



International Conference on Teaching and Learning English as an Additional Language,  
GlobELT 2016, 14-17 April 2016, Antalya, Turkey

## Perception of Nuclear Stress in Vocabulary Items in Teacher Education in terms of Shadow Listening

Mehmet Demirezen<sup>a,\*</sup>

<sup>a</sup>*Hacettepe University, Ankara 06800, Turkey*

### Abstract

Words are made up of syllables in all languages. Some of these syllables are made more pronounced by bearing a primary stress phoneme which carries the highest prominence among in louder forms the surrounding syllables. The stressed syllable with a primary stress is an innate property of the word; each word carries a primary stress. The syllable with the primary stress is also known as tonic stress. The syllable with primary word-stress is most prominent because it is automatically placed upon the related syllable, drawing attention to native uses of pronunciation and intonation. Recognizing a stressed syllable requires us to perceive its prominence, which is actually an auditory signalling that the hearer's attention is centered upon. Perception of the nuclear stress escapes the attention of prospective Turkish students and English majors, especially in longer words. This research will investigate the perception of tonic stress placement in English words by the first year students in the English Language Education Department in one of the leading universities in Turkey. In the pre-test, the participants listened to 15 words given by a computer in audio forms and then were asked to single out the tonic syllable in a five-answer multiple choice test. After the evaluation of the pre-test results, the participants were taught for 3 hours on the inspection of tonic stress in words. Two weeks later, the same pre-test was administrated as post-test to the participants. While overall rate of success was 17.47% in the pre-test, it increased to 52.4% in the post-. These results indicate that the ability of nuclear stress perception in vocabulary items can be beneficial in learning listening comprehension.

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Peer-review under responsibility of the organizing committee of GlobELT 2016

*Keywords:* stress perception; primary stress; tonic stress; nuclear stress; stress blindness.

\* Corresponding author. Tel.: +90 312 2978575; fax: +90 312 2976119.  
E-mail address: [md49@hacettepe.edu.tr](mailto:md49@hacettepe.edu.tr)

## 1. Introduction

Strangely enough, it is a surprising to note that listening is the skill most often used in educational and everyday life, but has merited little research or pedagogical attention. Research has demonstrated that “adults spend 40-50% of communication time in listening” (Gilman & Moody, 1984: 331-34). Similarly, according to Miller (2003:16-19), “more than 40% of our daily communication is spent on listening, 35% percent on speaking, about 16% percent on reading, and only 9% percent on writing.” Dalton, et al. (2011:104) state that “in fact, we spend 45% of our time doing it.” Thus, listening is the most important skill as an active process because communication will not properly take place and be complete without effective listening. Yet in spite of its critical role in foreign language teaching and learning, listening has been neglected and remained one of the least researched processes in teacher education. One of the most crucial skills dependent on listening is the perception of word stress in relation to pronunciation and intonation teaching. The aspect of pronunciation is crucial to listening, and the major problem in learning pronunciation and intonation is that students have great difficulty in “hearing and identifying pronunciation and intonation the different patterns and of rising and falling tones” (Harmer, 2001: 370). Pronunciation and intonation perception involve not only cognitive (Fraser, 2001), but also perceptual (Flege, 1995; Kuhl & Iverson, 1995) and psychomotor abilities (Leather & James, 1991) of the non-native learners. Therefore, pronunciation and intonation perception is extremely difficult without explicit instruction on nuclear stress in vocabulary items.

### 1.1. *Suprasegmental background of word stress*

Word stress, as an element of suprasegmental structure, is a universal phonological dimension that varies across languages. In some languages, stress position may vary within the word and this variation is as lexically contrastive as in English. English is a stress-timed language, most words have stable lexical stress patterns and it is often easy to tell which syllables have stress. In other languages, like Turkish, French, Hungarian, and Polish, stress position is not generally fixed due to the fact lexical stress has been shown to be highly language-dependent. “However, despite highlighting the importance of suprasegmentals for communication, communicative proponents have typically failed to equip teachers adequately with strategies for teaching pronunciation in a communicative way, with most materials far from presenting pronunciation in a truly communicative and holistic manner” (Mompean & Fouz-González, 2016:166; Gilbert, 2010).

Nuclear Stress, also called nucleus or tonic stress, is the main stress in the pronunciation and intonation of words, requiring the use of extra muscular and respiratory energy during the articulation of the syllable which receives, due to certain reasons, more emphasis than surrounding syllables. The related syllable gains extra prominence with respect to neighboring syllables as a result of the primary stress it receives. English intonation and stress draws attention to native uses of these pronunciation features, who will be the likely listeners to (and judges of) learners’ pronunciation. That’s why Pennington (1996:253) advises teachers to pay attention to stress and intonation as examples of “general characteristics and overall voice quality which obstructs the intelligibility or make the accent sound especially non-native, i.e. non-English or non-standard.” Inappropriate stress in intonation created by non-native speakers can give rise both to misunderstanding message and create an unintended reception of the message in communication. All it boils down to, for both native and non-native listeners alike, is that misplacement of nuclear stress can get quite a different message. That is partly why nuclear stress placement is a very important aspect of intonation features in the *Lingua Franca Core*.

In English, the syllables in a word or group of words are not uttered with equal force due to tonic stress. Tonic stress refers to the syllable in a word that receives the primary stress in a intonation unit, like phrases and clauses. The tonic syllable is the most prominent, with primary stressed syllables in a word or word groups. A tonic syllable is always centered on a full primary-stressed vowel. Other stressed syllables may sound less prominent and may be interpreted as secondary, tertiary, and weak stresses. Every intonational phrase carries a ‘tonic’ syllable which sounds as one most prominent syllable of the phrase or clause. In Turkish, French, Polish, or Italian, the tonic syllable is always the last one. In English, the nuclear stress rule indicates that “stress is assigned to the rightmost stressable vowel in a major constituent (Chomsky and Halle, 1968).” Similarly, Cruttenden (1997), Spencer (1996), Katamba (1989), and Halle and Vergnaud (1987) confirmed that the Nuclear Stress Rule favors the rightmost constituents of a phrase in general. This rule seems to be the main stumbling block for English as a *Lingua Franca*

(ELF). Being the most audible and noticeable parts in utterances, it helps to identify the new information, emphatic information, contrastive knowledge in words, phrases, and clauses. “However, it is nuclear placement itself which causes the most serious problems at the productive level” to learners (Jenkins, 2000: 46). Similarly, O’ Conner (2006: 91) asserts very emphatically, “If you stress the wrong syllable, it spoils the shape of the word for an English hearer and he may have difficulty in recognizing the word.”

### 1.2. The determination of lexical stress

According to Rivers (1992: 243), “listening involves active cognitive processing the construction of a message from phonic material as aural reception”. “The perception of word stress depends heavily on listening skill. In fact, the determination of lexical stress in words and word groups has always been a serious problem in English for non-native teachers and teacher trainees. Word groups, sometimes called thought groups, have tone units that are short segments of speech which feature one prominent or dominant syllable. According to Brazil (1994: 3), “An appreciation that speaking involves one in adding tone unit to tone unit as one proceeds, not, as one tends to think, word to word, is an important part of the awareness on which its successful use depends.” Every phrase has a ‘tonic syllable’ which happens to be the most prominent syllable of that phrase, and which is always centered on a full primary-stressed vowel. Other stressed syllables may sound less prominent and may be interpreted respectively as secondary, tertiary, and weak stresses. At the phrase and sentence levels, tone units gain the name of intonation contours with a label called intonation contours.

In English, an important acoustic cue in word or word group recognition and retrieval is the placement of primary stress in words, phrases, and clauses. Correct word identification indicates that incorrect stress placement in spoken utterances interfere with L2 intelligibility. Misplaced word stress is more detrimental and damaging to intelligibility and accuracy. This is because primary stress in the suprasegmental structures of words English is not fixed to a given position. English allows “free stress placement within the intonation group to an extent that other languages do not” (Creider, 1979). That’s why in some words the first syllable is stressed, in other words the second syllable is stressed, as heard in the following words in which the primary stresses are noted with a raised bar before the stressed syllable in the following examples:

**absent** [ˈæbsənt] → **absentee** [æbsənˈti:]  
**Canada** [ˈkænədə] → **Canadian** [kəˈneɪdi:ən]  
**denote** [dɪˈnoʊt] → **denotation** [ˌdiːnoʊˈteɪʃən]  
**Japan** [ˌdʒəˈpæn/ → **Japanese** [ˌdʒæpəˈniːz/  
**partial** [ˈpɑːʃəl] → **partiality** [ˌpɑːʃiːˈæləDi]

Stress placement in English is phonemic and “mobile” (Yavaş, 2015: 180-181); Demirezen (2012a, 2012b; Rogerson-Revell, 2011; Kenworthy, 1987) and its perception becomes more difficult in polysyllabic words. The stressed syllable or syllables can vary depending on the structure and function of a word. Obviously, there are stress placement rules in English, but they are rather complex, therefore, the prediction of the place of stress phonemes can be very difficult for second language learners:

**audio** [ˈɑːdiːoʊ] → **audition** [əˈdɪʃən] → **auditorium** [ˌɑːdɪˈtɔːri:əm]  
**aristocrat** [ˈæːnɪstəkɹæt] - **aristocracy** [æːnɪsˈtɑːkɹəsi] - **aristocratic** [æːnɪstəˈkɹæDɪk]  
**authorize** [ˈɔθəraɪz] (v) - **authority** [əˈθɔːrɪDɪti] (n) - **authoritarian** [əθɔːrəˈteɪri:ən] (n)  
**confident** [ˈkɒnfədənt] (adj) - **confidential** [ˌkɒnfəˈdɛnʃəl] - **confidentiality** [ˌkɒnfədɛnʃiˈæləDi]  
**equalize** [ˈiːkwəˌlaɪz] - **equality** [ɪˈkwələDi] - **equilibrium** [ˌiːkwəˈlɪbri:əm]  
**human** [ˈhju:mən] - **humanity** [hjuːˈmænəDi] - **humanitarian** [hjuːˈmænəˈteɪri:ən]  
**parliament** [ˈpɑːləmənt] → **parliamentary** [pɑːləˈmentɪ] → **parliamentarian** [ˌpɑːləməˈnɪˈteɪri:ən]  
**democrat** /ˈdɛməˌkɹæt/ → **democracy** /dɛˈmɑːkɹəsi/ - **democratic** /ˌdɛməˈkɹæDɪk/ → **democratization** /dɪmɑːkɹətəˈzeɪʃən/

Nuclear stress, then, refers to the syllable in a word which receives the primary stress in an word; it must be remembered that phrases and clauses can have more than one thought group or intonation unit, therefore they can have more than one tonic stress. For example, according to Cruttenden (1997) “primary stress is assigned on the second element of phrases”, as seen in *black dréss*, *old scrípt*, and *grass hát*. You can change the stress from the principal noun to another content word such as an adjective (big, difficult, etc.), intensifier (very, extremely, etc.). This emphasis calls attention to the extraordinary nature of what you want to emphasize. According to Honbolygo & Csépe (2012), Kijak (2009), Tremblay (2009), and Friederici, Friedrich & Christophe (2007), and Fraser, 2010) this is “a phonological characteristic (saved in the mental dictionary) and can serve a contrastive function to help distinguish between semantically distinct words”.

In terms of perception, the term “intelligibility refers to the listener’s ability to rightfully identify or recognize words or utterances in terms of the place of stress” (Hustad, 2012; Kirkpatrick, Deterding & Wong, 2008; Zielinski, 2008; Field, 2005; Jenkins, 2000, 2002). This perception ability is influenced by many factors. A certain degree of intelligibility may be lost due to “listeners’ applying their L1 speech processing strategies, to a speech signal that contains features that are non - standard in terms of English phonology” (Tyler & Cutler, 2009; Zielinski, 2008, Field, 2005; Munro, 2008). The placement of word stress also gives rise to other phonetic and phonological processes that can cause shifts in the phonetic quality of segmental and suprasegmental shift in the stressed and/or unstressed syllables. For example, in English, stressing one syllable is accompanied by vowel reduction in one or more surrounding syllables (Demirezen, 2012: 112-123; Demirezen, 2010: 1567-1571). Mackay, 1987; Ladefoged, 1975) (e.g. **ph**otograph [ˈfɒ:təgræf] vs photographer [fəˈtɒgrəfə] vs photographic [fɒ:təˈgræfɪk]). Intelligibility of words and their pronunciation is much more impaired if such shifts of primary stress movements are not recognized. From a pedagogical perspective, perception of how these specific features of mis-pronunciation caused by mis-stressing pertaining to tonic stress, contribute to the intelligibility of English L2 in words or word groups can provide valuable information to those testing, learning and teaching second languages (Derwing & Munro, 2005). Murphy & Kandil (2004: 61–74) analyzed the word-level stress patterns in the academic word lists and reported several problems on the issue of Word-level stress patterns in relation to mobility of stress. What this means in practice is that any word, regardless of its syntactic position, can be given nuclear stress if it is the stress which the speaker wishes to make the focus of his or her message (Jenkins, 2000:46).

Roach (2013), Cruttenden (1997), and Demirezen (2012a, 2012b) remarked that in English both the number of syllables contained in words and particular suffixes and prefixes affected the placement of stress are responsible for the position of stress. The misplacement of the nuclear stress is mostly phonologically L1-driven for Turkish English teachers and trainees. In addition, nuclear stress misplacement is influenced by the mobility of stress feature in English; it denotes that there is no fixed place for stress in English language. In addition, prefixes like {con-, dis-, ex-, in-}, and suffixes like {-ion, -ual, -ial, -ient, -IOUs, -ior, -IC, -ity} lure the place of the primary stress to the preceding syllable.

Stress is placed on the last syllable in case of most words with following endings: {-ette}: cigarette, {-oon}: cartoon, {-oo}: shampoo, {-ique}: technique, {-eer}: engineer, {-ee}: refugee, {-esque}: picturesque, {-ain}: entertain.

## 2. Theoretical Background

In the field of TESOL, EFL and ESL most research has been conducted on the specification of primary stress in words or word groups. For example, Dewing & Munro (2005) denoted that nuclear stress placement in the utterances by non-native teachers are influenced by L1. Field (2005) indicated that lexical stress has played a crucial role in the intelligibility of vocabulary items and word groups uttered by non-native teachers. Similarly, Johnson (2013: 207) stated that “putting the stress on the nucleus is very important for intelligibility, and learners are not always very good at it”. Lesage and Bus (2014: 377-400) diagnosed the same problem in the speech of French and Italian learners of English, and stated that intelligibility of English as L2 is dependent on the effects of incorrect word stress placement which is increased by incorrect vowel reduction; thus, this is a common problem due to linguistic typology.

In the field of teacher training in Turkey, research on the learning of nuclear stress is limited. Aslant (2013: 268-279) has handled lexical stress patterns and pointed out that Turkish English pre-service language teachers

lacked substantial knowledge as to the placement of lexical stress, exhibiting serious problems on intelligibility and acquisition of lexical stress patterns which need to be developed, but they have attained a high level of stress placement competency in words which had been provided with ample practice in remedial teaching in the articles of many writers. Hismanoglu (2012: 639 - 645) analyzed the phonological awareness of prospective EFL teachers and remarked that they lacked a deep-seated rate of awareness on word and word group stress patterns. Demirezen (2012b) has demonstrated, using a computer application, the problems of lexical stress perception in the pronunciation Turkish English teachers and teacher trainees; most were - misperceiving primary stress in words or word groups. Again, in word groups or at the simple sentence level, Demirezen (2014:1115-1121) has discovered that 77% of the first year Turkish students majoring in English as a foreign language have problems in perceiving the placement of the primary stress in extended simple sentences.

As opposed to research on non-native learners, the effect of correct word stress placement by L2 learners on native speaker's recognition of the produced words has been the subject of most phonological research. For example, Slowiaczek (1990) used *shadowing task* in order to prove the influence of word stress on native speakers' meaning processing. In an experiment, native speakers of English were exposed to words which were pronounced both with correct and incorrect stress. Then, the native speaker subjects were asked to repeat the words they heard immediately. The results of the study indicated that incorrect placement of word stress negatively influenced native speakers' analysis of received words. Similarly, Aitchison (1994) discovered that English native speakers, while listening to speech, tended to pay more attention to stressed syllables than to unstressed syllables, which shows that wrong stress placement greatly influences native speakers' perception of speech.

### 3. Methodology

In this study, learners' perception of nuclear stress placement in vocabulary items was explored.

#### 3.1. Participants

Participants were 42 Turkish freshmen studying English who were studying in the Department of English Language Education in the Faculty of Education at Hacettepe University in the year of 2015. 10 of them were males, and 32 of them were females. They were a homogenous group who graduated from Anatolian High Schools and Anatolian Teachers' High Schools. Their ages ranged from 18 to 19. The study focused on both perception and production, seeing them as equally important. They studied broad and narrow transcription in the course titled İDÖ 175 Listening and Production I (İDÖ 175 Dinleme ve Sesletim I).

A list of 15, randomly chosen (potentially problematic) vocabulary items were taken from the *Longman Dictionary of American English* (2008) by the researcher. A committee of three experts approved these 15 words for the study. The audio forms of these words were used as stimuli in the administration of a pre-test and post-test in a soundproof foreign language teaching lab. No headphones were used. Some of the vocabulary items had two syllables, some had three syllables, and many of them were polysyllabic.

In the pre-test, the audio-listening of vocabulary items was used as stimuli. In order to create a pre-test, each vocabulary item was assigned with five distracters in a multiple choice test, and each distracter word had a syllable with capital letters to mean that that syllable carried the nuclear stress. Each of the five alternatives of the pre-test was given via representation technique to the participants who saw the alternatives on the page: this is what is meant by shadow listening in this research. Each vocabulary item was played three times with 5 second intermissions from the computer using the recorded voices of native speakers. They listened to word stress in inside two or three-syllabled or polysyllabic words each of which had only one dynamic, primary stress with in audio English listening exercises. They were asked to identify the primary stress in these words.

#### 3.2. Procedure

As a preliminary step, a pre-test was administered to participants, who listened to 15 questions from the voices of native speakers. Students saw the words with their spelled forms and at the same time they heard the pronunciation of them with a primary stress on one of the syllables as shadow listening. Nuclear stress-related familiar words were



#### 4.2. RQ 2: Is there a significant difference between the students' pre-test and post-test rates of overall success?

Table 2: The Difference between Students' Pre-test and Post-test Scores

	N	M	SD	df	t	p
Pre-test	42	2.62	1.53	41	11.462	.000
Post-test	42	7.86	2.48			

A paired-samples t-test was performed to explore whether there was a significant difference between the students' pre-test and post-test rates of overall success. The paired-samples t-test revealed a statistically significant difference between the students' overall success in the pre-test and post-test,  $t(41)=11.462$ ,  $p<.05$ . Students' overall success in the post-test ( $M = 7.86$ ) was significantly higher than their overall success in the pre-test ( $M = 2.62$ ).

#### 4.3. RQ 3: What is the order of learning difficulty of vocabulary items in the pre-test?

Table 3: The order of learning difficulty in the pre-test

Order	Words	N	M	SD	%
1	fallibility	42	.02	.154	2.4
2	melodious	42	.05	.216	4.8
3	popularity	42	.05	.216	4.8
4	futuristic	42	.12	.328	11.9
5	obligatory	42	.12	.328	11.9
6	geographical	42	.14	.354	14.3
7	gymnasium	42	.14	.354	14.3
8	idealistic	42	.19	.397	19
9	managerial	42	.19	.397	19
10	negotiation	42	.21	.415	21.4
11	homogenous	42	.21	.415	21.4
12	grammatical	42	.24	.431	23.8
13	justifiable	42	.29	.457	28.6
14	frequency	42	.31	.468	31
15	eligibility	42	.33	.477	33.3

The statistical analysis revealed that "fallibility" was the most difficult word for learners in the pre-test (2.4%). Descriptive statistics indicated the following order of difficulty from the most difficult word to the least: *fallibility*, *melodious*, *popularity*, *futuristic*, *obligatory*, *geographical*, *gymnasium*, *idealistic*, *managerial*, *negotiation*, *homogenous*, *grammatical*, *justifiable*, *frequency*, *eligibility*.

#### 4.4. RQ 4: What is the order of learning difficulty of vocabulary items in the post-test?

Table 4: The order of learning difficulty in the post-test?

Order	Words	N	M	SD	%
1	obligatory	42	.21	.415	21.4
2	frequency	42	.29	.457	28.6

3	eligibility	42	.29	.457	28.6
4	justifiable	42	.38	.492	38.1
5	fallibility	42	.38	.492	38.1
6	futuristic	42	.40	.497	40.5
7	negotiation	42	.45	.504	45.2
8	idealistic	42	.45	.504	45.2
9	popularity	42	.55	.504	54.8
10	melodious	42	.67	.477	66.7
11	geographical	42	.69	.468	69
12	managerial	42	.71	.457	71.4
13	homogenous	42	.76	.431	76.2
14	gymnasium	42	.79	.415	78.6
15	grammatical	42	.83	.377	83.3

The statistical analysis revealed that “obligatory” was the most difficult word for learners in the post-test (21.4%). Descriptive statistics provided the following order of difficulty from the most difficult word to the least: *obligatory, frequency, eligibility, justifiable, fallibility, futuristic, negotiation, idealistic, popularity, and melodious, geographical, managerial, homogenous, gymnasium, grammatical.*

#### 4.5. RQ 5: Do they need a treatment?

Since the passing grade is 65 out of 100, there is a need for further training on the perception of nuclear stress. Listening fluency can be developed with the help of digital recorders, with a variable speed control or a playback program with speed control such as the Windows Flash, listening to authentic English on TV channels and radio programs. Repeated listening via electronic dictionaries can additionally provide quantity of practice as deliberate learning activities.

## 5. Conclusion

The current study aimed to explore the usefulness of *applying the nuclear stress studies* for the teaching and learning of English pronunciation and intonation in teacher training. Vocabulary instruction through listening emphasizes correct pronunciation of the vocabulary items. The target stress recognition and pronunciation aspects in this study were considered problematic due to students’ perceptual or articulatory capacities. In doing so, a pretest was administrated to the participants via representation technique. A three-hour teaching practice was conducted in class by means of representation technique, controlled practice, and phonological transcription on hundreds of English vocabulary items by the help of electronic speaking dictionaries. The same pre-test was administrated to the participants after 15 days as a post-test. While overall rate of success was 17.47% in the pre-test, it increased to 52.4% in the post-test, which means that the participants require more training to perceive word stress. The perception of nuclear stress happens to be a fairly challenging matter for students. It is as if they have some kind of “stress-deafness” (Dupoux et al., 2008, 2010; Peperkamp et al., 2010) towards target language word stress patterns. Participants could not properly perceive the manipulation and shift stress in syllables within the words of the corpus. Thus, the results of this paper pointed to the fact that the perception of **nuclear stress** placement in English vocabulary items has important implications for Turkish speaking prospective students as well as English teachers in Turkey.

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