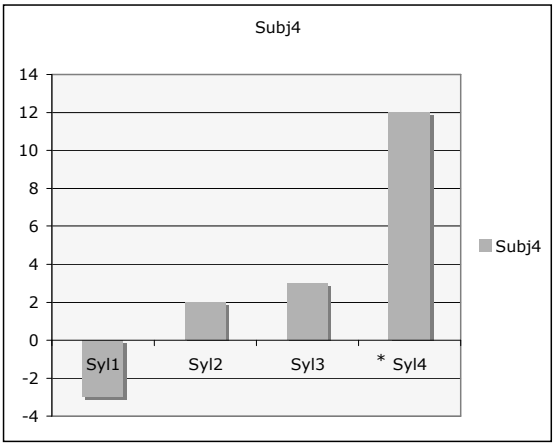


Figure 3: Mean percentage lengthening on each syllable in the four-syllable words with secondary stress on Syllable 1, and primary stress on Syllable 3, for Subject 4. Significant absolute lengthening effects are indicated with *.



5. SUMMARY AND DISCUSSION

Our findings support the Multiple Site hypothesis. In particular, they suggest that the initial, secondary-stressed syllable (e.g. *de-* in *democratic*) provides a potential phrasal-stress-related lengthening site that is distinct from the main stress lengthening target (e.g. *–cra-*). The non-obligatory nature of this lengthening target is shown by the fact that only two of our four subjects lengthened the secondary-stressed syllable. The view that this site is distinct from the main stress syllable site is supported by the non-significant lengthening on the second syllable in these words (e.g. *–mo-)* that was lower in magnitude than the lengthening on the preceding secondary-stressed syllable. Although the secondary-stressed syllable (e.g. *de-*) and the primary-stressed syllable (e.g. *–cra-)* were composed of different segments and were therefore not strictly comparable, our data suggest that the magnitude of lengthening on the initial, secondary-stressed syllable, when lengthening occurs, is less than the magnitude of lengthening on the primary-stressed syllable.

Our data also suggest that lengthening on the other proposed phrasal-stress-related lengthening targets, the main stressed syllable and the final syllable, are also optional: One subject reliably lengthened only the main stressed syllable, without lengthening the final syllable, and another subject lengthened the final syllable, without reliably lengthening the main stressed syllable.

Together, these results show the distinct nature of these multiple lengthening sites. At the same time, they highlight the subject-specific nature of lengthening patterns for this type of word.

6. REFERENCES

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