COMMON ALGORITHMS OF PRIMARY STRESS PLACEMENT ON POLYSYLLABIC WORDS

PhD. Metin Yurtbaşı
Bayburt University, Faculty of Education
English Teacher Training Deparment
metinyurtbasi@yahoo.com

Abstract
Turkish students tend to make considerable stress placement errors when pronouncing English polysyllabic words because of the interference of the traditional word stress patterns of their mother tongue. They usually misplace stresses in their utterance, both either as a result of their native pronunciation habits or their lack of stress-placing knowledge in the target language. Experience has clearly shown that one of the most visible areas of weakness in Turkish students learning English is stress placement. This is the main problem to be explored and resolved in this research with an "algorithm of suffixes"**.** The learners of English in Turkey are very much in need of practising such algorithm listings and going through electronic dictionaries. The study patterns or algorithms in this research involve in at least four-syllabled words with one prominent primarily stressed syllable. Students are first given a pretest to see how they naturally fare in English rhythm to expose their wrongly-misplaced stress patterns, their stress mobility concept and their fossilized erratic stressing habits. In the pretest, 25 questions are downloaded via the audacity program given to them within 5 second-intervals three times by the computer. Those freshmen non-initiated to the English stress patterns clearly present in this test a total lack of English stress pattern marked by a general irregularity in their utterance. Then they are briefed on general characteristics of English stress pattern of such polysyllabic words based on their grammatical category within an algorithm of some general suffix patterns. After a 3 hour intensive stress placement drill, a post-test of fresh 25 words is administrated to them. This post-test determines the rate of students' improvement in their pronunciation and proves the efficiency of the algorithm of suffixes introduced.
Keywords: Prımary Stress Placement, Common Algorıthms

1 Background to the issue of polysllabic words' stress in English

A polysyllabic word is a word having more than three syllables (polysyllable, 2017). In such polysyllabic words in English at least one of the syllables is stressed. And in most dictionaries that syllable is followed by a stress mark ['] in its phonetic transcription (Wenszky, 2000, 2017). For example in the word *'FEBruary* ['fɛbrʊəri] the first syllable (feb-) is stressed, and for the word *'OPposite* ['ópəzít] again the first syllable (-op-) is stressed. In *in'CREdible*, however, the second syllable (-cred-) and again in *e'XAmine* the second syllable (-am-) is stressed. And finally in the word *employ'EE* the last syllable (-ee) is stressed to prove the inconsistency of the English phonetics. Stress is one determinant of word pronunciation in English and it is important for the speaker to predict its location for the accuracy of his spoken utterance as well as his understanding of it. The primary or main stress in a word is the exact location of its most prominent syllable determining its meaning to be conveyed clearly (main stres, 2017). It is the distinction in stress that causes the difference in pronunciation and the meaning between the noun *'OBject* (with primary stress located on the first syllable) and the verb *ob'JECT* (with primary stress located on the second syllable) (Wenszky, 2000).

This difference in stress is manifested by variations in the pitch, duration and amplitude of each syllable in a word. Although English is notorious for its complicated stress patterns, there are still certain features or algorithms for predicting the location of the primary stress. It is good to know that in English certain suffixes do influence the stress such as the suffix *-eer* (as in the word *engin'EER* attracts primary stress to itself to the end whereas words containing the suffix *-ical* (as in *'CHEMical*) cause the primarily stressed syllable to immediately precede the suffix (word stress, 2017).

Many works to resolve this problem have shown that a simple rule for the assignment of stress to English words can operate as accurately as other more complex algorithms. Thus it has been noted that the most effective way of predicting the primary stress of a word is accomplished by incorporating some basic stress rules with some level of morphological decomposition (predictability, 2017).

Following the analysis by Fudge (1984), on the effect of affixes (i.e. prefixes and suffixes) on stress patterns in English, an algorithm has been developed that will locate the primary stressed syllable. The algorithm has two components: one makes use of a basic stress rule, the other involves the analysis of words into their constituent morphemes.

Much work has been done to formally capture the systematic variations in the location of main stress for English words (Wenszky, 2000). Selkirk's work (Selkirk, 1995) has pointed to the concept of "syllable weight" as being important for stress determination in a word. Syllable weight refers to the phonological structure of each syllable. A "heavy" syllable is one that ends in a consonant cluster (i.e. more than one consonant). A "light" syllable is one that ends with a single consonant. This concept is important for stress placement, because it is usually a heavy syllable that carries primary stress. Light syllables are usually unstressed. Another important observation about basic stress patterns in English is that primary stress rarely occurs on the last syllable of a polysyllabic word. It usually occurs on the penultimate (second to last) or on the antepenultimate (third to last) syllable. The choice of which of these syllables receives primary stress depends on the concept of syllable weight. In particular, stress placement depends on the weight of the penultimate syllable (Wenszky, 2000).

2 The statement of the problem

Word stress is an integral part of English language and it has the importance to set the very basic quality of oral communication. Natives largely rely on stress pattern of words to identify the words correctly and most of the problems occurring during communication between non natives and natives stems from the lack of emphasis on word stress patterns. However the correct application of stress in words is a demanding skill and knowledge as the word stress pattern of English does not have concrete rules to apply every new word for foreign English learners. Despite this difficulty, considering its importance for communication, some word stress patterns or algorithms must be emphasized and importance should be given to pronunciation education. Thus, solving the stress placement problem of English learner will certainly have a beneficial effect on their overall communication strategies (Lieberma-Prince, 1977).

3 The purpose of the study

Mistakes in word stress are a common cause of misunderstanding in English (Briony, 1987. Because stressing the wrong syllable in a word can make the word very difficult to hear and understand. Stressing a word differently can change the meaning or type of the word. Even if the speaker can be understood, mistakes with word stress can make the listener feel irritated, or perhaps even amused, and could prevent good communication from taking place. For these and many other reasons word stress is an extremely important part of the English language learning. And students should definitely get special help from their pronunciation teachers to acquire the skill of placing stress on the right syllable in order to express themselves intelligibly (Halle-Vergnaud, 1987). Thus an early introduction of stress patterns in curricula will be of immense benefit to students both in terms of their efficient foreign language communication and their effective learning. Experience has clearly shown that one of the most visible areas of weakness in Turkish students learning English is stress placement. This weakness is further magnified by the fact that no stress patterns and drills are introduced in the early levels of the curriculum or indeed at any other level.

Foreign students in general find it difficult to deal with the correct stressing of English polysyllabic words, and it would be maddening for anyone to learn the stress of each word separately. For this and many other related reasons, in order to establish an efficient foreign language communication and effective learning teaching as many English stress patterns and supporting them with appropriate drills is of paramount importance and absolute priority.

Stress patterns should be introduced to students as early as possible (Rogerson-Revell, 2011). This would help them avoid the wrong accentual habits and build a strong foundation for verbal language

activity. The current study has the sole purpose of raising awareness on this issue and provide relevant materials to remedy the ills of wrong stress placement especially in polysyllabic words. Thus we can emphasize this systematic approach to English stress pattern in Turkey, especially with reference to the classification of some English word-endings in a set of algorithm of suffixes (Burzio, 2007).

4 Methodology
The algorithm of suffixes described in this article has been evaluated using a method that has been used to assess other such algorithms. A corpus of 475 polysyllabic words was compiled from the Brown Corpus of most frequent words of English. The list contains the most frequent polysyllabic words of English. The algorithm was tested on this list in order to determine its accuracy and to compare it to the accuracy of other systems.

After each word was tested, it was evaluated as to whether the stress was located on the correct syllable. For illustrative purposes, only a few stress patterns are dealt with here. In a first stage, only the main stress is accounted for. Because of the general linguistic level of our students and the wrong accentual habits that they might have acquired in high school, and the possible interference from the mother tongue, the stress patterns and rules should be proposed to them in a simple form to facilitate their learning and automatic drilling.

The exceptions to the rules should be rote-learnt to avoid confusion. It is worth mentioning that the Daniel Jones *English Pronouncing Dictionary* (Jones, 1917) has thousands of polysyllabic words to work on and the number of irregularity are less than to be numbered.

5 Algorithm of suffixes affecting the stress pattern of polysyllabic words in English
Peter Roach (Roach, 1983) claims that "the effect of prefixes on stress does not have the comparative regularity, independence and predictability as suffixes" and adds that "there is no prefix of one or two syllables that always carries primary stress". He continues that "the best treatment seems to be to say that stress in words with prefixes is governed by the same rules as those for words without prefixes" (Wenszky, 2000).

He could very well be the right adviser to help us frame our algorithm for the stress placement in English polysyllable words.
Roach suggests that polysyllabic words have three types of suffixes having to do with their stress-placement, i.e "suffixes carrying primary stress themselves" (also called the autostressed suffixes), "suffixes that do not affect stres placement" and "suffixes that influence stres in the stem" (Halle-Vergnaud, 1987). Here is the algorithmic listing of those suffixes determining the English stress placement in polysllabic words with their many examples**:**

5.1 Autostressed Suffixes (Suffixes carrying primary stress themselves)
 "-ATION": prepa'ration, repu'tation, despe'ration, coro'nation, hesi'tation, popu'lation, star'vation, deco'ration, agi'tation, quo'tation, do'nation, civili'zation, imagi'nation.
"-SELF": her'self, him'self, it'self, my'self, one'self, our'self, thy'self, your'self.
 "-EE": refu'gee, evacu'ee, employ'ee, arrest'ee, assign'ee, confer'ee, train'ee, assault'ee, audit'ee, award'ee, biograph'ee, call'ee, contact'ee, counsell'ee, elect'ee, flirt'ee, interact'ee, introduc'ee, invest'ee, murder'ee, own'ee, phon'ee, pick'ee, rap'ee, releas'ee, rescu'ee, tickl'ee.
 "-EER": mountai'neer, volun'teer, auctio'neer, budge'teer, came'leer, canno'neer, chario'teer, comman'deer, conventio'neer. de'creer, domi'neer, electio'neer, engi'neer,
fak'eer, fictio'neer, 'fleer, fore'seer, 'freer, junke'teer, leafle'teer, marke'teer, muske'teer, muti'neer, orien'teer, over'seer, pio'neer, pisto'leer, sloga'neer, summi'teer.
"-ESE": Portu'guese, journa'lese, bureaucra'tese, compute'rese, educatio'nese, federa'lese, governmen'tese,   journa'lese,   lega'lese,   officia'lese,   telegra'phese.
"-ETTE":   ciga'rette,   launde'rette,   bru'nette,   chemi'sette,   co'quette,   flowe'rette,

kitche'nette, luncheo'nette, maiso'nette, pi'pette, pous'sette, quar'tette, quin'tette, roo'mette, sermo'nette, servi'ette, silhou'ette, toi'lette, towe'lette, videocas'sette, wago'nette.

 "-ESQUE": pictu'resque, ara'besque, Beat'lesque, bur'lesque, Disne'yesque, gigan'tesque, gro'tesque, humo'resque, Lincol'nesque, mode'lesque, pictu'resque, Roma'nesque, Rube'nesque, statu'esque, Michelange'lesque.

5.2 Suffixes that do not affect stress placement

 "-ABLE": 'comfortable, a'batable, a'bominable, ac'ceptable, ac'complishable, ac'countable, a'chievable, a'daptable, 'admirable, ad'visable, a'greeable, 'amiable, 'applicable, at'tainable, be'lievable, 'blamable, 'breakable, 'calculable, 'certifiable, 'classifiable, col'lectable, com'mendable, con'ceivable, de'fendable, de'pendable, de'testable, de'visable.

 "-AGE": 'anchorage, 'amperage, as'semblage, 'baronage, 'brakeage, 'brokerage, 'counterespionage, 'harborage, 'sewerage, 'shrinkage, 'stockbrokerage, 'tutelage.

"-AL": re'fusal, ab'dominal, ab'normal, abo'riginal, aca'demical, a'coustical, ad'ditional, aero'medical, 'agricultural, 'anal, 'anarchical, 'ancestral, appa'ritional.

 "-ARY": ˈactuary, ˈˈcapilˌlary, ˈordiˌnary, ˈarbiˌtrary, fiˈduciary, ˈnecessary, ˈlegenˌdary, ˈFebruary, ˈcustoˌmary, ˈdictionary, aˈpotheˌcary, ˈmerceˌnary, ˌbeneˈficiary, ˈadversary, ˈcommenˌtary, reˈactioˌnary, ˈmomenˌtary, heˈreditary, evoˈlutionary, conˈfectionary.

 "BERRY": ˈbarberry, ˈbayberry, ˈdogˌberry, ˈchinaˌberry, ˈcranˌberry, ˈdewˌberry, ˈsnowˌberry, ˈgooseˌberry, ˈˈhackˌberry, ˈmulˌberry, ˈblackˌberry, 'winterˌberry.

 "-EN": 'widen, 'straighten, 'strengthen, 'broaden, 'deepen, 'soften, 'steepen.

 "-FUL": 'wonderful, 'basketful, 'bottleful, 'bountiful, 'bucketful, 'conflictful, 'dessertˌspoonful, dis'graceful, dis'gustful, disres'pectful,

dis'trustful, 'foresightful, 'insightful, 'prayerful, re'proachful, 'tablespoonful, unre'morseful.

 "-ING": a'mazing, a'bandoning, a'bolishing, a'bounding, 'abrogating, ad'ministering, ad'monishing, 'handiˌcapping, 'handˌshaking, 'heartˌbreaking, 'hospitalizing, 'trespasing, 'triumphing, uncom'pelling.

 "-ISH": 'devilish, 'amateurish, car'toonish, 'cleverish, 'cockneyish, 'countryish, 'waterish, 'yellowish.

 "-LIKE": 'animallike, 'basketlike, 'businesslike, 'chimneylike, com'puterlike, de'tectivelike, 'doughnutlike, 'factorylike, 'flowerlike, 'granitelike, 'lobsterlike.

"-LESS": 'powerless, af'fectionless, agen'daless, am'bitionless, 'asteriskless, 'characterless, com'passionless, consti'tutionless, 'daughterless, e'motionless,

"-LY": 'hurriedly, ab'horrently, a'bominably, a'bortively, a'bundantly, aca'demically, ac'commodatingly, a'cquisitively,

ad'ditionally, ad'ministratively, ad'venturously, af'fectionally, ag'gressively, a'greeably, 'amateurishly.

 "-MENT": 'punishment, 'government, de'velopment, 'managemet, em'ployment, a'rrangement, im'provement, a'ppointment, 'parliament, a'ssessment, be'reavement, rede'velopment, a'ccompaniment, pre'dicament, en'lightenment, a'mazement, rein'forcement.

 "-NESS": 'yellowness, a'bortiveness, ab'ruptness, 'absoluteness, ab'surdness, a'busiveness, 'accurateness, 'airlessness, 'airworthiness, a'likeness, 'agelessness, ad'visableness, ad'venturesomeness, 'amorousnes, 'appositeness, be'tweenness, 'beautifulness.

 "-ONY": ˈacrimony, ˈagrimony, ˈalimony, ˈantiˌmony, ˈceremony, ˈmatrimony, ˈpatrimony, ˈparsimony, ˈsanctimony, ˈtestimony.

 "-ORY": ˈminatory, ˈauditory, ˈmandatory, ˈoratory, ˈpredatory, ˈlaudatory, ˈcirculatory, ˈpurgatory, aˈccusatory, oˈbligatory, deˈrogatory, conˈciliatory, conˈtributory, deˈpository, ˈpromissory, exˈclamatory, interˈrogatory, preˈparatory, obˈservatory, maˈnipulatory.

 "-OUS": 'poisonous, ab'stemious, acri'monious, adven'tageous, ambi'dextrous, ana'chronous, a'nonymous, antitu'berculous, 'blasphemous, ca'cophonous, can'tankerous, cere'monious, con'temptuous, har'monious, ho'monymous.

 "-FY": 'glorify, 'amplify, 'classify, com'plexify, de'classify, dis'qualify, dis'satisfy, e'xemplify, mis'classify, over'simplify, per'sonify, 'sanctify, sub'classify.

"-WISE": 'otherwise, anti'clockwise, 'contrariwise, 'counterclockwise, 'profitwise.

"-Y": 'beautifully, ab'dominally, ab'horrently, acci'dentally, ca'cophony, cos'mogony, dis'harmony, ethno'botany, he'gemony, inter'company, 'matrimony.

5.3 Suffixes that influence stress in the stem

"-EOUS": advan'tageous, contempo'raneous, con'sanguineous, dis'courteous, extempo'raneous, homo'geneous, instan'taneous, miscel'laneous, nonsimul'taneous, porce'laneous, simul'taneous.

"-GRAPHY": photo'graphy, 'biography, ge'ography, 'autography, bibli'ography, chro'nography, to'pography, vide'ography.

"-IAL": pro'verbial, acces'sorial, ad'verbial, adver'torial, ambassa'dorial, anticom'mercial, bac'terial, bicen'tennial, bioma'terial, circumfe'rential, diffe'rential, evi'dential, extrater'restrial, imme'morial, inter'racial.

"-IC": cli'mactic, acro'nymic, acti'vistic, adventu'ristic, a'gnostic, agora'phobic, alche'mistic, allo'graphic, allo'morphic, al'truistic, topo'graphic, plura'listic, nonrea'listic.

"-ION": per'fection, abbrevi'ation, abomi'nation, accep'tation, adminis'tration, antiorgani'zation, argumen'tation, assasi'nation, inconside'ration, inflam'mation.

"-IOUS": in'jurious, acri'monious, antire'ligious, cere'monious, dishar'monious, har'monious, inhar'monious, nonre'ligious, osten'tatious,

"-TY": tran'quillity, a'bility, ab'surdity, accounta'bility, ad'versity, advisi'bility, amo'rality, an'tiquity, au'dacity, bar'barity, believa'bility, bisexu'ality.

"-IVE": re'flexive, a'bortive, abs'tractive, ac'comodative, ac'cumulative, a'cusative, af'firmative, ag'gressive, al'literative, argu'mentative, compre'hensive, con'templative, contra'ceptive (Celex2, 1996)

5.5 Stems of "–ative" words and their stress pattern

abˈlate, acˈcumuˌlate, acˈcuse, adˈminisˌtrate, adˈverse, afˈfirm, ˈaffriˌcate, agˈglutiˌnate, alˈliteˌrate, ˈalterˌnate, aˈmeˌliorate, apˈpreciˌate, ˈargument, asˈsimiˌlate, asˈsoˌciate, auˈthority, ˈcalcuˌlate, calm, cause, ˈcogiˌtate, colˈlaboˌrate, comˈmemoˌrate, comˈmiseˌrate, comˈmuniˌcate, comˈmute, comˈpare, conˈnote, conˈserve, conˈsult, ˈcontemˌplate, ˈcoopeˌrate, ˈcopuˌlate, ˈcorreˌlate, corˈroboˌrate, create, ˈcumuˌlate, cure, deˈclare, ˈdecoˌrate . deˈgeneˌrate, deˈlibeˌrate, deˈlimiˌtate, ˈdemonsˌtrate, deˈnote, deˈrive, deˈtermine, disˈcrimiˌnate, ˌdoˈnate, dure, ˈeduˌcate, eˈlate, ˈemaˌnate, eˈvoke, exˈhort, exˈploit, exˈplore, ˈfedeˌrate, ˈfigure, fiˈxate, form, ˈgeneˌrate, ˈgraviˌtate, ˈillusˌtrate, iˈmagine, ˈimiˌtate, comˈmunicative, ˈindiˌcate, inˈform, iˈniˌtiate, ˈinnoˌvate, ˈoperative, ˈinteˌgrate, inˈterpret, inˈterroˌgate, inˈvestiˌgate, lax, ˈlegisˌlate, loˈcate, maˈnipuˌlate, ˈmediˌtate, ˈmultiply, arˈrate, neˈgate, ˈnomiˌnate, ˈnorma, ˈopeˌrate, opt, ˈoxiˌdate, ˈpalˌliate, ˈpeneˌtrate, ˈoperative, ˈprediˌcate, preˈpare, preˈserve, preˈvent, ˈprobe, .ˈpropaˌgate, proˈvoke, purge, ˈquality, ˈquantity, .reˈcupeˈrate, reˈform, reˈgeneˈrate, reˈlate, ˈremonsˈtrate, reˈmuneˌrate, reˈpare, ˌrèpreˈsent, reˈstore, roˈtate ˌroˈtate, ˈrumiˌnate, seˈdate, ˈsepaˌrate, ˈspecuˌlate, ˈstimulate, talk (Wenszky, 2000).

6 Conclusion

In summary, the algorithm presented here represents a computationally efficient and accurate system for the task of assigning primary stress to English words. Combined with a set of letter-to-sound rules, it allows one to one type of any English word and have as output a phonemic representation of the word with the location of the primary stressed syllable. The algorithm for the correct placement of stressing in polysyllabic words has been so designed that if there are any further changes that need to be made to increase the accuracy, this can be accomplished with great facility. However the rules presented here constitute but the tip of the iceberg, as the full range of the English accentual system demands a more lengthy study and a lot of patience and hard work. In spite of time and curriculum constraints, it is worth going to the trouble of systematically reinforcing the adoption of valuable attitudes and strategies by our students. Teaching students English stress placement is a difficult task and a big challenge, but this will certainly have a beneficial effect on their overall communication strategies. For this reason, the stipulation of English stress patterns and rules in the English Language curricula remains an urgent priority and an absolute requirement.

References

Briony W. (1987). Word stress assignment in a

Word stress (2017). seas3.elte.hu/analysis/analysis6.pdf

Wenszky N. (2000). Secondary Stress in English Words, Doctoral Dissertation

text-to-speech synthesis system for British English

Syllabification (2017). www.elearnenglishlanguage.com/blog/learn-english/.../syllabification-word-stress/

Speech and Language, 12(2):119–142

Selkirk, E. (1984). Sentence Prosody: Intonation, Stress, and Phrasing

Roach, P. (1983). English Phonetics and Phonology

pronunciation and lexicon compression. Computer

Predictability, (2017). www.esltrail.com/2008/02/word-stress-predictability.html

Polysyllable (2017). https://en.wiktionary.org/wiki/polysyllable

Pamela Rogerson-Revell, P. (2011). Language Arts & Disciplines

Main stress (2017). https://www.tolearnenglish.com/exercises/exercise...2/exercise-english-76222.php

Liberman-Prince (1977). On stress and linguistic rhnythm, Linguistic Inquiry Volume 8, Number 2 (Spring 1977) 249-336 2.4

Jones, D. (1917). English Pronouncing Dictionary

Halle-Vergnaud, (1987). An essay on stress, by Morris Halle and Jean-Roger Vergnaud. Cambridge, MA: MIT Press

Fudge, E. (1984). English word-stress. London: Allen and Unwin

Computer Speech and Language, 2:235–272.

Celex2 (1996). The CELEX2 lexical database

Burzio, L. (2007). Phonology and phonetics of English Stress and vowel reduction

Bagshaw, P. (1998). Phonemic transcription by analogy in text-to-speech synthesis: Novel word

.