

## **What in the world do we know about word stress?**

### **A review of what it is and how to teach it**

by Martin Checklin

#### ***Abstract***

*Word stress is an imperative part of English language learning, both in terms of comprehending spoken English and increasing oral intelligibility. However, it can often be a difficult area for learners of English to master successfully and one which is problematic for teachers of pronunciation to embrace in their teaching. This literature review presents an overview of what word stress is, its importance in intelligibility, and specific issues which certain language background groups encounter. Additionally, the review discusses and critiques the teaching methods of word stress found in commercially-produced textbooks and thus provides theoretical knowledge for teachers to incorporate into their classroom teaching. Recommendations for further research into word stress acquisition are outlined.*

#### **Introduction**

As pronunciation teaching has become more focused on increasing intelligibility rather than emulating a ‘native-like’ accent (Levis, 2005), faulty production of word stress has been found to significantly decrease intelligibility (Cutler & Clifton, 1984; Gallego, 1990; Bond, 1999; Field, 2005). This literature review presents an overview of what word stress is, its relationship with intelligibility and particular problems that students from certain language backgrounds might encounter. In addition, the paper discusses and critiques some of the methods for teaching word stress found in teaching resources in order to provide pronunciation teachers with theoretical knowledge which they can incorporate into their classroom practice.

#### **English word stress**

English, along with other languages such as Russian and Arabic, belongs to a group of languages which are described as ‘stress-timed’ languages (Abercrombie, 1967). These languages’ syllables are

not equally stressed: some are more prominent, others have less prominence and some have none at all; and this system of stress-timing lies at the root of the whole suprasegmental system of English (Dickerson, 1978). In contrast, languages such as French, Telugu and Yoruba place equal stress across their syllables (Abercrombie, 1967). Syllable-timed languages have been described as ‘machine gun’ like (Crystal, 1994) as each syllabic duration is the same like the sound of a machine gun. However, there has also been some criticism suggesting that languages cannot be separated so distinctively (Roach, 1982; Crystal, 1994) and, further, that no language can be described as completely stress- or syllable-timed (Mitchell, 1969). It has been shown that there are times when English speakers use more syllable-timed patterns, such as when using baby-talk, sarcasm or in situations when clarity is essential such as in aviation or nautical speech (Crystal, 1994). In addition, some speakers who have English as a primary language, such as Africans, Indians or the Welsh, use more syllable stress patterns (Crystal, 1994) and, in the case of Singapore English, final consonants are lengthened and unstressed syllables less weakened (Ling & Grabe, 1999).

As part of the stressed-timed pattern, words with two syllables will have one syllable stressed more than the other. Multisyllabic words may also have a secondary stressed syllable which usually precedes the primary stressed syllable (Ernestus & Neijt, 2008). The acoustic features of word stress are that the primary syllable has an elongated, higher pitched and louder vowel quality. Experimental results have shown that duration and intensity ratios are both cues for judgements of stress and that vowel length is a more effective cue than intensity ratio (Fry, 1958). The acoustic properties of the stressed syllables in English are different to those of the unstressed syllables. The unstressed syllables have a weaker vowel and often include the *schwa*. Visually, when we produce word stress our lips and chins move more (Scarborough, Keating, Mattys, Cho & Alwan, 2009). Accordingly, the vowel is fuller than in non-stressed syllables where it is weaker and therefore requires less mouth opening. It is important to note this and cue our students when observing models of words stress or using reflection while practising.

As with all linguistic features, word stress is acquired at different stages by children and, as they mature, so does their ability to use word stress with increased complexity (Atkinson-King, 1973). Even before language as we know it appears, babies’ babbling has prosodic features associated with word stress patterns (Davis, MacNeilage, Matyear & Powell, 2000). One important study showed that, in a group of infants aged from 18-30 months, although not fully adult developed, fundamental frequency, amplitude and duration were controlled to the extent that identifiable stress contrasts could be perceived (Kenoe, Stoel-Gammon & Buder, 1995). However, it is not until when they are about 12 years old that children have completely mastered the complexities of word stress (Atkinson-King, 1973; Vogel & Raimy, 2002). It has also been suggested that it is more difficult for English native

speakers to achieve mastery of word stress when compared with speakers of other languages such as French and Welsh (Vihman, Nakia & DePaolis, 2006).

### **Word stress and intelligibility**

In principle, stress alone could serve to distinguish words, but in reality it seldom does. Minimal pairs in English which are distinguished by word stress, such as ‘insight/incite’, are rare (Cutler, Dahan & van Donselaar, 1997). However, we know that faulty suprasegmental aspects of speech can impact on intelligibility (Anderson-Hsieh, Johnson & Koehler, 1992; Derwing, Munro, & Wiebe, 1998; Hahn, 2004; Kang, Rubin & Pickering, 2010) and that word stress constitutes a significant part of suprasegmental speech. There is evidence to indicate that intelligibility and comprehensibility are undermined specifically by faulty word stress (Cutler & Clifton, 1984; Gallego, 1990; Bond, 1999; Field 2005). Faulty prosodic features including word stress may affect comprehension more adversely than segmental errors (Anderson-Hsieh, Johnson, & Koehler, 1992; Bond, 1999). This misunderstanding of word stress can have significant impact beyond the language lab or classroom. For example, it has been found that word stress mispronunciation contributes to misunderstandings between GPs and their patients in multicultural medical clinics (Roberts, Moss, Wass, Sarangi & Jones, 2005).

Although not fully understood, possibilities of how word stress can be so detrimental to intelligibility have been discussed. We know that regional and foreign accents trigger a delay in word identification processes (Clarke & Garrett, 2004; Floccia, Butler, Goslin, & Ellis, 2009). It may be that the English listener relies on word stress to decode the word and locate the word in their mental lexicon (Grosjean & Gee, 1987) and that, if stress is wrongly distributed, it might have serious consequences for the listener to locate words within a piece of connected speech (Field, 2005). Lexical stress plays a central role in determining the profiles of words and phrases and misplaced word stress appears to be more perceptually important to native speaker listeners than are instances of mispronounced phonemes (Bond, 1999). Word stress errors in which the stress is shifted to the following syllable (e.g., ‘TURbine’ changes to ‘TurBINE’) have been shown to more detrimental than vice versa (Cutler & Clifton, 1984) and even more so if combined with a phonemic error (Field, 2005). However, it is important to note that these studies have generally investigated native speakers’ understanding of non-native speakers. There is a paucity of evidence which describes whether faulty word stress is detrimental to intelligibility in non-native to non-native interactions. This is not surprising as, overall, research investigating non-native to non-native interactions is still in its early stages (Pickering, 2006).

### **Word stress learning and specific language groups**

Overall, the picture of which language groups need to work more on word stress is varied but the evidence suggests that many learners of English have word stress production errors. Studies have shown that speakers of tonal languages such as Chinese or Japanese do not seem to make errors related to syllabic structure or lexical stress but appear to follow no pattern at all (Archibald, 1997). Vietnamese students can use pitch and loudness changes as found in Vietnamese but not vowel length or reduction (Nguyen & Ingram, 2005). Therefore, it is necessary for teachers to draw learners' awareness to all features of word stress and to provide them with explicit training, particularly vowel reduction and syllable duration contrast.

Many students may transfer their mother tongue word stress patterns to English (Archibald, 1992; Guion, 2006) which is perhaps based on whether they can or cannot detect phonological features such as weaker vowels (Guion & Lee, 2006). However, we cannot assume that just because a student speaks another stressed-timed language that they do not make stress errors (Benrabah, 1997). Vowel quality of the unstressed syllable may not be as weak as in English as, for example, in Arabic (Benrabah, 1997). Advanced Portuguese English speakers' principal word stress error was to transfer Portuguese secondary stress to primary stress in English. Additionally, with Spanish speakers, it has been found difficult to determine whether their errors are based on first language transfer or on an actual mislearning of stress patterns (Baptista, 1989). It may be that years of learning and general proficiency will impact more on accuracy (Guion, 2006; Chakraborty & Goffman, 2011). Regardless of the errors, due to the complexities of English word stress, many students would benefit from working on improving their command of English word stress.

There is some research evidence which describes a phenomenon of 'word stress deafness'. This is when non-native speakers of English cannot identify differences in words that differ solely in word stress (Dupox, Pallier, Sebastian-Galles & Mehler, 1997; Pepperkamp & Dupox, 2002). Contrary to this deafness belief, other research has found that non-native English speakers, including students from non-stress language backgrounds, were able to hear stress placement on spoken English words at near native levels and that length of stay or age were not correlated in achieving this and that, furthermore, they were able to learn differences in word stress (Davis & Kelly, 1997). Specific language groups, including Spanish, Korean and Thai speakers, have been shown to be able to learn word stress (Guion, Horada & Clark, 2004; Guion, 2005; Wayland, Guion, Landfair & Li, 2006) but success factors in these studies also included L1 prosodic features, age of acquisition and perhaps English proficiency.

### **Teaching word stress**

Lexical stress is specific to individual words. So there lies a responsibility for presenting stress patterns while teaching vocabulary and the oral practice of new words should most definitely include word stress practice (Field, 2005). Late learners of English may rely more heavily on word-by-word learning of stress patterns (Guion, 2006) particularly if they are from tone language backgrounds (Wayland, Guion, Landfair & Li, 2006). This word-by-word learning may occur while learning new vocabulary. It is important to be reminded that word stress learning cannot be taught in isolation. It is clearly linked to other aspects of pronunciation, vocabulary learning and grammar.

Although English word stress has been demonstrated to have certain regularity it is still more complex than in other modern languages, a fact that discourages many teachers and textbook writers from teaching stress prediction techniques (Hubicka 1981; Baptista, 1989). Although these observations were made a couple of decades ago, it is unfortunate that pronunciation textbooks still offer limited resources in terms of aspects of word stress such as depth, accuracy, variety or real functional communication. Marianne Celce-Murcia's much-cited work encourages a communicative approach to teaching pronunciation, but she has herself stated that teaching word stress in her communicative way is more difficult than teaching phonemic aspects of pronunciation (Celce-Murcia, 1987). However, in a more recent co-authored study she suggests methods for presenting word stress to students through listening discrimination activities followed by guided practice and then communicative practice using games (Celce-Murcia, Brinton & Goodwin, 1996).

The harder something is to learn through simple association, either due to it being too distant, rare, unreliable or too hard to notice then the more important 'explicit' learning is and adults should be exposed to and taught formal rules to draw on their explicit learning skills (De Keyser, 2003). In particular, as teachers we need to make explicit the features of English (Taylor, 1981). As this is the case, then due to the variance and less predictive patterns of English word stress, it has been recommended to teach word stress rules (Kenworthy, 1987; Dalton & Seidlhofer, 1994).

Three main rules have been discussed in the literature. The first of the three is phonological similarity. This is when students use known stress patterns from other similar words and transfer them to new words. For example, a student may know the word stress pattern of 'humanity' and apply its word stress structure to a new vocabulary item such as 'absurdity'. It is particularly of note that late learners of English rely most on the stress patterns of phonologically-similar known words (Guion, 2006). The placement of certain suffixes in English can alter a stress pattern. For example, adding '-ian' to a root word changes the stress (consider Library and LibrARian), while other suffixes do not have this effect (evident in 'FRIEND' and 'FRIENDship' where both place stress on the same syllable (see Yavas,

2006, for a full review). It is suggested that this feature of stress patterns in English be explicitly taught and practised in the classroom (Ghorbany, 2011). The explicit teaching of suffix rules may assist in accessing the students' ability to learn stress through the use of phonological similarity. Additionally, analogy exercises, where students group words with similar stress patterns or find the odd one out (Field, 2005), again rely on phonological similarity. It has been shown how early and late bilinguals both demonstrated ability for analogical extension and learning simple patterns (Guion, 2004).

The second rule relates to word class. Just over 80% of two syllable nouns and adjectives place stress on the first syllable, e.g., 'KITChen' and 'EXTra' (Hammond, 1999). However, verb stress works in the opposite manner (consider 'achIEVE' and 'agREE'). The word class rules appear in many English teaching textbooks but there is little evidence for the effectiveness or transfer of this rule.

An important third rule concerns the syllabic structure of words (Guion, 2006). English stress tends to fall on syllables with longer vowels or when the word ends in two or more consonants (Chomsky & Halle, 1968). However, it may be that consonant clusters are less important than vowel length and there are many exceptions to this rule (Guion, 2006). Early bilinguals can pick up more complex pattern learning such as syllabic structure rules but still show some slight deficits in this area (Guion, 2004).

Whatever rule is decided upon, they have one thing in common; all of these explanations take time and need to be broken down to teachable concepts, if they can be at all. Mastering a linguistic rule may happen but internalising the stress patterns for specific words is not the same (Field, 2005).

The use of visual prompts to support students' learning processes in language acquisition is well documented for both segmental and suprasegmental aspects of pronunciation learning (Hardison, 2003; Hazan, Sennema, Faulkner, Ortega-Llebaria, Iba & Chung, 2006). Providing clear visual cues to students to help emphasise word stress, such as underlining, using bold or capitals, circling or using ticks may be routine (Lin, Fan & Chen, 1995). Clapping or tapping the relevant word stress by the teacher or in student-led small groups has also been described (Lin, Fan & Chen, 1995). Other visual cues include vowel stretching (Gilbert, 1978; Lin, Fan & Chen, 1995). This is when a piece of elastic is stretched by the teacher while modelling to emphasise the stressed syllable which additionally adds a kinaesthetic dimension to the learning process.

Second language learners struggle with hearing intonation well as they focus on trying to understand different sounds, word meaning and grammar (Gilbert, 1978). Developing students' awareness of

intonation patterns in English can be augmented by providing auditory cues. Gilbert describes the kazoo as the best tool a pronunciation teacher can have. By humming the word shape into the kazoo, students can hear the intonation pattern of the syllables without worrying about the sounds (Gilbert, 1978). Another similar trick to this could be using nonsense words so students focus on acoustic patterns rather than semantics (Mekhoukh, 2010).

Another study reported that during a four week project involving six students in an intense program of learning both sentence and word stress using rap music that students were perceived as having improved oral performance (Fischler, 2005). The course was designed to include adequate and appropriate auditory discrimination and controlled, guided and communicative practice. While this innovative approach is to be applauded, it is unclear whether using rap music is any more beneficial than using other word stress teaching methods in an intensive program. Certainly it may appear to be motivational to certain student groups and we are fully aware that motivation is critical to language acquisition (Smit & Dalton 2000; Smit 2002; De Graff & Housen, 2009).

Technological advances have widened computer-assisted language learning practices but technology is only as good as the practitioner or user (Brett & Gonzalez-Llorett, 2009). It has been shown that the use of computerised material for pronunciation learning is a promising area but should incorporate empirical findings to provide worthwhile training for learners (Derwing & Munro, 2005; Levis, 2007). Levis further notes that teachers need to be more aware of computerised assisted language learning (CALL) and they need to know what exercises are effective using CALL, understand its strengths and limitations and overall be familiar with available CALL tools and associated terminologies. The evidence for CALL and word stress acquisition is very limited. One researcher, using a program called Wavesurfer which allows acoustic visualisation of sound, found that students were enthusiastic and were able to make long-term acquisition of particularly difficult words including polysyllabic words. However, it was also found that this practice was not generalisable to a large amount of vocabulary and was time-consuming (Hincks, 2002).

Finally, when targeting phonemic accuracy, we should aim to use words where the target phoneme is contained in a stressed syllable (Gilbert, 1978). For example, if refining a student's pronunciation of 'l', it is better to practice with words like 'allow' or 'aloud' than 'follow' or 'bellow' so that students do not pause before the stressed syllable. It is also common for language learners to emphasise many words in a sentence; however, this confuses the English listener (Gilbert, 1978). In our aim to increase intelligibility through clearer sounds, we should ensure that students are not stressing every sound they make but are maintaining naturalness associated with correct word stress usage.

## **Conclusion**

Word stress plays an important role in intelligibility and deserves to be studied in all English classes – not just pronunciation classes – and by all students regardless of their general language proficiency levels. Teaching word stress can occur as part of any lesson provided that the teacher is empowered with the theoretical knowledge of word stress and the enthusiasm to teach it. Less proficient learners should be made aware of word stress whereas more experienced learners can better cope with learning rules associated with word stress. Of the rules discussed in this article, phonological similarity may be the best one to start with as early and late bilinguals pick this up well.

The teaching of new vocabulary and word stress are closely entwined. Several ways to teach word stress have been presented. Despite this, the studies in the review present little evidence to support their claims. There have not been any meta-analysis or randomised control trials investigating how students best learn word stress. Although a few cohort studies were found, they had low numbers of participants. Additionally, some of the techniques outlined date back over 30 years, and more recent studies, including those using CALL, are limited.

## **Recommendations**

While there are significant studies confirming the importance of word stress accuracy, further research is required. Miscommunication due to word stress errors has mostly been investigated using native English speakers listening to non-native speakers. Further studies are required to investigate whether word stress is as detrimental to intelligibility in non-native speaker interactions where English is used as a lingua franca. The results of such research may have a significant impact on classroom teaching. Knowing the importance of word stress in non-native to native interactions, a teacher of migrants may choose to focus on word stress. On the other hand, a teacher of students who require English to speak to other non-natives may place less importance on word stress if it is shown that word stress is not detrimental to non-native to non-native intelligibility.

There is limited comparison within the literature of methods used to teach word stress. Although there is some comparison of which word stress rule is better to learn, there have been insufficient studies comparing techniques. One further direction may be to investigate whether CALL can augment or even replace traditional classroom methods for teaching word stress. With the shift of focus onto intelligibility and communicative practice, any future research comparing techniques should include outcome measures of intelligibility, perceived comprehensibility and reports of communication in real-life situations (as also suggested by Pickering, 2006). Given that some of the techniques of teaching word stress in the review are dated, it would be advantageous for researchers to survey and



collect data from teachers to investigate what the current classroom activities are regarding word stress teaching practices and beliefs.

Finally, while authors have made useful contributions to understanding word stress errors according to specific language learners, further studies are required to widen this area of knowledge, especially given that word stress production errors are widespread. Such studies should inform teachers further about how specific language groups learn word stress and of the possible success factors certain learners may have.

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***Martin Checklin** is a trained speech pathologist who began teaching English in 1996. He has taught in the UK, Spain, Japan and Australia. He currently works as a speech pathologist and specialist pronunciation trainer. Martin has previously conducted research looking at speech intelligibility and its relationship to social participation. His areas of interest include how to teach suprasegmental aspects of pronunciation effectively and making pronunciation practice meaningful.*

*Email: [martinchecklin@yahoo.com.au](mailto:martinchecklin@yahoo.com.au)*

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