# PRODUCTION OF ENGLISH STRESS BEATS: THE CASE OF POLISH SPEAKERS

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## ABSTRACT

This paper examines part of an experiment devoted to Polish English (hencefore PE) stress production. The experiment was conducted on sixteen adult Polish English speakers. The experimental lexical stratum that I used in the investigation was the list of sentences used in Archibald's (1998) and Waniek-Klimczak's (2002) experiments. A controlled reading list was recorded and then analyzed auditorily. The aim of the pilot study was to analyze the metrical structure of PE penultimate stress in longer consonant final words. Specifically, my goal was to explain why stress in PE is systematically located on the antepenult syllable in words ending in a consonant. This is unexpected from the point of view of both Polish (where stress is normally assigned to the penult syllable) and English (where in words of this type stress is assigned to the penult or the antepenult, depending on the weight of the penult syllable).

KEYWORDS: Word stress; English; Polish.

## 0. Introduction

In PE, longer words ending in a consonant have antepenult stress. A typical example is a word like *consensus*. Whereas this word is pronounced with penult stress in English, it is pronounced with antepenult stress in PE. This is all the more striking because in Polish the regular stress pattern is also penult. The question, then, is why the stress pattern of both English and Polish is changed in PE. Why, in other words, is a word like *consensus* pronounced with antepenult stress in PE, rather than with penult stress, as one might expect?

I propose that these facts can be explained in terms of a tree-cum-grid[1] framework. At the level of prosodic constituency the phonologies of English and PE are identical.

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[1] Three important references for tree-cum-grid theories are Halle and Vergnaud (1987), Hayes (1995), and Hyde (2001).

The prosodic word is basically right-headed, and at the foot level constituents are left headed (trochaic). The important difference between English and PE is explained in terms of the grid. At the level of the gridmarks in English, both nuclear heads and their dependents within the syllable correspond to beats. This means that the whole syllabic material projects beats for the purposes of gridmark structure. Consequently, in English closed syllables and syllables with long vowels project two positions on the grid. The important result is that in English two monosyllabic, consecutive feet do not count as a stress clash. This means that, in a word like *consensus*, the first two syllables can both be stressed. Since the last of the two monosyllabic feet becomes the head of the word tree, the main stress in this example will fall on the penult syllable. In PE, on the other hand, only the nuclear heads of syllables project a grid. This means that each syllable corresponds to one and only one gridmark. PE shares this property with Polish. As a result of this important characteric of PE, it is not allowed to create two consecutive monosyllabic feet, because that would create a stress clash. Only one, bisyllabic foot can thus be constructed over the first two syllables in an example like *consensus*. This foot becomes the head of the word tree. Therefore, its head, the first syllable, receives the main stress of the word. This, then, explains why in PE stress is located on the antepenult syllable in words ending in a consonant, even in those cases where English has penult stress. Basically, the idea is that English is quantity sensitive, because each segment in a rhyme projects a gridmark, whereas PE is not quantity sensitive, because in PE one and only one gridmark is projected for each rhyme. This being the case, in English a sequence of two monosyllabic feet does not violate a stress clash. In PE, on the other hand, two monosyllabic feet do create a stress clash, because this system is not quantity sensitive. Therefore, in order to alleviate the clash the stress must be shifted one syllable to the left, in PE, in words like *consensus*.

PE clash avoidance provides us with crucial evidence, then, that antepenult stress in words ending in a consonant is a consequence of the non-quantity sensitivity of PE, in the sense that every syllable projects one and only one gridmark. If this is the case, then the question is what the status is of word final syllables ending in a consonant. In my paper I propose that syllables of this type do carry a foot. At first sight this seems to indicate that final syllables ending in a consonant count as heavy. This, then, apparently seems to suggest that PE has two foot types; final feet in PE seem to behave as if they are quantity sensitive, whereas word-internal syllables are not quantity sensitive. On closer view, however, no such bifurcation needs to be postulated. My analysis proposes that this bifurcation can be explained in terms of the regular Polish phonology. In Polish, a single word final consonant is always in the onset of an abstract, empty (inaudible) syllable, as has been argued in Harris and Gussmann (1998).[2] This being the case, a final

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[2] These authors also show, quite convincingly, that in Polish even word final clusters can be in the onset of an empty syllable. This happens with clusters of rising sonority. Word final clusters of falling sonority, on the other hand, are located in two separate syllables; the first (sonorant) consonant of the cluster occupies the coda position of the audible syllable, and the second consonant of the cluster occupies the onset of a syllable whose nucleus is empty.

syllable ending in a consonant really is the first syllable in a bisyllabic foot, the second syllable of which is empty. In my paper I propose that in PE a final empty syllable must be parsed by foot structure. In this respect PE differs from Polish, where empty syllables do not count for the purposes of foot assignment. Due to this difference between Polish and PE a word ending in a closed syllable is parsed completely differently in these two systems. In Polish a word final closed syllable does not constitute the head of a foot. It rather is located in the dependent (weak) position of a foot. In PE, on the other hand, a word final closed syllable is always the head of a bisyllabic foot. This is so because a word final consonant occupies the onset of an empty syllable, and because, in PE, an empty syllable must be parsed by a foot. Making use of empty syllables in PE and assuming that, in PE, empty syllables must be foot parsed allows us to get rid of the bifurcation between quantity sensitive, final feet and non-quantity sensitive, word internal feet in PE. We can maintain, then, that in this system all feet are non-quantity sensitive.

The concept that word-final closed syllables create a branching foot, whose final syllable is empty, raises a further question. Why is it that bisyllabic feet of this nature do not attract main stress? This problem is particularly puzzling as "normal binary" feet (i.e. bisyllabic feet with two audible syllables) in English, as well as in PE, do attract stress. The difference between bisyllabic feet with two audible vowels and bisyllabic feet with one empty vowel is again explained in terms of the grid. It is claimed that a gridmark may not be located in a doubly dependent position of the word. This notion plays an important role in my paper, as I will show later. A doubly dependent position is a weak position in a position that is weak itself. For instance, the weak syllable of a foot that is not the head of the word tree qualifies as a doubly dependent position. I furthermore claim that an empty syllable does not project a gridmark. This being the case, a bisyllabic foot whose second syllable is empty can be located in the dependent, or weak position of the word tree. On the other hand, a bisyllabic foot whose syllables are both filled may not be located in a dependent position of the prosodic word, neither in English, nor in PE. This, then, explains the difference with respect to stress attraction between bisyllabic feet with two audible vowels and feet with one empty vowel. The former do attract stress, and the latter do not.

My analysis of PE can be seen as being built with ingredients that are present either in English or in Polish. It is an interesting feature of this analysis that the result can be something that is not attested in Polish or in English. From the L2 acquisition point of view the English, Polish and PE stress patterns may be interpreted as an interlanguage phenomenon (Archibald 1998; Waniek-Klimczak 2002, among others). In terms of parameter setting (or constraint ranking for that matter) the three systems can be characterized in the following way:

Structure of the prosodic word:
  **Polish**
        (a) right headed;
        (b) the final foot may not be in a dependent position (non-finality does not play a role).

**English**
>   (a)  right headed;
>   (b)  the final foot must be in a dependent position (non-finality does play a role).

**Polish-English**
>   (a)  right headed;
>   (b)  fhe final foot must be in a dependent position (non-finality does play a role).

Foot structure:
>   **Polish**
>>   left headed;
>   **English**
>>   left headed;
>   **Polish-English**
>>   left headed.

Syllable structure:
>   **Polish**
>>   (a)  empty syllables are created at the word edge to avoid a word ending in a consonant;
>>   (b)  empty syllables are not parsed by foot structure.
>   **English**
>>   (a)  empty syllables are created at the word edge to avoid a word ending in a consonant;
>>   (b)  empty syllables are parsed by foot structure.
>   **Polish-English**
>>   (a)  empty syllables are created at the word edge to avoid a word ending in a consonant;
>>   (b)  empty syllables are parsed by foot structure.

Gridstructure:
>   **Polish**
>>   Only the nuclear head projects a gridmark, not its dependent.
>   **English**
>>   Every position in the nucleus projects a gridmark (the nuclear head, as well as its dependent).
>   **Polish-English**
>>   Only the nuclear head projects a gridmark, not its dependent.

**All three systems**
>   (a)  A gridmark is only allowed on a segment if that segment is filled.
>   (b)  A gridmark is not allowed in a doubly dependent position.

These parameter settings, to be explained shortly, show that in many respects PE is a compromise between English and Polish; some features it shares with English, whereas other features it shares with Polish.

The article proceeds as follows. In Section 1, I will present the relevant facts I want to discuss in this article. In Section 2, I sketch the framework within which I will develop my analysis. In that section I will also briefly sketch the main characteristics of the English and Polish stress systems. In Section 3, I present my analysis of Polish English. This is a highly interesting system because it seems to exhibit patterns that are not found in English or Polish.

1. The relevant facts

One interesting result of my investigation is that in longer words ending in a consonant the stress is systematically located on the antepenult syllable by the subjects in the experiment, even if this is not the case in English. The examples in my corpus material are: *consensus*, *appendix*, *synopsis*, *horizon*. In English, these words are stressed on the penult, but in my investigation 94% of the subjects stress them on the antepenult in their Polish English. The difference between English and Polish English is exemplified in (1).

(1)     English          Polish English
        con*sen*sus       *con*sensus
        ap*pen*dix        *ap*pendix
        sy*nop*sis        *sy*nopsis
        ho*ri*zon         *ho*rizon

This is all the more striking because in Polish stress is normally assigned to the penult syllable. So, here we find a case where speakers produce a pattern that is neither attested in their L1 (Polish), nor in the L2 (English). A situation like this may be interpreted as an interlanguage phenomenon (Archibald 1998; Waniek-Klimczak 2002, among others).

Interestingly, this systematic difference between Polish English and English is only attested in words ending in a word final consonant. In words ending in a vowel, stress assignment is almost perfect. In Polish English, subjects (98%) adhere to the pattern attested in English. Some examples exemplifying this are:

(2a)    Penult stress
        English          Polish English
        a*ro*ma           a*ro*ma
        Mani*to*ba        Mani*to*ba
        a*re*na           a*re*na

(2b)    Antepenult stress
        *ci*nema            *ci*nema
        A*me*rica           A*me*rica

At first sight, it seems difficult to understand the difference between words ending in a consonant and those ending in a vowel in general terms. One cannot simply say, for instance, that in English feet are quantity sensitive, whereas they are not in Polish English. In order to reach the antepenult syllable one would also have to say that the word final syllable is extrametrical. The difference between English and Polish English in a word like *consensus* would then rougly look as follows, using informal notation:

(3)     English                 Polish English
        (con)(sen){sus}         (con sen){sus}
          *     *     *           *    *     *
            *     *                *
              *                    *

In the next section, I will explain the framework I will be working with. For the time being, it is only important for the reader to understand that in (3) there is a difference in foot structure between the two forms. In English the word *consensus* contains a word final extrametrical syllable. There are *two feet* preceding that syllable. The last of these feet receives the word stress, to be read off from the gridmark representation; the more gridmarks are accumulated on a syllable the more stress that syllable has. In the Polish English form, on the other hand, there is only *one foot* preceding the word final extrametrical syllable. This difference between English and Polish English would be a consequence of the fact that English has quantity sensitive feet, whereas Polish English has quantity insensitive feet. Consequently, a closed syllable, like *sen*, is not allowed in the weak position of an English foot, whereas it is allowed in Polish English. This, then, would explain the difference between the two representations of *consensus* in the two varieties of English; in English there cannot be a foot like (consen), whereas in Polish English such a foot could easily be made.

    While this account would explain the forms in (1), it is at a loss in explaining why the curious difference between English and Polish English is only attested in words ending in a consonant. In words ending in a vowel there does not seem to be a difference between English and Polish English, as we have seen in (2). If extrametricality would be assigned in Polish English in words of the type *aroma*, *Manitoba*, *arena*, we would incorrectly derive antepenult stress, of course. I illustrate this in (4).

(4)     (a ro){ma}
          *  *   *
          *

In this configuration, the final syllable is extrametrical, so it is invisible for foot structure. Therefore, a bisyllabic foot is constructed to the left of the extrametrical syllable. Since this is the only foot in the word, it will become the head of the word tree. That implies that the head of the foot receives the main stress. This creates antepenult stress in this configuration. Of course, this is an incorrect result.

Trying to explain the difference between words ending in a consonant and those ending in a vowel, one would have to say that only in the former a foot is assigned to the final syllable. This is exactly the approach taken by Hayes in his groundbreaking thesis (Hayes 1981). Thus, in the framework of Hayes, the two words *consensus* and *aroma* differ in that in the former the final syllable contains a (monosyllabic) foot, whereas the latter contains a bisyllabic foot at the right edge of the word. As far as the final foot is concerned the difference between the two words can be illustrated by means of Hayes' notation in (5).

(5)
$$\begin{array}{cc} F & F \\ \wedge & | \\ \text{a ro ma} & \text{consensus} \end{array}$$
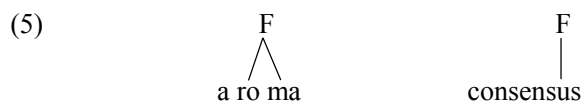
The evident fact that in words ending in a consonant a monosyllabic foot is assigned follows from the fact that in English feet are quantity sensitive. For this reason a closed syllable counts as heavy. Therefore, it may not be located in the weak position of a foot, and that is why in words ending in a consonant a foot is erected over the final syllable. On the other hand, in words ending in a (short) vowel, like *aroma*, the final syllable is light. It may therefore be located in a foot's weak position, and that is why in words of this type a bisyllabic foot is built at the right edge of the word.

Naturally, in order to be able to construct a foot over the final syllable (if a word ends in a consonant), we have to say that feet are quantity sensitive in Polish English. Furthermore, in order to be able to assign main stress to the antepenult, we have to build a bisyllabic foot to the left of the final foot. Consequently, to reach the antepenult syllable in a case like *consensus* we would have to build the following foot structure (in (6) I have been faithful to Hayes' notation):

(6)
$$\begin{array}{cc} F & F \\ \wedge & | \\ \text{con} & \text{sensus} \end{array}$$

The structure in (6) is problematic now, because this is an illicit foot representation. The final foot would have to be quantity sensitive, but the foot to its left would have to be quantity insensitive. The final foot must be quantity sensitive because the closed syllable must not be allowed to be located in the weak, or dependent position of the foot. The word internal foot must be quantity insensitive, because this foot does allow a

closed syllable in its weak position. Notice now, that, normally, it is impossible for a system to allow both foot types. Obviously, then, it is impossible to construct the foot structure in (6) in Polish English, because this foot structure can only be derived on the assumption that this system does have two foot types; a final, quantity sensitive foot and a word internal non-quantity sensitive foot. This, then, raises the question of how we can reach the antepenult syllable in words where a monosyllabic foot is constructed (at the right edge) in words ending in a consonant.

In order to account for the Polish English antepenult stress in words ending in a consonant a device is needed that allows us to construct a monosyllabic foot over the final, closed syllable (as in English), without making use of quantity sensitive feet (quite unlike English). If we would succeed, a word like *consensus* would receive the foot structure in Polish English already exhibited in (6). In such a structure the final foot would be skipped by the main stress, as in English. Main stress would then be located on the antepenult syllable. The puzzle that remains to be solved, then, is how we can construct a monosyllabic foot over the final, closed syllable, while at the same time constructing larger feet encompassing closed syllables in their weak position, *without making use of quantity sensitive AND quantity insensitive feet in one and the same language*. This is the problem to be dealt with in this article.

Essentially, I propose that the representation of stress consists of two representational modes, the grid and foot structure, as proposed most recently in Hyde's thesis (Hyde 2001). Also following Hyde, I propose that the distinction between quantity sensitivity and non-quantity sensitivity is to be expressed at the level of the grid. I will argue that Polish English is much like Polish in that *it is a non-quantity sensitive system*, unlike English. The apparent quantity sensitivity of the word final closed syllables, I claim, follows from a hypothesis that is commonly assumed by proponents of Government Phonology: at the phonological level, there are no words ending in a consonant. Words of this type really end in an *empty syllable*. For arguments that this is true for Polish, I refer to Harris and Gussmann (1998),[3] Cyran (2003)[4] and Gussmann (2007)[5] who claim that Polish admits a more generous use of empty nuclei than other languages. In the spirit of these authors I will make use of the empty nucleus to explain the apparent quantity sensitivity of word final closed syllables in Polish English. Before I can show the details of my analysis, I will first lay out the assumptions I will be making in the domain of stress theory.

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[3] According to these authors (among others) it is the case that *in all languages* all words ending in a consonant really end in an empty syllable.

[4] For empty nuclei at the right edge in Polish, see Cyran (2003).

[5] For a more elaborate analysis of Polish word initial, medial and final empty syllables, see Gussmann (2007), where one can find numerous examples of words with empty nuclear positions. A few examples are *p∅tak, t∅kliwy, dr∅gnąć, wiatr∅, s∅łoń∅*. ∅ symbolizes a skeletal nuclear position that is phonetically inaudible.

2. Theoretical assumptions

In the literature, there has been much debate about the question of what the proper representation of stress is. At the beginning, it was thought that it contains feet, as well as grid structure (Liberman and Prince 1977). There were two antagonistic responses to Liberman and Prince. Kiparsky (1979) suggested that the grid was superfluous. Prince (1983), on the other hand, claimed that feet could be dispensed with. Later, Halle and Vergnaud (1987) returned to the original proposal by Liberman and Prince. Recently, Hyde (2001) has confirmed that this is correct. Nowadays, it seems to be the standard theory; the representation of stress contains feet as well as grid structure. It should be noted, though, that Halle and Vergnaud's theory as well as Hyde's theory differ in some respects from the theory proposed by Liberman and Prince. One of the main differences is that quantity sensitivity/non-quantity sensitivity is to be expressed at the level of the grid, not at the level of foot structure, as was the case in Liberman and Prince. I will follow this proposal. Exactly how this works will be explained now.

Following Halle and Vergnaud and also Hyde, I assume that every syllable head corresponds to a gridmark, or "projects" a gridmark, to use another term. Thus, in a schematic representation of 6 syllables we get the following grid configuration.

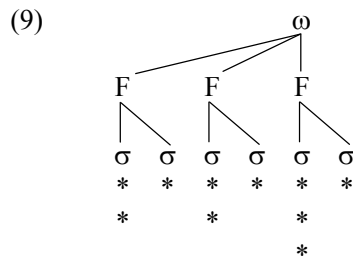(7)     σ   σ   σ   σ   σ   σ
        *   *   *   *   *   *
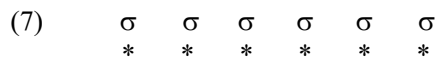
Likewise, the head of every foot projects a gridmark. Suppose that a series of trochees is built over the hypothetical example in (7). We would then get:

(8)     F       F       F
        ⋀       ⋀       ⋀
        σ   σ   σ   σ   σ   σ
        *   *   *   *   *   *
        *       *       *
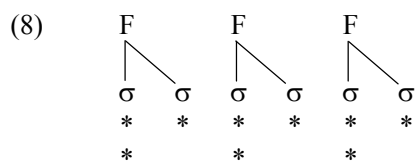
In this configuration, a straight line indicates headedness. Thus, the first, third and fifth syllables each constitute the head of their feet. For that reason they all project a gridmark.

At the next level, where the prosodic word is located, there is one foot which is the head of the word. Suppose that in a language the right foot of the word is the head foot. Being the head of the word, that foot also projects a gridmark. Given this assumption, we suppose that in such a language the representation in (8) would receive the following word tree and its accompanying grid:
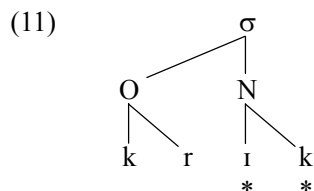
(9)

```
                                    ω
                       ┌────────────┼──────┐
                       F            F      F
                      /\           /\     /\
                     σ  σ         σ  σ   σ  σ
                     *  *         *  *   *  *
                     *            *      *
                                         *
```

In (9) "ω" represents the word tree. The grid structure indicates where the stresses are in this hypothetical word. Gridmark columns indicate relative degrees of stress; the higher the tower the greater the stress. Thus, in this example the penult syllable has main stress, and the first and third syllables have secondary stress.

In many languages, light syllables (most frequently open syllables with short vowels) behave differently from heavy syllables (most frequently syllables with long vowels or syllables with a short vowel followed by a tautosyllabic consonant). I assume, following Halle and Vergnaud (1987) and Hyde (2001), that in languages where this distinction is made, not only the syllable head (i.e. the head of the nucleus) projects a gridmark, but also its dependent. Let us take a hypothetical syllable like *krik*, in a language where a distinction is made between heavy and light syllables with regard to stress.

(10)

```
                        σ
                      /  \
                   O       N
                  /\      /\
                 k  r    ɪ  k
```
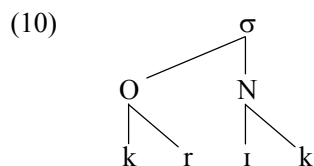
In this configuration, "σ" represents the syllable node, "O" represents the onset, and "N" represents the nucleus. In all languages, the head of the nucleus projects a gridmark, as we have seen. In the languages where heavy syllables (of the type in (10)) behave differently from light syllables, the dependent of the nuclear head also projects a gridmark. In (10) the dependent of the nuclear head is the velar stop following the vowel. Consequently, both the vowel and the velar stop project a gridmark, yielding the structure in (11).

(11)

```
                        σ
                      /  \
                   O       N
                  /\      /\
                 k  r    ɪ  k
                         *  *
```
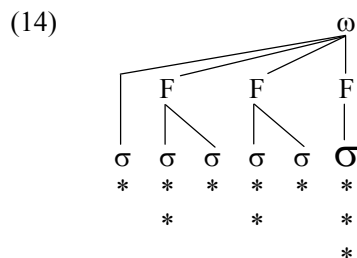
It is considered to be a universal principle by Halle and Vergnaud, and also Hyde, that at the level of the grid, the head must always be stronger than its dependent. From this it follows that, if the dependent projects a gridmark, then the head must project a higher column on the grid. The configuration of (11) is therefore illicit. It is therefore changed into the following representation:

(12)

```
            σ
          ╱ │
       O      N
      ╱ ╲    ╱ ╲
     k   r  ɪ   k
            *   *
            *
```
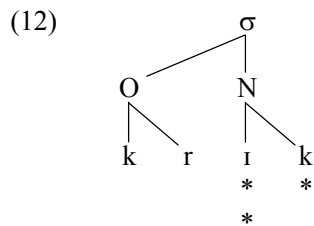
This configuration shows that, at the level of the grid, heavy syllables form a higher grid tower than light syllables, for the latter project just one gridmark. This becomes clear when we compare the heavy syllable in (12) with a typical light syllable, like *kri*.

(13)

```
            σ
          ╱ │
       O      N
      ╱ ╲     │
     k   r    ɪ
              *
```
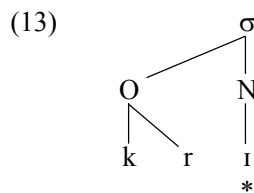
Let us now return to a hypothetical configuration with six syllables in a language where a distinction is made between heavy and light syllables. Let us put a heavy syllable in the final position (heaviness is now indicated by a "big" sigma; I have used this nota-tion to save space). Assume, furthermore, that the language uses trochees (i.e. left headed feet) and a right headed word tree, much as in the preceding hypothetical exam-ple. Under these assumptions the following representation is created (following stan-dard theory I assume that a monosyllabic foot over a light syllable is universally ruled out; that is why the initial syllable in (14) is directly dominated by the word tree):

(14)

```
                              ω
           ┌──────┬──────────┼──────┐
           │      F          F      F
           │     ╱ │        ╱ │     │
           σ    σ   σ      σ   σ     Σ
           *    *   *      *   *     *
                *          *         *
                                     *
```

Comparing this representation with the one in (9), which does not contain heavy syllables, we note that in (14) the main stress is shifted to the right. This is because the high tower created by the fact that both the nuclear head and its dependent project a gridmark should not be located in the weak (dependent) position of a foot. In other words, a representation like the following is not allowed:

(15)
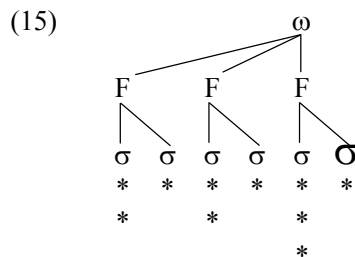


This is wrong because the final syllable has a high grid tower, but is also located in the dependent position of the final foot. The combination of these two properties is not allowed, universally.

Following Halle and Vergnaud (1987) and Hyde (2001), my analysis so far shows that the distinction between quantity sensitivity and non-quantity sensitivity is to be expressed on the grid. The system works as follows. In languages where the heavy syllables attract stress not only the nuclear head but also its dependent project a gridmark. As a result, the nuclear head must project a second mark, thus creating a high tower. Such a high tower is universally ruled out in the dependent position of a foot. It can therefore only be located in the head position of the foot. This is why a heavy syllable attracts stress in languages where feet are quantity sensitive. It is well known that Polish and English differ along this dimension. English is notoriously quantity sensitive, as has been shown quite convincingly in Hayes' thesis (Hayes 1981). Polish, on the other hand, is non-quantity sensitive, as has been shown in Rubach and Booij (1985). Later I will show that Polish English adopts this property from Polish. It is the only dimension (in the domain of stress) where Polish English is identical to Polish, rather than to English. I will now make explicit what the role of extrametricality is in my study.

Consider the following two English words: *Abigail, Apalachicola*. In the first word, the first syllable has main stress and the final syllable has secondary stress. In the second form the penult syllable has main stress and there are secondary stresses on the first and third syllables (from the left). The metrical structure of these two words is as follows:

(16)
```
        ω                                           ω
       / \                                        / | \
      F   F                                      F  F  F
      |\  |                                      |\ |\ |\
      A bi gail                                  A pa la chi co la
      *  *  *                                    *  *  *  *  *  *
      *     *                                    *     *     *
      *                                                      *
```

In *Abigail*, the final foot of the word is NOT the head of the word tree. On the other hand, in *Apalachicola* the final foot indeed IS the head of the word tree, accounting for the main stress on the penult syllable. How we account for the fact that the difference in the number of syllables (monosyllabic versus polysyllabic) can have such an important effect on the position of the main stress? Or more precisely, how can we account for the fact that a monosyllabic foot is allowed in the non-head position of the word tree, whereas a polysyllabic foot cannot be tolerated in this position?

In Hayes' thesis, this phenomenon is accounted for in terms of extrametricality. In his approach of extrametricality, Hayes claims that in English a monosyllabic foot is extrametrical. That means that it is *not visible to the word tree*. For this reason, the final syllable in *Abigail* is not considered by the word tree, so that the foot immediately to the left of the final foot becomes the head of the word. That explains why the first syllable of *Abigail* receives main stress. In *Apalacicola*, on the other hand, the final foot is not monosyllabic. Therefore, according to Hayes, it cannot be extrametrical. Consequently, it is visible to the word tree, so that the final foot becomes the head of the word, the result being that the penult syllable (the head of the final foot) carries main stress.
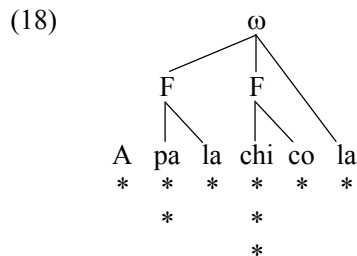
Interestingly, in the recent literature, the device of extrametricality has raised some serious skepticism, in particular among the OT-phonologists. They have even completely abolished the whole concept and replaced it by a device called *Non-Finality*. Usually, this is implemented by a constraint with roughly the following formulation:

(17)    NON-FINALITY
         The head of the word cannot be located at the right edge.

In a language where this constraint is high ranked the foot, which is the head of the word, must be followed by another syllable. Assuming that in English NON-FINALITY is high ranked, *Abigail* cannot have main stress on the final syllable, because that would mean that the head foot would be located at the right edge of the word.

This is all very well, but how can extrametricality be blocked in words like *Apalachicola*? Why not build the final foot over the antepenult and the penult syllables? That would surely satisfy Non-FINALITY, as shown in (18).

(18)

```
                          ω
                   ┌──────┴───┐
                   F          F
                 ┌─┴─┐      ┌──┼──┐
                 A  pa  la  chi  co  la
                 *   *   *   *   *   *
                         *       *
                                 *
```
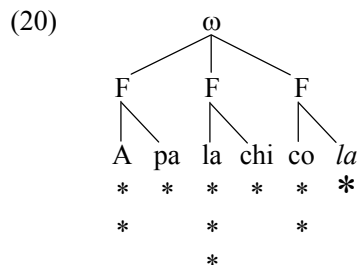
Needless to say, this representation is completely erroneous. An obvious question to ask, then, is why in English extrametricality is only assigned to monosyllabic feet (as in *Abigail*) but not to any other foot type.

I propose to answer this question in terms of the grid. I suggest that there is a constraint *ruling out a gridmark in a doubly dependent position*.
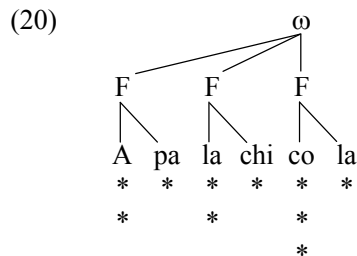
(19)    NO-DOUBLYWEAK
        A gridmark is not allowed in a doubly dependent position at a constituent's non-recursive side.

To see what this means, consider the representation of the word *Apalachicola* if the final foot would be in the non-head position, thus satisfying NON-FINALITY.

(20)

```
                       ω
               ┌───────┼───────┐
               F       F       F
             ┌─┴─┐   ┌─┴─┐   ┌─┴─┐
             A  pa  la  chi  co  la
             *   *   *   *   *   *
             *       *       *
                     *
```

In this representation, I have capitalized the relevant gridmark. The relevant constituents in dependent position I have written in italics. The capitalized gridmark is located in a doubly dependent position because it is located in a syllable that is a dependent in a foot. In its turn, this foot is in a dependent position in the word tree. Being in a doubly dependent position, the capitalized gridmark is not allowed by the constraint NO-DOUBLYWEAK. However, the vowel in the head of a nucleus MUST have a gridmark, so it is not possible to simply remove the gridmark from the final syllable. There is no other way, then, to salvage the illicit representation in (20) but to posit the final foot in the head position of the word tree. That gives us the representation in (16), repeated here as (21).

(20)

```
                                    ω
                           ╱────────┼────╲
                        F        F        F
                       ╱╲       ╱╲       ╱╲
                      A  pa   la  chi   co  la
                      *   *    *   *    *    *
                      *        *        *
                                        *
```

Of course, the question must now be answered of why the doubly dependent gridmarks to the left of the main foot are allowed in this representation. In the representation in (21), these are the gridmarks accompanying the vowels of the second syllable and the fourth syllable. Notice that this follows from the stipulation added to the constraint NO-DOUBLYWEAK. There, it is said that the constraint only restricts the distribution of the gridmarks *at the non-recursive side* of the word tree. In a right headed word tree, the non-recursive side is the one located to the right of the head. Notice now that in the representation in (21) the doubly dependent gridmarks are located to the left of the head of the word tree. Therefore, they are not subject to the constraint NO-DOUBLYWEAK. One reviewer suggests that this reference to the non-recursive side of the word tree is not very different from the traditional approach in terms of extrametricality. In essence, I agree with this remark. The point, however, is not so much that I want to derive extrametricality. I rather want to reformulate it in such a way that the particular behavior of empty syllables can be explained in a relatively general way. This is not possible with the traditional extrametricality. It is possible, however, if extrametricality is reformulated in terms of the interaction between gridmarks and prosodic structure as formulated in the constraint NO-DOUBLYWEAK. This will become clearer in the next section.

I also want to point out that NO-DOUBLYWEAK must dominate NON-FINALITY. So, the ranking required is as follows:

(22)    Required ranking: NO-DOUBLYWEAK » NON-FINALITY

The constraint NON-FINALITY requires that the head of the word should not be located at the right edge. On the other hand, NO-DOUBLYWEAK penalizes a representation where a gridmark is located in a doubly dependent position. Sometimes these two constraints conflict. This happens only with bisyllabic feet. Since NO-DOUBLYWEAK dominates NON-FINALITY, bisyllabic feet cannot be located to the right of the head of the word tree; only monosyllabic feet can. This explains the difference between *Abigail* and *Apalachicola* in (16). In the form *Abigail*, NON-FINALITY can be satisfied without violating NO-DOUBLYWEAK. In other words, the final foot can be in the dependent position of the word tree, precisely because it is monosyllabic. In the form *Apalachicola*, on the other hand, the final foot cannot be located in the dependent position, because

that would violate NO-DOUBLYWEAK. More specifically, it is the gridmark in the dependent syllable of the dependent foot that violates this constraint.

In this section, I have made the following claims. The representation of stress consists of two modes of representation, constituent structure and grid structure. The distinction between quantity-sensitivity and quantity-insensitivity is made at the level of the grid. In languages (like English) where heavy syllables attract stress, the vowel in the head position of the nucleus AND the dependent segment of the nucleus project a gridmark. This creates a tower of gridmarks in one and the same syllable, and such a strong configuration is not allowed in the dependent position of a foot. In a quantity-insensitive language each syllable projects one and only one gridmark, because in such a language only the vowel in the nuclear head projects a gridmark.

Finally, I have shown that there is no such thing as extrametricality anymore. We now have NON-FINALITY instead. English typically is a language where this constraint plays a role. Its effect is that the final foot of the word cannot be the head of the word tree. Quite typically, this is only the case when the final foot is monosyllabic. Again, English is a good example of a language where this restriction is observed. The fact that NON-FINALITY can only take effect with a monosyllabic foot, I have tried to explain in terms of the grid, or rather in terms of the interaction between the grid and prosodic structure. I have suggested that it can be explained by the constraint NO-DOUBLYWEAK. This constraint rules out a gridmark in a doubly dependent position, at least at the non-recursive side of the word tree. Having explained the theory of stress I will be working with, I will now proceed to study the interesting phenomenon of antepenult stress in Polish English in consonant final words.

3.   The analysis of the relevant facts in Polish English

Recall that in Polish English the stress is located on the antepenult syllable in words ending in a consonant. The examples showing this are repeated in (23).
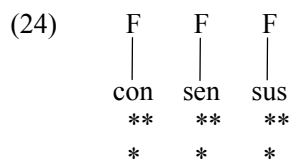
(23)     English                    Polish English
         con*sen*sus                *con*sensus
         ap*pen*dix                 *ap*pendix
         sy*nop*sis                 *sy*nopsis
         ho*ri*zon                  *ho*rizon

These forms make clear that this happens even in words where in English stress is located on the penult syllable.
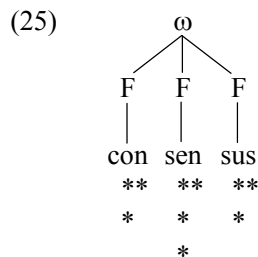
Let us now proceed to explain why these words have penult stress in English. The final syllable is closed by a consonant and is therefore heavy. This being the case, two gridmarks will be created in the domain of the final syllable. This accumulated strength enforces the construction of a monosyllabic foot, because a rich grid structure can only be located in a foot's head position. In all examples but the last, the penult syllable is
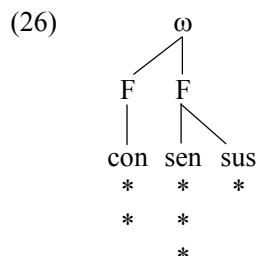
also closed. The same reasoning therefore applies, so again a monosyllabic foot must be constructed over the penult syllable. The antepenult syllable is heavy in the case of *consensus*. Consequently, that syllable also receives a strong grid structure, with the result that, again, a monosyllabic foot is constructed over this syllable. In the case of the remaining three forms, probably no foot is constructed over the initial syllable, because in most languages monosyllabic feet over a syllable with a short vowel are not allowed. Since this issue is not so important for our purposes I concentrate on the word *consensus*. At the foot level and the grid level its representation looks as follows:

(24)          F       F       F
              |       |       |
             con     sen     sus
             **      **      **
              *       *       *

Since the final foot of the word is monosyllabic, it is possible to satisfy NON-FINALITY, as well as NO-DOUBLYWEAK. The word tree, then, has the following structure:

(25)                 ω
                   / | \
                 F   F   F
                 |   |   |
                con sen sus
                **  **  **
                 *   *   *
                     *

Obviously, Polish English is not a quantity sensitive system, because in this system a closed syllable can easily be located in a foot's dependent position. This entails that in Polish English one and only one gridmark can be projected for each syllable. In slightly more formal terms, in Polish English only the vowel in the head of the nucleus projects a gridmark. Let us see where this leads us. In the case of *consensus* we would apparently get:

(26)                ω
                  /  |
                F    F
                |   / \
               con sen sus
                *   *   *
                *   *
                    *

Every syllable projects one and only one gridmark. Thus, there is no accumulated (rich) grid structure in the domain of a syllable. Consequently, feet can be built in their maximal size. Since the maximal foot must be binary (never ternary or even more), the final foot covers two syllables. To the left of that foot, a monosyllabic foot can be constructed. The word tree must be right headed, as in English. Consequently, penult stress is derived, as shown in (26). This, of course, is a bad result, in the sense that it does not account for the pattern I have attested; in Polish English words ending in a consonant have antepenult stress, not penult stress. How we can solve this problem?

Following, among others, Harris and Gussmann (1998), I propose that word final consonants are not really final; phonologically they are in the onset of an empty syllable.[6] This is one of the central hypotheses in GP. Cyran (2002/2003) in his model also claims that:

> In GP, surface word-final consonants are always followed by an empty nucleus phonologically.
>
> (Cyran 2002/2003: 76)

According to Harris and Gussmann, this is true in Polish as well as in English. In accordance with what was said above, a word like *consensus* has the following syllable structure:

(27)      σ      σ      σ      σ
         con    sen    sus

The configuration in (27), with its empty syllable, naturally raises the question of how the empty syllable behaves with respect to foot structure and grid structure. Is it footed like a regular syllable? Does it receive a gridmark like a regular syllable? There is evidence that in Polish an empty syllable is NOT footed. If it were, the language would have final stress in words ending in a consonant, which is obviously wrong. In Polish, words ending in a consonant normally receive penult stress, exactly as the words ending in a vowel.

In English, on the other hand, there is evidence that the empty syllable does count for the purposes of foot structure. To see why this must be the case, consider a word like *bayonet*. At the surface level, this word ends in a consonant preceded by a short vowel. Phonologically, the surface final consonant is followed by an empty vowel. Suppose that the final, empty syllable would not be parsed by foot structure. In that case, the syllable *yo* would be the head of the final foot, and the syllable *ne* would be in the foot's dependent position. Since there would only be one foot in the word, the syllable *yo* would receive the main stress. Of course, this is the wrong result. On the other hand, if the final, empty syllable IS parsed by foot structure, then the syllable *ne* is in the head

---

[6] In GP, one can find this idea in various formulations. It plays an important role in the licensing relations holding between nucleus and onset, as has been shown by Cyran (2002/2003), Ciszewski (2005).

position of the final foot, with the empty vowel in the foot's dependent position. To the left of that final foot, another foot is constructed over the two syllables *bayo*. The final foot is skipped by NON-FINALITY. Consequently, main stress is now located on the syllable *ba*, the first syllable of the word, and this is the correct result. In sum, there is good evidence that, in English, a word final empty syllable is parsed by foot structure. Let us assume that this is also true for Polish English. A word like *consensus* now gets the following foot structure in PE:

(28)

```
      F          F
     /\         /\
    /  \       /  \
   σ    σ     σ    σ
  con  sen   sus
```
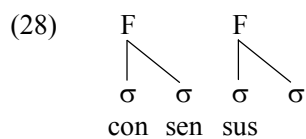
In this representation, the final foot is bisyllabic, so one might expect that the final foot becomes the head of the word tree. This is because, apparently, NON-FINALITY is blocked by the higher ranking NO-DOUBLYWEAK. Recall now that the latter constraint is formulated in terms of the grid. It says that a gridmark should not occur in a doubly dependent position. We can now simply assume that an empty syllable does not project a gridmark, neither in English, nor in Polish English. Accordingly, *consensus* has the following structure on the grid.

(29)

```
      F          F
     /\         /\
    /  \       /  \
   σ    σ     σ    σ
   *    *     *
   *          *
  con  sen   sus
```
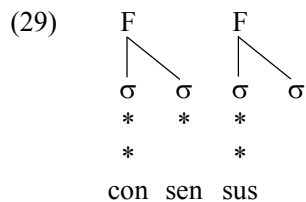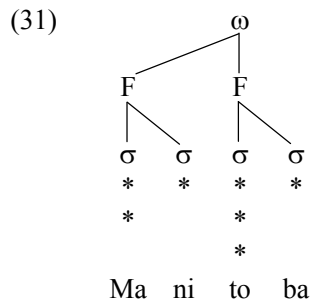
Given this representation, it is now possible to satisfy NON-FINALITY *and* NO-DOUBLYWEAK at the same time, because, even if the final foot would occupy the dependent position in the word tree, there would still not be a gridmark in a doubly dependent position. It follows from the simple fact that empty syllables do not count for the grid, although they do count, at least in some languages, for foot structure. Bisyllabic feet containing an empty syllable therefore behave as monosyllabic from the perspective of the grid. This allows the final foot in the word to be in the dependent position of the word tree, so that NON-FINALITY can be satisfied, without creating a violation of NO-DOUBLYWEAK. The full structure of *consensus*, then, is as in (30) overleaf.

We can see, then, that it is possible to derive antepenult stress in words ending in a consonant in Polish English. In this system everything is as in English, with just one exception; Polish English is not quantity sensitive. Formally this means that in Polish English there is no accumulation of gridmarks within one syllable. This is the main rea-
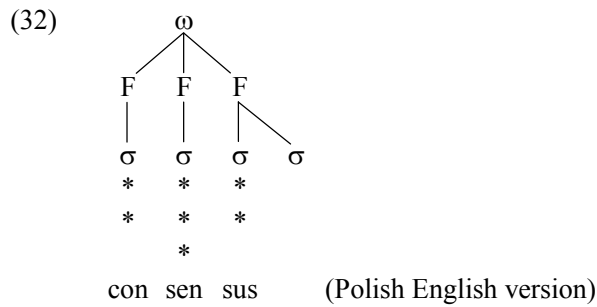
(30)      ω
          /\
         /  \
        F    F
       /|   /\
      σ σ  σ  σ
      * *  *
      *    *
      *
      con sen sus
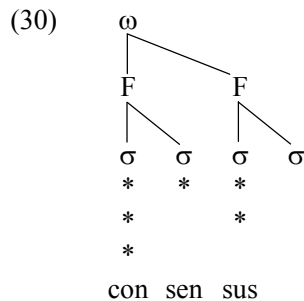

son why in Polish English the stress is located on the antepenult syllable in words end-
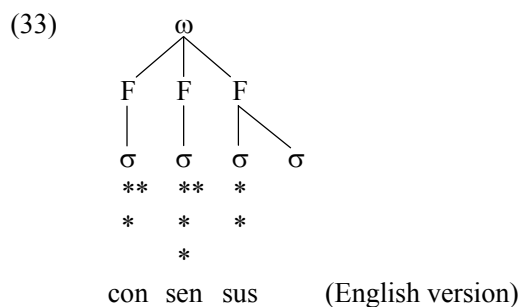ing in a consonant.

    As far as words ending in a vowel are concerned, everything is like in English. Take
a word like *Manitoba*, for instance (cf. other examples in (2)). This word does not end
in a consonant, so it is not required to create an empty syllable at the end of the word.
But that means that at the right edge of the word a binary foot is built, both syllables of
which are filled. As a result, it is impossible to satisfy both NON-FINALITY *and* NO-
DOUBLYWEAK. Since, as we have seen, NO-DOUBLYWEAK is stronger, it must be satis-
fied when the two constraints are in conflict. That means that it is impossible to locate
the final foot in the dependent position of the word tree. Consequently, the metrical
structure of the form *Manitoba* in Polish English looks as follows:

(31)              ω
                 /\
                /  \
               F    F
              /|   /\
             σ σ  σ  σ
             * *  *  *
             *    *
                  *
             Ma ni to ba


One important problem still remains to be made explicit. One might think that a native
speaker of Polish who is speaking English has the explicit knowledge of the position of
main stress in English words. That would mean that he/she is aware of the fact that, in
English words of the type *consensus*, the main stress is on the penult syllable. The ques-
tion, then, is why is the native speaker of Polish not capable of *imitating* this in Polish
English. In other words, why is the following structure, which just imitates the English
word, not allowed in Polish English?

(32)
```
                 ω
               / | \
             F   F   F
             |   |   / \
             σ   σ  σ   σ
             *   *  *
             *   *  *
                 *
```
con  sen  sus        (Polish English version)

The answer to this question follows from my analysis without any new stipulation. Recall that the basic difference, and in fact the only difference, between English and Polish English is the following: in English not only the vowel in the nuclear head position, but also its dependent project a gridmark. In Polish English, on the other hand, only the vowel in the nuclear head projects a gridmark. That is why, in the configuration in (32), there is only one gridmark on the basic line for each syllable. Compare this with the same word in English:

(33)
```
                 ω
               / | \
             F   F   F
             |   |   / \
             σ   σ  σ   σ
            **  **  *
             *   *  *
                 *
```
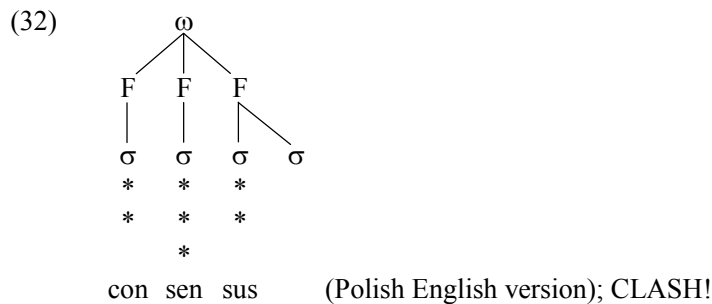con  sen  sus        (English version)

Now we can observe a very important difference between *consensus* as it is structured in the English grammar and the same word as it is structured in the Polish English grammar. In the Polish English version, something is going terribly wrong: it contains instances of the so called "stress clash" phenomenon. That means that it has configurations on the grid where two colums/towers are adjacent, without an intervening lower level gridmark. This is usually not tolerated by the languages of the world. The general structure of a stress clash is as follows:

(34)    The structure of a stress clash

```
        *  *
        *  *
```

Notice that in Polish English words of the type *consensus* have at least one stress clash (at least IF the precise location of main stress is imitated by the speaker of Polish English). The relevant clash, the one that is present in all the examples listed earlier, is capitalized.

(32)

```
                ω
              ╱ │ ╲
          F    F    F
          │    │    │╲
          σ    σ    σ   σ
          *    *    *
          *    *    *
                    *

        con  sen  sus       (Polish English version); CLASH!
```
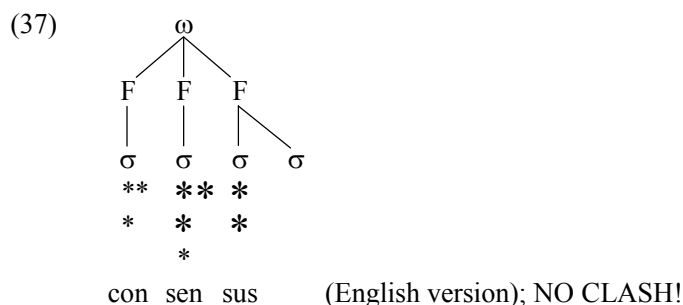
Such a terrible clash is not tolerated, and that is why in Polish English the word is pronounced without a clash. But in order to do that, the main stress cannot be located in the position where it should be in English. It can only be located in a position where it does not create a clash, and that is the antepenult position. That is why, in Polish English, the word *consensus* receives the structure already given in (26) and repeated here.

(36)

```
        ω
        │╲
        F    F
        │    │╲
        σ    σ    σ
        *    *    *
        *◄───     *
        *

      con  sen  sus
```
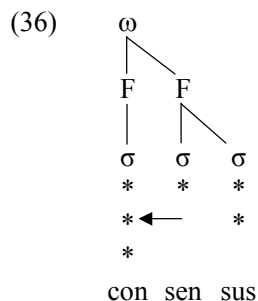
It is of paramount importance to realize that there is no stress clash in English. This is a consequence of the fact that in this system not only the vowel projects a gridmark, but also its dependent. It is the gridmark that is projected by the dependent that is able to alleviate the clash. In order to clarify this, I repeat the word again in (37), and this time I have capitalized the relevant part of the representation.

We can see that, in English, two adjacent stressed syllables are allowed. In the representation in (37) these adjacent stressed syllables do not constitute a clash, because the canonical representation of a clash, given in (34), is not met; there is an alleviating, lower level beat that separates the clashing gridmarks from each other. Thus, English allows adjacent stresses, precisely because in this language the dependent position of a syllable projects a gridmark. This is why in English representations like those in (37)

(37)

```
              ω
           ╱  │  ╲
         F    F    F
         │    │    │╲
         σ    σ    σ   σ
        **   **   *
         *    *    *
              *
```

con  sen  sus　　　(English version); NO CLASH!

are allowed. This analysis predicts that, in English, adjacent stresses are allowed, provided the left one of the two adjacent stresses is located on a heavy syllable. This prediction is entirely borne out, as is shown by a word like *maintain*. This word contains two adjacent stresses. Yet, it does not contain a stress clash, because the first stress is located on a heavy syllable. Consequently, the gridmark created by the dependent segment of the heavy syllable alleviates the clash.

This, then, shows that it is impossible to imitate the words ending in a consonant in such a way that the exact position of the stress is carried over to PE. It is impossible, because PE is not quantity sensitive, whereas English is quantity sensitive. Due to this, the correct English position creates a stress clash in the Polish English equivalents. This causes a stress shift to the left, explaining why in the PE equivalent of these words stress is located on the antepenult syllable, rather than on the penult, where it is found in English.

## 4. Conclusion

In this article, I have shown that, as far as stress is concerned, there is only one major difference between English and Polish English. The former, but not the latter, is a quantity sensitive system. This means that, in English, a heavy syllable projects two gridmarks on the basic line in one and the same syllable. In Polish English this is not the case. As a result, in Polish English, main stress cannot be placed on the penult syllable if a word ends in a consonant; that would create a stress clash. In English, it is possible to place the main stress on the penult syllable provided that syllable is heavy. In that case, there is no stress clash in English.

Apart from this one difference between English and Polish English, both systems are identical. Both have trochees; both have high ranking NON-FINALITY, but in both cases this constraint is outclassed by the constraint NO-DOUBLYWEAK. In both systems, moreover, words do not end in a consonant; they always end in a vowel, which can be empty. Furthermore, in both systems empty syllables are footed, and in both systems an empty vowel does not count at the level of the grid. The fact that in Polish English empty syllables are footed is different from Polish.

As a final point, I would like to remark that the systematic location of antepenult stress in words ending in a consonant is highly significant. It shows that a speaker of a L2 can do things that are not attested in his L1, nor in his L2.

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