Is metrical foot a phonetic object?

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**Abstract**

The assumption behind this study is that metrical feet are not ‘groups of syllables’ or ‘interstress intervals’ but rather ‘groups of vowels’ extracted from the phonetic material contained between two stresses. We analyse the duration, pitch and intensity of all vowels in isolated pronunciations of 72 initially stressed items (mono-, di- and trisyllables). The results reveal that pre-fortis clipping of the stressed vowel and final lengthening are interrelated, which suggests that stressed and unstressed final vowels are able to ‘negotiate’ their durations. Such ‘communication’ between the stressed vowels and the final unstressed ones is possible only if a mediating constituent (the foot) is postulated. Most importantly, we found no significant differences (*p* < .05) between the total vowel durations in words having a different number of syllables, which supports the assumption of foot-level isochrony in English. It was also observed that the significant increase in vowel duration in stressed CVC monosyllables co-occurs with a significantly greater pitch slope, which we interpret to be a tonally driven implementation of minimal foot binarity requirement.

**Introduction**

Although the concept of the metrical foot has been widely used in phonological literature, little attention has been devoted to formulating a properly constrained formal definition that could be empirically testable at the same time. Most of the definitions available so far (Abercrombie 1967, Hayes 1995: 40, Giegerich 1992: 181) refer to the traditional notion of the syllable (which, however, is in itself highly disputable, both phonologically and phonetically) and the idea of an interstress interval. It seems likely that the persistent definitional problem has its sources in the original poetic usage of the term, whereby the foot is used as a cover term for all sorts of interstress intervals within a rhythmical piece of poetry. Rhythmicity in poetry, however, is arrived at rather artificially and results from a conscious artistic manipulation of lexical and syntactic structure, subordinated to the intended semantic result. As such, it is quite different from a (potential) rhythmicity of naturally produced language. Thus, it should not be taken for granted that the poetic and the linguistic stress foot are identical in terms of size, internal structure and the acoustic characteristics of their components.

However, most phonological approaches seem to tacitly rely on the assumption that foot heads (i.e. stressed elements, be it whole syllables, syllable rhymes or nuclei, depending on the framework) share the same, formal and/or acoustic properties and, what seems even less empirically grounded, that the universal foot template is binary (Hayes 1995: 71). It was the latter assumption in particular that has led to a lot of *ad hoc* theorising, i.e. extrametricality rules in Metrical Phonology (Hayes 1995, among others), the ‘superfoot’ (Selkirk 1980, Harris 1994, among others), whose aim was to cater for ternary stress patterns through binary footing. The dogmatic insistence on binarity in Optimality Theory and Government Phonology, on the other hand, results in disregard for the data that do not support universal foot binarity.

As observed by de Lacy (2007), the strong theoretical predictions are usually based on empirically poor and impressionistic data. Unfortunately, this also refers to English. Despite abundant literature on the formal aspects of the English foot structure, its acoustic properties remain largely unexplored. In this pilot study we analyse the acoustic properties of both stressed and unstressed vowels as well as the relations that hold between them. In particular, our aim is to establish a set of relations between different acoustic properties of consecutive vowels which may indicate that the foot is a real phonetic object.