

Quantity vs. Quality

A Competence-Performance Study of Tertiary Stress for Egyptian EFL Learners

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Abstract

The aim of the present paper is to investigate the relationship between perception and production of tertiary stress, a field that has not received enough attention. Perception and production are in many cases distanced from each other. The precedence of perception over production does not receive its due attention from instructors or learners. More specifically, the paper aims to explore the level of acquisition of tertiary stress by Egyptian junior, senior and MA EFL learners in five faculties in three universities. It explores the relationship between competence in and performance of English as an FL. Poor exposure of Egyptian students to English as an FL hinders good acquisition in a formal instruction class. The implication of the study is that the students should receive specific training so that they can perceive tertiary stress. The study has been carried out through a pre/post-test design including various levels of instruction that have been used to collect the data of the study and exposure to native speaker recordings of the test material.

Key Words: perception / production / acquisition/ performance / competence / primary stress / secondary stress / tertiary stress / ultimate / penultimate / antepenultimate / left alignment / right alignment

1. Introduction

The present study investigates the phonological relationship between perception and production of stress in general, and of tertiary stress in particular, the latter being a field that has not been sufficiently investigated. Hale and Reiss (2008: 1180) regard phonology as a discipline of language that focuses on studying "the underlying, phonemic representations and the phonological computation system". This computation system is pivotal in the acquisition and production of speech. According to Hansen (2006: 28), the acquisition of L² requires the "learners' engagement in meaningful communication."

Before exploring the acquisition of tertiary stress by Egyptian EFL learners, it is most fitting to discuss briefly the background of the topic in the five following points (i) controversy over the definition of stress, (ii) its degrees, (iii) its significance, (iv) its placement unpredictability, and (v) its perception.

1.1. Stress: Definitions

Stetson (1951: 67) defines stress in terms of its effect on the syllable: "stress affects the factors of the syllable on which it falls" by modifying the quality of the vowel and increasing the intensity of the syllable and the duration of the consonants. Bolinger (1958: 149) remarks that the term "stress" should be limited to "the domain of word stress". Thus, it should be used to refer to the prominence of a particular syllable in the word. According to Fry (1960: 80), it comprises both "the total effort that the speaker puts into uttering" a given string of words or syllables, and "the amount of effort he himself would have put into the utterance". Robins (1964: 108-9) adds that stress "is a generic term for the relatively greater force exerted in the articulation of part of an utterance". Abercrombie (1967: 35) relates it to loudness: "a stress pulse usually has the effect of producing a louder sounding syllable". Crystal (1969: 156) views stress as encompassing the "variations in ... contrastive prominence" that are "due to loudness"; it is "the degree of force used in pronouncing a syllable" Crystal (1985: 288). Gimson (1973: 95) assumes that it "has been linked with the prominent or more perceptible segments of an utterance". O'Connor (1973: 194-5) highlights its auditory standpoint, stating that loudness is "the auditory correlate of stress" since "the stressed syllables tend to sound louder than the unstressed" though the part played by stress in loudness "is not enough to make the sort of sound difference" that is "perceived and used in language". Jones (1975: 909) describes it "as the degree of force with which a sound or a syllable is uttered". Roach (2002:73-74) assumes that stressed syllables are "produced with greater effort than unstressed," and that "the term accent" refers to "some of the manifestations of stress (particularly pitch prominence)". McMahan (2002: 118) states that it is distinguished from its environment by (i) "higher fundamental frequency," (ii) greater "duration," and (iii) "greater intensity".

This plethora of definitions leads us to conclude that phoneticians know what stress is, but cannot give an all-inclusive definition that encompasses all its causes and effects. The controversy over the definition of stress results in another controversy, the one over its degrees.

1.2. Degrees of Stress

Jespersen (1933: 651) argues that there are four degrees of stress: strong, half-strong, half-weak, and weak. These four degrees are later given the labels primary, secondary, tertiary, and weak in Targher et.al. (1951: 35). Chomsky and Halle (1968: 15) complain that English "has complex prosodic contours involving many levels of stress and pitch",

while Backley and Nasukawa (2009: 49) argue that these complex contours govern "phonological strength," which is "characterised in both melodic and prosodic terms". Roach (1991: 87) favors a three-degree system as a hearer "can observe a type of stress that is weaker than tonic strong stress but stronger than that of the first syllable of around". Such differences over the degrees of stress lay a great deal of importance on its significance in word recognition and shape.

1.3 Significance of Stress

O'Conner (1973: 194) confirms that stress in English is an "essential part of word-shape," adding that "words easily become unrecognizable if the stress is wrongly placed". Quoting the words photograph and photography to exemplify for the vocalic changes that take place under derivation, O'Conner (1973: 252-3) argues that differences in stress are "accompanied by differences of phoneme selections". This is further emphasized when we derive the adjective photographic from photograph. Brown (1977: 48) states that "it is difficult to interpret an utterance in which a word is pronounced with the wrong stress pattern". Roach (1991: 91), "unintelligibility problems for foreign learners" can result from "incorrect stress placement," which "is therefore a subject that needs to be treated very seriously". However, stress which is significant in word shape and recognition, is also often unpredictable.

1.4 Unpredictability of Stress Placement

It is difficult for EFL learners to learn stress placement. The prediction of stress in English is a far-fetched goal. Robins (ibid: 288) asserts that English is one of the languages that "have a 'free' or 'movable' stress". Thus, the position of stress in English "may vary from word to word" (Robins, ibid: 109). Bolinger (1964: 285) adds that "English has really no predictable placement of stress. It must be learned from word to word". The difficulty here is ascribable to the disparity between the spelling and the pronunciation of vowels, the complexity of consonant clusters, among others. O'Connor (1973: 233-4) explains that "English stress is free in the sense that one cannot predict simply from knowing the number of syllables in a word which syllable the stress will fall on". O'Conner (1973: 90-91) asserts that "every English word has a definite place for the stress," and that stress in English is unpredictable: "there is no simple way of knowing which syllable or syllables in an English word must be stressed." Gimson (1980: 221) emphasizes the unpredictability of English stress: "the accentual pattern of English words" is both fixed and free. It is "fixed in the sense that the main accent always falls on a particular syllable of any given word, but free in the sense that the main accent is

not tied to any particular situation in the chain of syllables constituting a word." O'Conner (1973: 91) recommends that "every time you learn another word you must be sure to learn how it is stressed". According to Ladefoged (1982: 224), English has a "variable word stress", and Roach (1991: 91) remarks that stress is "not predictable by rule and must be learned word by word". Bermudez-Otero et. al. (2006: 5-6) state that "the ... permissiveness of English word-level phonology [is] a historical accident," since in OE "primary stress was assigned by aligning a moraic trochee with the left edge."

The unpredictability of stress lays a heavy burden on both instructor and learner; they have to perceive it before attempting to produce it.

1.5 Perception of Stress

The perception of stress in general, and of primary stress in particular, is associated with many factors or correlates. The first factor is **quantity** (Fry, *ibid*: 423; Lehiste, *ibid*: 126; Stetson, *ibid*: 67; Allen, 1973: 81). This probably accounts for the tendency for Arab learners to stress the ultimate syllable in trisyllabic words with long or diphthongal vowels. The second factor is **loudness** for the hearer (Lehiste, *ibid*: 117, 146; Crystal, 1969: 115). The third factor is **vowel quality** (Crystal, 1969:282; Gimson, 1980: 223-4; Chomsky and Halle, *ibid*: 59), something that the Arab learners find difficult to perceive. The fourth factor is **pitch** (Gimson, 1980: 27; Bolinger, 1958, 149; Crystal, 1969: 118-9), which does not seem to have an equivalent referent in Arabic phonology.

Gimson (1980: 222-6) argues that stress is not the only factor that makes a syllable more prominent than the neighboring ones; pitch and quality are no less important. Long vowels and diphthongs are "associated with prominence, especially by the listener," no matter how "weakly stressed by the speaker they may be". Roach (1991: 85-6) views stress from two equally important angles: production and perception; the former depends on the amount of "muscular energy" exerted by the speaker on a certain syllable, while the latter measures how much that syllable is prominent for the hearer. Prominence requires at least two of the following "four main factors: (i) loudness, (ii) length, (iii) pitch and (iv) quality," with pitch and length being more important. Clark and Yallop (1995: 348-57) argue that vowel change is regarded as the feature that characterizes stress shift. Roach (2002: 73) assumes that "stress produce[s] in turn various audible results," which include (i) "pitch prominence, in which the stressed syllable stands out from its context, and (ii) comparative length, since "stressed syllables tend to be longer"

and "louder than unstressed" ones. Major (2008: 75) argues that perception of L² singularities is not easy to achieve because this "perception is governed" by the learner's L¹ features. Learners often transfer their "L1 perceptual systems when hearing the L²s."

Thus, research has proved that there is some relationship between vowel length and stress. The longer the vowel, the more acoustic energy it has, and the more stress it seems to receive. Perception of stress by the hearer depends on how much prominence, muscular energy and pitch the speaker puts on the syllable. The syllable, thus stressed, represents a peak prominence that can be felt by the hearer.

2. Method and Procedure

This research studies the morphological and phonological features and the difficulties involved in the transcription / pronunciation of a corpus consisting of 84 English words containing tertiary stress. It is based on five tests conducted in three stages. The first stage includes a preliminary, diagnostic written test, accompanied by the first tape-recorded test, conducted on the same day at the beginning of the semester. The second stage is a written post-test, accompanied by the second tape-recorded test. Both tests were conducted consecutively on one and the same day, six weeks after the diagnostic tests. This stage was conducted after the informants had had enough oral instruction and written exercises on the subject. The third stage is a third tape-recorded test conducted two weeks after the second stage and after sufficient oral practice, aided by a tape-recorded reading of the test items by two native speakers of English working for Cairo British Council.

The transcriptions provided by the learners were judged by a three-party group of staff-members according to the IPA transcription system which is used in the tests and the instruction sessions in which they received their instruction in the various listening, phonetics and phonology courses.

2.1. The Sample

The sample consists of the most distinguished 50 out of a total number of 1175 junior and senior students in five departments of English at five faculties in three Egyptian universities. The participants are described as follows:

Junior Students' Profile

University	Faculty	# Students	Sample F	Sample %
Mansoura	Arts, Junior	355	10	2.8
Zagazig	Primary Education	310	10	3.2
Zagazig	Education	290	10	3.4
Total Junior Students		955	30	3.1

Senior and MA Students' Profile

University	Faculty & Year	# Students	Sample F	Sample %
Al-Azhar	Tafahna-I-Ashraf Education, Senior	180	10	5.6
Zigzag	Specific Education, MA	40	10	25.0
Total Senior & MA Students		220	20	9.1
Total Junior, Senior & MA Students		1175	50	4.26

2.2. The Tests

The study has been carried out through a pre/post-test design including various levels of instruction that have been used to collect the data of the study and exposure to native speaker recordings of the test material.

The test-items consist of 84 trisyllabic words containing final tertiary stress. The total number of transcriptions provided is 4200 (84 words multiplied by 50 students). They are divided into two equal groups: 42 for the pre-tests and 42 for the post-tests. (Cf. Appendix A, and Appendix B)

In preparation for the pre-tests, the informants have received revision exercises for three weeks on the IPA consonant sounds, short and long vowels and closing and centering diphthongs. Then they were given preliminary exercises on stress and weak syllables. The diagnostic pre-test was then conducted in a two-hour session. The informants were asked to transcribe the items given and to mark the primary stress. The same process was followed in the written post-test six weeks later. Before the third tape-recorded test, the students were referred to the recordings of the

two native speakers from the British Council in Cairo. The purpose of the oral tape-recorded tests is to see how far the perception of prominence in these words can be reflected in the actual performance in the spoken as well as the written form. Inquiry into the nature of errors of junior, senior, and MA learners can help EFL Egyptian instructors diagnose the symptoms of weakness, design remedial material for these errors, and suggest some corrective steps for the perception and production of tertiary stress.

The informants' performance in the pre-tests shows that the learners know very little about tertiary stress, whether as a concept (competence) or as a practical process of production (performance). The material for analysis in the five tests is expected to be fairly sufficient for evaluating the performance of the informants, deducing implications and drawing prospective results and findings.

The two recordings of the test-items by the British native speakers of English were meant to enhance the practical aspects of tertiary stress as an act of performance that complements the competence side. The informants were asked to repeat the tape-recordings in the light of the practice they had of the native speakers' model.

2.3. The Research Questions

The research questions are as follows:

1. How do the informants perform in the transcription/ pronunciation of tertiary stress in the written and the tape-recorded pre-tests?
2. What is the difference in their performance between the first, the second and the third tape-recorded tests in terms of the prosodic and/or phonological structure of the word?
3. Do the informants allocate primary stress to the ultimate syllable with the long vowel or with qualitative short vowel while being tempted to allocate secondary stress to antepenultimate syllable particularly when the vowel in question is long?
4. Is the informants' performance related to their level of study? In other words, is performance hierarchical, i.e., best in the MA level and worst in the junior level?
5. Does the suffixation of past-tense -ed to the tri-syllabic words make syllable more weighty for the informants?
6. What is the relationship between the informants' errors and their L¹, i.e., Arabic?

2.3. Analysis and Discussion

The test items under scrutiny can be considered from two main standpoints: (i) the proportion of correct/wrong primary stress placement, and (ii) the introduction of word-initial secondary stress when the primary stress is right aligned.

2.3.1. Overall Performance

Table 1, along with its corresponding chart, shows the frequencies and percentages of the informants' performance in the four tests. The following abbreviations are used for the type of test: WrPre for the written pre-test, WrPst for the written post-test, RcPre for the first tape-recorded pre-test, and RcPst for the second tape-recorded test.

Table 1: Overall Performance

Stress		RcPre	WrPre	RcPst	WrPst	Total
1 st Syllable (Correct)	F	493	530	818	1949	3790
	%	23.5	25.2	39.0	92.8	45.1
2 nd Syllable (Wrong)	F	37	230	5	26	298
	%	1.8	11.0	0.2	1.2	3.6
3 rd Syllable (Wrong)	F	1570	1340	1277	125	4312
	%	74.8	63.8	60.8	6.0	51.3

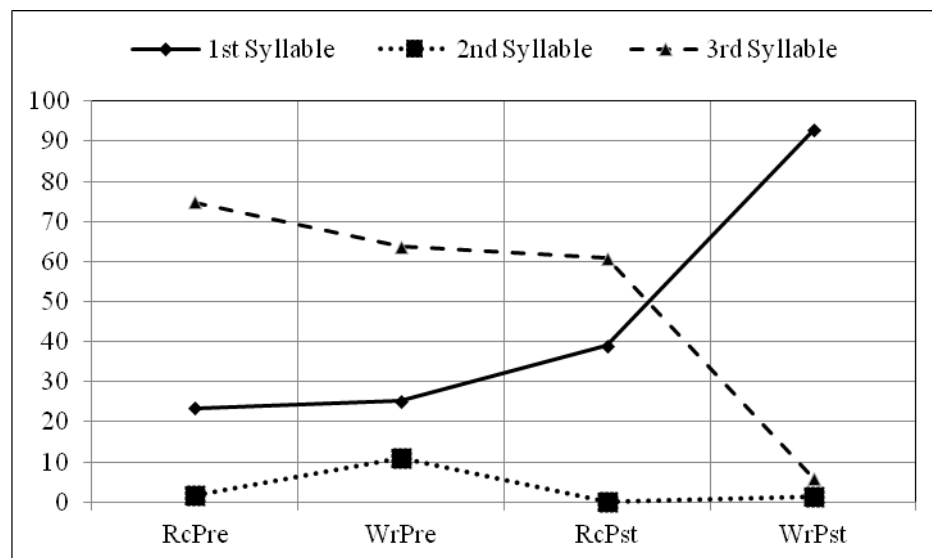


Figure 1: Chart of the Overall Performance

The overall performance in the four tests combined is 3790 (45.1%) correct transcriptions and pronunciations out of the total 8400 written and recorded items; it is reflected in various ways in the detailed

proportions of each test on its own. In the first place, the performance of the students in the WrPre (530= 25.2%) and the WrPst (1949= 92.8%) shows a significantly high response to the concept of the tertiary stress on the part of the students. In the RcPre and the RcPst, however, the improvement is not as significant as it is in the written tests. Thus, the frequencies of correct stress placement are 493 (23.5%) in the former, but 818 (39%) in the latter.

The proportions of oral performance reveal how much the informants need concentrated practice. The improvement in the RcPst shows how much it is difficult for them to perceive what stress is from a practical point of view, or what the different degrees of stress are. They can understand where the primary stress falls in the test items but cannot produce or perform them in the right way. The lack of direct contact with native speakers of English leaves its negative impact on their performance of such a suprasegmental feature as stress. Authentic drilling, aided by native-speaker recordings, is an indispensable means of enhancement.

The overall performance can be studied from various angles. The first is the different degrees of performance in the three groups of students belonging to the three levels of study.

2.3.2. Student Groups in the Written Tests

Table 2 below, along with its corresponding chart, provides the proportions of the informants' performance in the WrPre in the five faculties with a view to measuring their knowledge of tertiary stress. A fourth column is added to the rightmost side of the table to provide the proportions of the cases in which the informants inserted antepenultimate secondary stress to the items where they wrongly placed ultimate primary stress on the syllable that they regarded as weightiest.

Table 2: Student Groups in the Written Pre-Test

Faculty & University	Antepenult		Penultimate		Ultimate		Secondary Stress	
	F	%	F	%	F	%	F	%
Junior	240	19.1	146	11.6	874	69.4	590	46.8
Senior	163	38.8	36	8.6	221	52.6	162	38.6
MA	127	30.2	48	11.4	245	58.3	189	45.0
Total	530	25.2	230	11.0	1340	63.8	941	44.8

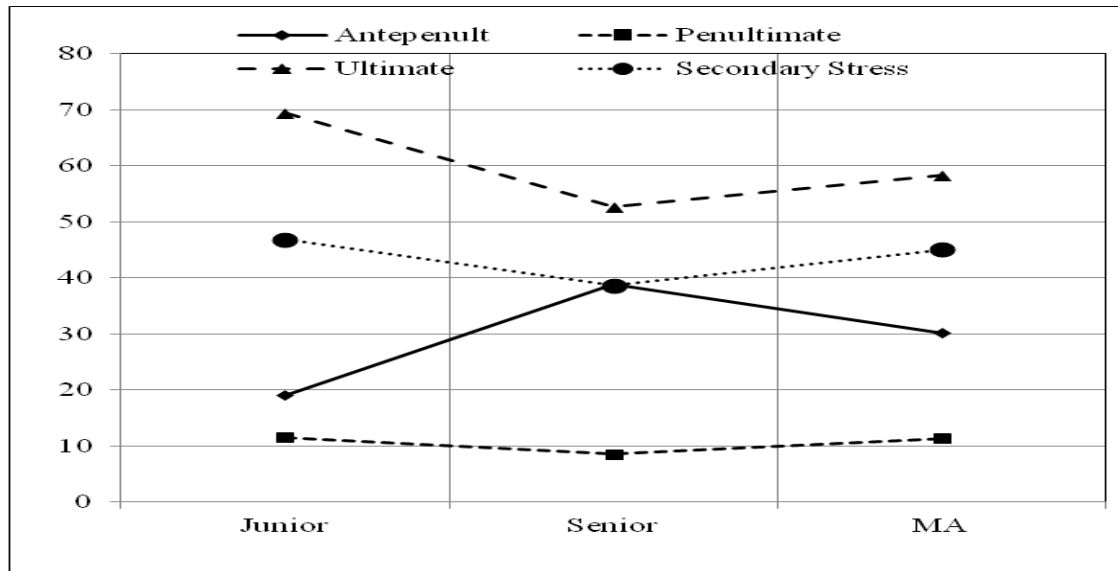


Figure 2: Chart of proportions of informants' performance in the WrPre

The proportions in the table and the continuous line in the chart show that the lowest performance in the WrPre ranges from 19.1 for the junior group up to 38.8 for the senior group, with the MA group falling in between: 30.2%. The informants' knowledge of tertiary stress is quite poor. The proportions of ultimate primary stress are represented by the heavy broken line in the top of the chart. This vast majority reflects the fact that stress for Egyptian EFL learners seems to work on a quantitative rather than a qualitative basis. Those with penultimate primary stress are represented by the medium broken line in the bottom of the chart. They are quite a minority. The rightmost, new column in the table is represented by the light broken line in the middle of the chart.

The relationship between the high proportions ultimate primary stress and the insertion of antepenultimate secondary stress is reflected in the parallelism between the heavy and the light broken lines in the chart. The insertion of antepenultimate secondary stress shows the negative effect of the wrong practice of stress right alignment, which goes against the process of left alignment in English.

Table 3, along with its corresponding chart, provides the proportions of the informants' performance in the WrPst with a view to discovering which groups improve, which do not, and how much improvement there is, if any. It shows that the highest performance in WrPst range from 97.9% for the junior group down to 74.8% for the senior group, with the MA groups in between: 95.7%. The proportions of

the ultimate primary stress represent no majority at all, unlike what we have seen in the WrPre, which reflects the informants' ability to comprehend what it graphically means not to allot the primary stress on the basis of quantity.

Table 3: Student Groups in the Written Post-Test

Faculty & University	Antepenult		Penultimate		Ultimate		Secondary Stress	
	F	%	F	%	F	%	F	%
Junior	1233	97.9	13	1.0	14	1.1	17	1.3
MA	402	95.7	4	1.0	14	3.3	3	0.7
Senior	314	74.8	9	2.1	97	23.1	54	12.9
Total	1949	92.8	26	1.2	125	6.0	74	3.5

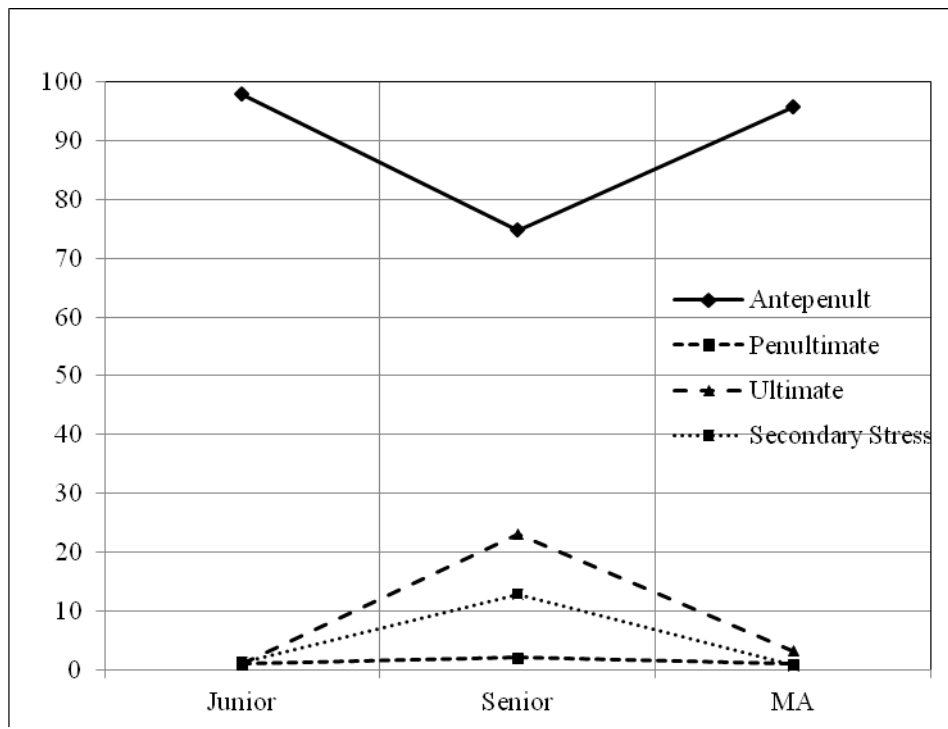


Figure 3: A Chart of the Proportions of the Informants' Group Performance in the WrPst

The relationship between the low proportions of ultimate stress and the insertion of antepenultimate secondary stress is reflected again in the relative parallelism between the heavy and the light broken lines in the chart. On the whole, the chart shows a striking difference that tells of a magnificent improvement in the WrPst in all the three groups. The senior group has the highest proportions of penultimate stress (23.1%) and also of antepenultimate secondary stress (12.9%).

The two continuous lines in the WrPre and WrPst charts above go different ways; the lowest group in the former table is the highest in the latter table and the highest the lowest. But correct judgment is still early since we now discuss written tests, which do not necessarily represent perception in the right sense of the word. At this stage the learners' knowledge of tertiary stress has improved in the WrPst on the graphological level; an improvement that decreases as we move on the chart from left to right. This judgment still needs further verification and support or rebuttal from the tape-recorded tests.

Tables 2 and 3 and their corresponding charts show that the informants' performance in the written tests is partially level-bound. It is relatively hierarchical: better in higher and worse in lower levels. In the WrPre, MA informants unexpectedly have a low proportion of correct stress placement, and in the WrPst junior informants have a high proportion of correct stress placement.

2.3.3. Student Groups in the Recorded Tests

Table 4 below provides the proportions of the informants' performance in the RcPre in the three groups. It shows that the MA student group is highest (44.5%), with the senior group falling next (27.4) and the junior group lowest (15.2). The higher the level, the better the performance. Table 5 below provides the proportions of the informants' performance in the RcPst in the three groups:

Table 4: Student Groups in the Recorded Pre-Test

Faculty & University	Antepenult		Penultimate		Ultimate	
	F	%	F	%	F	%
Junior	191	15.2	19	1.5	1050	83.3
Senior	115	27.4	6	1.4	299	71.2
MA	187	44.5	12	2.9	221	52.6
Total	493	23.48	37	1.29	1570	74.7
						6

Table 5 (for the RcPst) below shows that the MA student group is still highest (71.9%), with the senior group falling next (39.35) and the junior group lowest (27.9). As in the RcPre above, the informants' level of study also seems to matter: the higher the level, the better the performance. Thus, performance in the tape-recorded tests is clearly level-bound. Tables 4 and 5 prove this claim. It is almost perfectly hierarchical: better in higher and worse in lower levels. The improvement is at its best in the MA group (from 44.5 to 71.9%).

Table 5: Faculty Groups in the Recorded Post-Test

Faculty & University	Antepenult		Penultimate		Ultimate	
	F	%	F	%	F	%
Junior	351	27.9	5	0.4	904	71.7
Senior	165	39.3	0	0	255	60.7
MA	302	71.9	0	0	118	28.1
Total	818		5		1277	
%	38.95		0.24		60.8	

From the tables and charts provided above, we can generalize by saying that in the WrPre and the WrPst, the graphological improvement is striking, though this should not be taken as a true indicator for successful perception. We can also say that in the RcPre and the RcPst the improvement is much less than in the written tests, and that the two lines representing the tape-recorded tests proceed with some fair degree of parallelism, though the improvement in the MA group is great.

2.4. Ultimate Syllable Vowel in the Written Tests

The overall performance provided in 2.3.1 can be viewed from a different angle: the performance in the informants in the various types of ultimate syllable structure. We will discuss the pre-test first.

2.4.1. Ultimate Syllable Vowel in the WrPre

Table 6, with its corresponding chart, shows the statistics for the various degrees of achievement in the WrPre concerning the kind of vowel phoneme used in the tertiary-stress syllable of the test items.

Table 6: Ultimate Syllable Vowel in the WrPre

Word	Primary Stress						Secondary Stress	
	Antepenult		Penultimate		Ultimate			
	F	%	F	%	F	%	F	%
/eɪ /	83	15.1	40	7.3	427	77.7	333	60.5
/aɪ z/	108	19.6	58	10.5	384	69.8	232	42.2
Long Vowel	59	23.6	35	14.0	156	62.4	114	45.6
/aɪ /	184	36.8	64	12.8	252	50.4	179	35.8
/əʊ /or/ɪ ə/or Short Vowel	96	38.4	33	13.2	121	48.4	83	33.2
Total	53	25.2	23	11.0	1340	63.8	941	44.8

In table 6 and its corresponding chart, we can see how the groups of test items containing /eɪ /, /aɪ z/ or a long vowel in the ultimate syllable represent some difficulty for the informants. The performance in the items with a penultimate syllable containing the vowel /eɪ / is best

(15.1%), while that in the items with an ultimate syllable containing /ɪ ə/, /ʊ ə/ or a short vowel is worst.

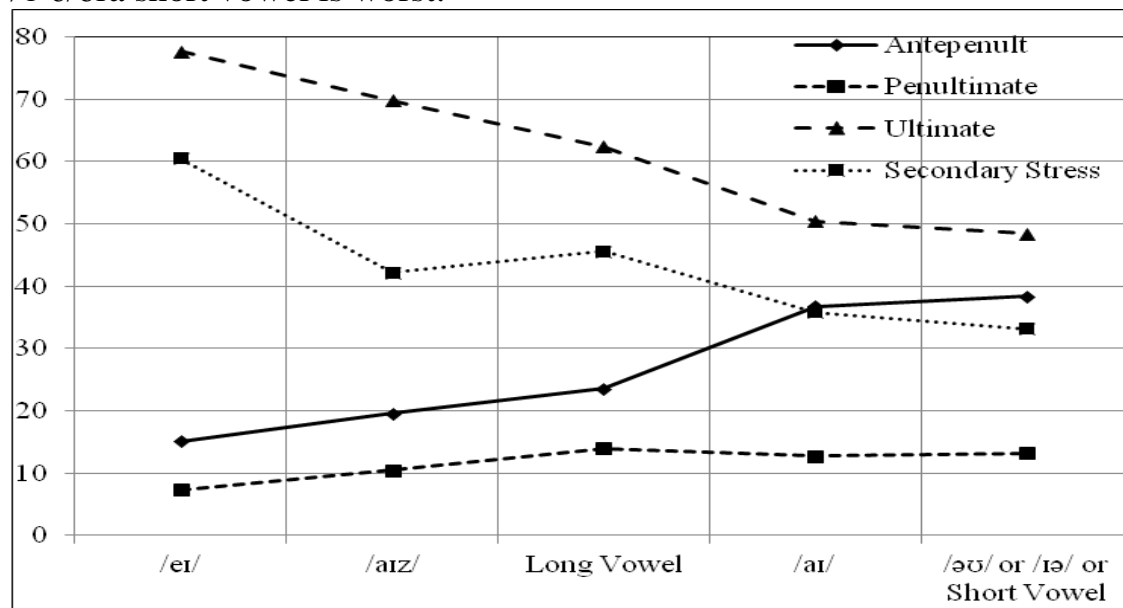


Figure 4: A Chart of the various degrees of achievement in the WrPre

Table 6a below shows the test items in the group containing /eɪ / in the penultimate syllable in a descending order of difficulty. The syllables that carry the tertiary stress but were wrongly given primary stress have the following structures: /veɪ /, /leɪ /, /streɪ /, /geɪ /, /teɪ / and /keɪ /. One common cause of difficulty is that all the above verbs are suffixed with the past tense morpheme [-ed], which has tipped the balance in favor of the wrong prominence of the penultimate over the correct one of the preantepenultimate syllable. Another common cause is the consonant cluster before or after the antepenultimate vowel. Thus, the following verbs are wrongly transcribed: captivated /, kæptɪ ' veɪ tɪ d/ as /kæp' tɪ veɪ tɪ d/, calculated /, kælkjə' leɪ tɪ d/ as /kæl' kju:leɪ tɪ d/, demonstrated /demən' streɪ tɪ d/ as /dɪ ' mɒnstreɪ tɪ d/, formulated /, fɔ :mjə' leɪ tɪ d/ as /fɔ ' mju:leɪ tɪ d/, conjugated /, kɒndʒ ə' geɪ tɪ d/ as /kən' dʒ ju:geɪ tɪ d/, activated /, æktɪ ' veɪ tɪ d/ as /æk' tɪ veɪ tɪ d/, copulated, kɒpjə' leɪ tɪ d/ as /kə' pju:leɪ tɪ d/, advocated /, ædvə' keɪ tɪ d/ as /əd' vɒkeɪ tɪ d/ and illustrated /, ɪ lə' streɪ tɪ d/ as /ɪ l' ʌ streɪ tɪ d/.

Table 6a. Written Pre-Test Penultimate /eɪ /

Word	Primary Stress			Secondary Stress
	Antepenult	Penultimate	Ultimate	
captivated	6	5	39	33
calculated	6	4	40	32
demonstrated	6	4	40	33
formulated	6	4	40	37
conjugated	7	5	38	35
annotated	8	5	37	26
activated	8	4	38	29
copulated	8	4	38	28
advocated	8	3	39	24
illustrated	8	1	41	32
Imitated	12	1	37	24

Table 6b below shows the test items containing /aɪ /+/z/ in the penultimate syllable in a descending order of difficulty.

The syllables that carry the tertiary stress but were given primary stress have the following structures: /saɪ z/, /naɪ z/, /daɪ z/, /laɪ z/, /maɪ z/ and /raɪ z/. The common cause of difficulty is that the coda /z/ in the morpheme /saɪ z/ seems to tip the balance in favor of the prominence of the wrong ultimate over that of the correct antepenultimate syllable. A less common cause is the consonant phoneme cluster in fantasize [wrongly transcribed /, fæntə' saɪ z/ and /fæn' tæsai z/], and the consonant letter cluster in harmonize [wrongly transcribed /, hæ :rmə' nai z/ and /hæ : ' rmp nai z/], jeopardize /, dʒ epə' dai z/ as /dʒ ɪ ' pɑ :rdai z/] and fossilize /, fɒ sə' laɪ z/ as /fɒ ' sɪ laɪ z/.

Table 6b. Written Pre-Test Ultimate /aɪ z/

Word	Primary Stress			Secondary Stress
	Antepenult	Penultimate	Ultimate	
fantasize	5	3	42	23
harmonize	6	9	35	26
feminize	9	1	40	22
jeopardize	10	9	31	30
agonize	10	8	32	15
localize	10	7	33	20
minimize	10	1	39	22
authorize	11	7	32	20
focalize	11	5	34	19
analyze	11	3	36	16
fossilize	15	5	30	19

Table 6c below shows the test items containing a long vowel in the ultimate syllable in a descending order of difficulty.

The syllables that carry the tertiary stress but were wrongly given primary stress have the following structures: /fɔ :m/, /tju:d/, /grɑ :f/ and, /tju:t/. The allocation of the stress to the ultimate syllable can be attributed both to the phoneme cluster in the onsets /tj/ and /gr/ in four out of five items and to the letter clusters [tt] and [nst] in the onset of the penultimate syllable in the items attitude and institute. The geminate [-tt-] seems to represent an instance of L¹ interference. The item uniform, however, includes another instance of L¹ interference: the coda consonant cluster [rm], at least in the viewpoint of the informants. This is due to the wrong pronunciation /, ju:nɪ 'fɔ :rm/ common among Egyptian students. So the onsets /tj/ and /gr/ and the coda [rm] in the ultimate syllable seem to tip the balance in favor of the prominence of the wrong ultimate over that of the correct antepenultimate syllable. L¹ interference is again traceable in the items photograph and paragraph, which are so frequently used that they have acquired the Arabicized phonological form with the stress aligned to the right of the word because the ultimate vowel is long.

Table 6c. Written Pre-Test Ultimate Long Vowel

Word	Primary Stress			Secondary Stress
	Antepenult	Penultimate	Ultimate	
uniform	9	1	40	22
attitude	12	18	20	14
photograph	12	-	38	25
institute	13	13	24	21
paragraph	13	3	34	32

Table 6d below shows the test items in the group containing /əʊ / or /ɪ ə/ or a short vowel in the ultimate syllable in a descending order of difficulty.

Table 6d. Written Pre-Test Ultimate /əʊ /, /ɪ ə/ or Short Vowel

Word	Primary Stress			Secondary Stress
	Antepenult	Penultimate	Ultimate	
stratosphere	15	10	25	26
telephone	20	2	28	19
habitat	19	4	27	18
acrobat	20	12	18	2
catalogue	22	5	23	18

The syllables that carry the tertiary stress but were wrongly given primary stress have the following structures: /sfɪ ə/ and /fəʊ n/. The difficulty can be attributed to the onset /sf/ in stratosphere and to the phonologically Arabicized form in telephone, which seem to tilt the balance of prominence towards the wrong ultimate rather than the correct antepenultimate syllable.

In the items with a short vowel in the ultimate syllable, we have the structures /tæt/, /lɒ g/, and /bæt/. The relatively better performance is ascribable to the fact that the onset of the syllable is mono-consonantal. The feature worthy of notice is that in habitat and acrobat, the vowel in the ultimate syllable seems to be longer than it actually is. This is due to L¹ interference. The same applies to the ultimate syllable in catalogue, where the orthographically weighty end [-ogue] and the Arabicized /, kætə' lɒ :g/ seem to draw the stress. These vowels seem equal to long vowels in Arabic. This presumed length is the cause of its choice for the primary stress.

Table 6e below shows the test items in the group containing /aɪ / in the ultimate syllable in a descending order of difficulty.

Table 6e. Written Pre-Test Ultimate /aɪ /

Word	Primary Stress			Secondary Stress
	Antepenult	Penultimate	Ultimate	
gratify	15	11	24	19
modify	17	6	27	17
pacify	17	5	28	19
stratify	18	8	24	16
versify	18	8	24	17
satisfy	18	6	26	18
edify	19	6	25	15
clarify	19	4	27	22
signify	21	5	24	17
justify	22	5	23	19

The syllables that carry the tertiary stress but were promoted to the degree of primary stress have the structure /faɪ /. The comparatively better performance is due to the fact that the onset of the syllable is mono-consonantal, and that the syllable is open-ended, since there is no coda. But we still have four cases of phoneme or letter cluster before or after the penultimate syllable, which may be behind some of the errors.

This is exemplified in satisfy (wrongly transcribed /, sætɪ ' sfar / and /sæ' tɪ sfar /), signify (wrongly transcribed /, sɪ gnɪ ' faɪ / as /sɪ g' nɪ faɪ /), justify (wrongly transcribed /, dʒ ʌ stɪ ' faɪ / as /dʒ ʌ ' stɪ faɪ /) and versify (wrongly transcribed /, vɜ :rsɪ ' faɪ / and /vɜ : ' rsɪ faɪ /). On the other hand, the initial phoneme cluster in stratify seems to produce 11 out of 50 cases with the stress on the penultimate syllable (/stræ' tɪ faɪ /), and to produce 8 out of 50 in gratify (/græ' tɪ faɪ /) as well.

Though on a lesser extent than in the previous groups, the diphthong still tilts the balance of prominence towards the wrong ultimate rather than the correct antepenultimate syllable.

To sum up, the syllables that carry the tertiary stress but were wrongly given primary stress have the following structures: /veɪ /, /leɪ /, /streɪ /, /geɪ /, /teɪ / and /keɪ / (when followed by [-ted] which includes the past tense morpheme [-ed]); /saɪ z/, /naɪ z/, /daɪ z/, /laɪ z/, /maɪ z/ and /raɪ z/; /fɔ :m/, /tju:d/, /grɑ :f/ and, /tju:t/; /sfɪ ə/ and /fəʊ n/; /faɪ /; and /tæt/, /lɒ g/, and /bæt/.

The common causes of difficulty in the written pre-test are (i) the long vowels and diphthongs that form the axiom of the ultimate syllable, (ii) the past tense [-ed] suffixed to the verbs ending in [-ate], (iii) the coda /z/ in the syllable /saɪ z/ when compared with the open-ended /faɪ /, (iv) the onset phoneme clusters /tj/, /gr/ and /sf/, (v) L¹ interference in the coda letter cluster [rm], (vi) L¹ interference in the vowels /æ/ and /ɒ/ (reduced as /ɔ :/ in telephone) in the ultimate syllable, and (vii) initial phoneme clusters seemingly producing penultimate stress.

2.4.2. Ultimate Syllable Vowel in the WrPst

Table 7 shows the various degrees of achievement in the written post-test concerning the kind of vowel used in the tertiary-stress syllable of the test items:

Table 7: Ultimate Syllable Vowel in the WrPst

Vowel	Primary Stress						Secondary Stress	
	Antepenult		Penultimate		Ultimate			
	F	%	F	%	F	%	F	%
/eɪ /	473	86.0	12	2.2	65	11.8	49	8.9
/aɪ z/	515	93.6	5	0.9	30	5.5	13	2.4
Long Vowel	239	95.6	3	1.2	8	3.2	1	0.4
/əʊ /, /ɪ ə/ or Short Vowel	239	95.6	1	0.4	10	4	6	2.4
/aɪ /	483	96.6	5	1.0	12	2.4	5	1.0
Total	1949	92.8	26	1.2	125	6.0	74	3.5

The syllable containing the vowel /eɪ / still represents the lowest improvement (86%) while the remaining vowel types range from about 93 to 97%. It represents a stark difference that tells of a magnificent improvement in the written post-test as regards stress allocation. The proportions of the errors show that the syllable containing the vowel /eɪ / still represents the highest proportions of errors (11.8%) and to the second syllable (2.2%). The syllable containing the vowel /eɪ / also represents the highest proportions of secondary stress allotted to the initial syllable of the test items (8.9%). The syllable containing the vowels /aɪ z/ represents the next highest proportions of stress allotment to the third syllable (5.5%) and of secondary stress allotted to the initial syllable of the test items (2.4%). The cases that still represent some difficulty for the informants include the following:

Table 7a. WrPst Ultimate Syllable Difficulties

Word	Primary Stress			Secondary Stress
	Antepenultimate	Penultimate	Ultimate	
compensated	37	3	10	10
contemplated	38	2	10	8
confiscated	41	1	8	7
celebrated	44	1	5	3
aspirated	45	1	4	2
liquidize	46		4	1
journalize	44	1	5	3

The cause of the difficulty is that there are two consonant clusters /mpəns/, /ntəmp/ and /nfɪ sk/ around the antepenultimate vowel in compensated, /, kɒ mpən' sei tɪ d/ wrongly transcribed as /kəm' penseɪ tɪ d/, contemplated /, kɒ ntəm' pleɪ tɪ d/ as /kən' templeɪ tɪ d/, and confiscated /, kɒ nfi ' skeɪ tɪ d/ as /kən' fi skeɪ tɪ d/. The errors are less frequent when there is only one consonant cluster before or after the antepenultimate vowel: celebrated /, selɪ ' breɪ tɪ d/ wrongly transcribed as /sə' lɪ breɪ tɪ d/, and aspirated /, æspɪ ' rei tɪ d/ as /ə' spɪ rei tɪ d/. The same applies when there is one consonant cluster before or after the penultimate vowel: liquidize /, lɪ kwɪ ' daɪ z/ is wrongly transcribed as /lɪ ' kwɪ daɪ z/. For Egyptian students, L¹ interference creates a non-existent consonant cluster before the penultimate vowel in journalize /, dʒ ɜ :rnə' laɪ z/ wrongly transcribed as /dʒ ɜ : ' rnəlaɪ z/.

2.5. Ultimate-Syllable Vowel in the Tape-Recorded Tests

The following section discusses whether the recorded tests reflect the results of the written tests.

2.5.1. Ultimate Syllable Vowel in the RcPre

Table 8 shows the various degrees of achievement in the tape-recorded pre-test classified according to the vowel phoneme used in the ultimate syllable:

Table 8: Tape-Recorded Pre-Test Ultimate Syllable Vowel

Vowel	Primary Stress					
	Antepenultima		Penultimate		Ultimate	
	F	%	F	%	F	%
/eɪ /	35	6.4	22	4.0	493	89.6
/aɪ z/	109	19.8	0	0	441	80.2
Long Vowel	70	28.0	13	5.2	167	66.8
/aɪ /	164	32.8	1	0.2	335	67.0
/əʊ /, /ɪ ə/or Short Vowel	115	46.0	1	0.4	134	53.6
Total	493	23.5	37	1.8	1570	74.8

There are some changes in the learners' performance. First, the performance in the RcPre (23.5%) is lower than in the WrPre (25.2%). Second, the proportion of primary stress allotment to the penultimate stress has lessened from 11.0 to only 1.8%. The penultimate-syllable vowel types that still have relatively high proportions of stress are those containing /eɪ / (4.0) and long vowels (5.2%). This is why the proportions of penultimate stress will in this section be added to those with ultimate stress, both being wrong realizations of stress placement.

In this section, we will present a comparison between the WrPre and the RcPre in the five groups of final syllable vowel. The comparison held here will include two components correct WrPre and correct RcPre proportions of stress placement.

Table 8a shows the proportions of ultimate-syllable vowel type in these two tests. The syllables containing the vowel /eɪ / represent the

lowest proportion, (6.4%) while those containing /əʊ /, /ɪ ə/ or a short vowel represent the highest, i.e. the easiest for the informants (47.3%).

Table 8a: WrPre vs. RcPre Ultimate Syllable Vowel

Word	Primary Stress			
	WrPre		RcPre	
	F	%	F	%
/eɪ /	83	15.1	35	6.4
/aɪ z/	108	19.6	109	19.8
Long Vowel	59	23.6	70	28.0
/aɪ /	184	36.8	164	32.8
/əʊ /, /ɪ ə/ or Short Vowel	96	38.4	115	46.0

Table 8b shows the figures of the items in the group containing /eɪ / in the ultimate syllable in a descending order of difficulty.

Table 8b. WrPre vs. RcPre Penultimate /eɪ /

Word	WrPre	RcPre	Word	WrPre	RcPre
	re	re			
<u>captivated</u>	6	3	<u>activated</u>	8	2
<u>calculated</u>	6	6	<u>copulated</u>	8	6
<u>demonstrated</u>	6	0	<u>advocated</u>	8	4
<u>formulated</u>	6	2	<u>illustrated</u>	8	2
<u>conjugated</u>	7	3	<u>imitated</u>	12	1
<u>annotated</u>	8	6	Total		

The performance in the RcPre goes up and down, drawing closer to and farther away from the WrPre, but it is always below the WrPre. In calculated, the two tests are equal. In demonstrated, none of the RcPre 50 informants allocates correct antepenultimate stress. The effect of consonant cluster /nstr/ can still be felt. In imitated, formulated, activated, illustrated, captivated and conjugated, the number of correct stress allotment ranges from 1 to 3 out of 50 cases. It is worth noting that in the item illustrated, there are 17 RcPre cases with penultimate stress /ɪ 'lʌ streɪ tɪ d/. This is because the combination of the letter cluster [ll] (a geminate realized in Arabic) and the vowel /ʌ / seems to draw the stress in the informants' view. The letter cluster [ll] creates a case of germination associated with extra muscular energy. The vowel /ʌ / cannot be reduced in Arabic phonology because it is much decentralized, following only certain seven dark, velarized consonants and thus regarded

as a distinctively marginalized vowel. The remaining items range from 4 to 5 cases of correct stress placement.

Table 8c shows the figures of the items in the group containing /aɪ z/ in the ultimate syllable in descending order of difficulty.

Table 8c. WrPre vs. RcPre Penultimate/aɪ z/

Word	WrPre	RcPre	Word	WrPre	RcPre
fantasize	5	14	minimize	10	9
harmonize	6	14	authorize	11	9
feminize	9	8	focalize	11	9
jeopardize	10	8	analyze	11	14
agonize	10	8	fossilize	15	10
localize	10	6			

The performance in the RcPre goes up and down again, drawing closer to and farther away from the WrPre in a different way from what we have seen in the group containing the diphthong /eɪ /. It is below the WrPre in all but the three items fantasize, harmonize and analyze, in each of which 14 cases correctly receive the primary stress on the antepenultimate syllable.

Table 8d shows the figures of the items in the group containing a long vowel in the ultimate syllable in descending order of difficulty.

Table 8d. WrPre vs. RcPre Penultimate Long Vowel

Word	WrPre	RcPre	Word	WrPre	RcPre
uniform	9	11	institute	13	10
attitude	12	15	paragraph	13	21
photograph	12	13	Total		

Compared to the previous groups, the RcPre performance in is better than in the WrPre in this group that contains a pure long vowel in the ultimate syllable. The only exception is the item institute, where there are 13 RcPre compared to 10 WrPre instances of correct stress placement. Among the causes of this poor performance is the fact that there are 11 out of the 50 informants who pronounce the word with penultimate stress. The cluster /nst/ is behind this phenomenon. Table 8e shows the figures of the items that contain /əʊ / or /ɪ ə/ or the short vowels /æ/ and /ɒ /in the ultimate syllable in descending order of difficulty:

Table 8e. WrPre vs. RcPre Penultimate /əʊ /, /ɪ ə/ or Short Vowel

Word	WrPre re	RcPre	Word	WrPre	RcPre
stratosphere	15	13	acrobat	20	24
habitat	19	21	catalogue	22	26
telephone	20	31	Total		

Compared to the poor performance in the RcPre shown in tables 8band 8c, the performance here is better. The only exception is the item stratosphere, where 13 RcPre items are compared to 15 WrPre instances of correct stress placement. The cause of the difficulty is the phonological and graphological complexity of the word. The final letter cluster [sph] seems to bewilder the informants. Table 8f shows the frequencies of the items containing /aɪ / in the ultimate syllable in a descending order of difficulty.

Table 8f. WrPre vs. RcPre Ultimate /aɪ /

Word	WrPre re	RcPre re	Word	WrPre	RcPre
modify	9	17	justify	16	22
edify	11	19	pacify	16	17
satisfy	15	18	gratify	20	15
versify	15	18	stratify	21	18
signify	15	21	clarify	26	19
			Total		

The students' performance improves much in this group. The items gratify, stratify and clarify have less correct RcPre than WrPre cases. Strangely enough, these three items are the only ones that begin with phoneme clusters: /gr/, /str/ and /kl/, initial clusters that would normally create antepenultimate stress. Arabic speakers have various difficulties in pronouncing such clusters initially. It only seems that the cases with penultimate stress in the WrPre in these items have now ceased to exist, giving way to more errors with ultimate stress.

To sum up, the syllables that carry the tertiary stress but were wrongly given primary stress in the RcPre have similar structures to those of the WrPre. The performance in the RcPre goes up and down, drawing closer to and farther away from the WrPre, according to the vowel in the penultimate syllable. On the one hand, in the group with the vowel /eɪ / in the penultimate syllable, the performance in the RcPre is poorer than in the WrPre. The main causes are (i) the affixation with past tense [-ed] and (ii) the combination of the letter cluster [ll] with the vowel /ʌ /, which is

associated with dark, velarized consonants. In the group that ends in /aɪ z/ the performance in the RcPre is poorer than in the WrPre except in the three items fantasize, harmonize and analyze.

Moreover, in the group with long vowels in the penultimate syllable, the RcPre performance is better than in the WrPre except for the item institute because of the consonant cluster /nst/. In the group ending in the diphthongs /əʊ/ and /ɪ ə/ or the short vowels /æ/ and /ɒ/ in the ultimate syllable, the performance is still better: the only exception is the item stratosphere, where phonological and graphological complexity accounts for the poor performance. In the group with /aɪ/ in the penultimate syllable, the students' performance improves except in the 3 items gratify, stratify and clarify although they are the only ones that begin with phoneme clusters: /gr/, /str/ and /kl/, initial clusters that may cause antepenultimate stress. The cases with penultimate stress (/stræ' tɪ faɪ /, /græ' tɪ faɪ / and /klæ' rɪ faɪ /) in the WrPre in these three items have now ceased to exist, giving way to more errors with ultimate stress (/strætɪ ' faɪ /, /grætɪ ' faɪ / and /klærɪ ' faɪ /). Thus, the performance in the RcPre fluctuates, as it does in the WrPre, according to the vowel in the penultimate syllable.

2.5.1. Ultimate Syllable Vowel in the RcPst

Table 9 shows the statistics for the various degrees of achievement in the tape-recorded post-test classified according to the kind of vowel phoneme used in the ultimate syllable of the test items:

Table 9: Recorded Post-Test Ultimate Syllable Vowel

Vowel	Primary Stress					
	Antepenult		Penultimate		Ultimate	
	F	%	F	%	F	%
/eɪ /	102	18.5	1	0.2	447	81.3
/aɪ z/	213	38.7	0	0	337	61.3
Long Vowel	111	44.4	4	1.6	135	54.0
/əʊ /, /ɪ ə/ or Short Vowel	123	49.2	0	0	127	50.8
/aɪ /	269	53.8	0	0	231	46.2
Total	818	39.0	5	0.2	1277	60.8

The performance of the students in the RcPst is compared to their performance in the RcPre in order to see how far it improves and in what type or types of ultimate syllable vowel, if any.

In the following table, the RcPre and the RcPst figures are juxtaposed for this comparison:

Table 9a: RcPre vs. RcPst Final-Syllable Vowel

Vowel	Primary Stress				Improvement %
	RcPre		RcPst		
	F	%	F	%	
/eɪ /	35	6.4	102	18.5	12.1
/aɪ z/	109	19.8	213	38.7	18.9
Long Vowel	70	28.0	111	44.4	16.4
/aɪ /	164	32.8	269	53.8	21.0
/əʊ /, /ɪ ə/ or Short Vowel	115	46.0	123	49.2	3.2

The performance in the RcPst is much better than in the RcPre. The improvement is at its lowest (3.2%) in the items with /əʊ /, /ɪ ə/ or with a short vowel in the ultimate syllable and at its best in those with /aɪ / and /aɪ z/ (21.0 and 18.9% respectively). These two last groups are practically the same except for the syllable-final /z/. This degree of improvement is ascribable to the existence of an Arabic equivalent combination of the short vowel /ʌ / or /æ/ + the consonant /j/, producing such structures as /ʌ j/ when preceded by dark, velarized consonants or /æj/ elsewhere. The improvement is less in /eɪ /, which does not have an equivalent combinatory structure in Arabic. Thus, L¹ interference is apparently behind these different degrees of improvement. The syllables containing the vowel /eɪ / still represent the lowest proportion in both the RcPre and the RcPst.

2.6. Hierarchy of Difficulty in the Test Items

The WrPre and the WrPst items can be presented in a hierarchy of difficulty for the students. The purpose here is to see whether certain lexical items are easier or more difficult than other ones, or whether the informants' response to some of them is better in the WrPst.

2.6.1. Hierarchy of Difficulty in the WrPre

Table 10 shows the most difficult 14 test items:

Table 10: WrPre Most Difficult Items (Total =100)

Word	F	Word	F
fantasize	5	activated	8
calculated	6	advocated	8
captivated	6	annotated	8

demonstrated	6	copulated	8
formulated	6	illustrated	8
harmonize	6	feminize	9
conjugated	7	uniform	9
Total		100	

The striking feature in these 14 test items is that 10 of them are of this kind of words that end in /eɪ tɪ d/. The final /tɪ d/ tips the balance in favor of an ultimate primary stress given to the syllable containing the vowel /eɪ / in the present tense verb. Thus, we have only 71 (10.1%) correct transcriptions with antepenultimate primary stress in the present tense of these verbs. Conversely, we have as many as 390 (55.7%) wrong transcriptions with ultimate primary stress. There are only 3 instances with the vowel /aɪ / in the suffix /aɪ z/ that represent only 20 (2.9%) correct transcriptions and 117 (16.7%) wrong ones. An additional cause of difficulty in the items fantasize, harmonize, and feminize is that they are largely uncommon words. There is also the item uniform that ends in the long vowel /ɔ :/. An additional cause of the ultimate primary stress is the interference of L¹ since the word ends in the letter cluster [rm], where [r] is realized as a consonant, not much as a length mark. The ultimate stress produces 402 (57.4%) cases with an inserted antepenultimate secondary stress.

Table 11 shows the performance of the students in the less difficult 14 test items:

Table 11. WrPre Less Difficult Items

Word	F	Word	F
agonize	10	imitated	12
localize	10	attitude	12
minimize	10	photograph	12
Jeopardize	10	institute	13
authorize	11	paragraph	13
analyze	11	fossilize	15
focalize	11	gratify	15
Total		165	

There are 8 items that end in /aɪ z/, presumably the second most frequent error (after the ending /eɪ t/, discussed in the previous table). Here we have only 93 (13.3%) correct transcriptions with antepenultimate primary stress. Conversely, we have as many as 267 (38.1%) wrong transcriptions with ultimate primary stress. There are only 4 instances with the long vowels /ɑ :/ and /u :/ that provide only 25 (3.6%) correct

transcriptions and 116 (58.0%) wrong ones. There are also the items imitated, the last trace of the items ending in /eɪ tɪ d/ in table 10 above, and gratify, an indication of what the majority will be like in table 12 below). These two items include 27 (3.9%) correct transcriptions and 61 (8.7%) wrong ones. The ultimate stress in the 14 items of this group produces 269 (38.4%) cases with a needlessly inserted antepenultimate secondary stress. Table 12 shows students performance in the least difficult 14 test items:

Table 12: WrPre Least Difficult Items

Word	F	Word	F
stratosphere	15	edify	19
modify	17	clarify	19
pacify	17	acrobat	20
satisfy	18	telephone	20
stratify	18	signify	21
versify	18	catalogue	22
habitat	19	justify	22
Total		265	

There are 9 items that end in /aɪ /, the third most frequent error (after the endings /eɪ tɪ d/ and /ɑ ɪ z/, discussed in tables 10 and 11above). Here we have 144 (20.6%) correct transcriptions with antepenultimate primary stress. Conversely, we have as many as 228 (32.6%) wrong transcriptions with ultimate primary stress. There are only three instances that end with syllables having the short vowels /ɒ / and /æ/. These provide 61 (8.7%) correct transcriptions and 68 (9.7%) wrong ones. The items stratosphere and telephone, include 35 (5.0%) correct transcriptions and 53 (7.6%) wrong ones. The ultimate stress in the 14 items of this group produces 243 (34.7%) cases with a needless antepenultimate secondary stress.

The analysis of tables 10, 11 and 12 above shows that in the pre-test, the most difficult type for the sample students in the items that include an ultimate tertiary stress is that which ends in a syllable with the vowel /eɪ /, [-ate], especially when the past-tense morpheme [-ed] is affixed to these words. The next most difficult type is that which ends in /aɪ z/, spelled as [-ize] or [-yze]. The third most difficult type is that which ends in /aɪ /. This hierarchy suggests that a specific order, some graded way, should be followed when introducing the concept of the tertiary stress and when composing and constructing drills on the tertiary stress.

2.6.2. Hierarchy of Difficulty in the WrPst

The post-test items can also be presented in a hierarchy of difficulty for the students. The 42 test items are here divided, as in the pre-test items above, into three groups. Table 13 shows the performance of the students in the most difficult 14 test items.

Strikingly enough, 11 out of 14 items end in /eɪ t/, the most frequent error in the pre-test. Here we have as many as 473 (67.6%) correct transcriptions with antepenultimate primary stress. Conversely, we have only 65 (9.3%) wrong transcriptions with ultimate primary stress.

Table 13: WrPst Most Difficult Items

Word	F	Word	F
compensated	37	animated	45
contemplated	38	aspirated	45
confiscated	41	decorated	45
cultivated	43	hyphenated	45
automated	44	hibernated	46
celebrated	44	civilize	46
journalize	44	anglicize	46
Total		609	

There are three instances that end with syllables having the short vowels /ɒ / and /æ/. These provide 136 (19.4%) correct transcriptions and only 10 (1.4%) wrong ones. The ultimate stress produces only 54 (7.7%) cases with a needlessly inserted antepenultimate secondary stress. Table 14 shows the performance of the students in the WrPst less difficult 14 test items:

Table 14: WrPst Less Difficult Items

Word	F	Word	F
liquidize	46	simplify	47
carbonize	47	atmosphere	47
idolize	47	telegraph	47
legalize	47	democrat	48
magnetize	47	handicap	48
beautify	47	monologue	48
classify	47	finalize	48
Total		661	

There are 6 items that end in /aɪ z/, the second most frequent error in the pre-test. Here we have as many as 282 (40.3%) correct

transcriptions with antepenultimate primary stress. Conversely, we have only 16 (2.3%) wrong transcriptions with ultimate primary stress. There are 3 instances that end in /aɪ /, 3 that end in syllables having the short vowels /ɒ / and /æ/, and 2 instances that end in syllables containing the long vowel /ɑ :/ or the diphthong /ɪ ə/. These instances provide 541 (94.8%) correct transcriptions and only 15 (2.1%) wrong ones. The ultimate primary stress produces only 12 (1.7%) cases with an inserted antepenultimate secondary stress. Table 15 shows students performance in the WrPst least difficult 14 test items:

Table 15: WrPst Least Difficult Items

Word	F	Word	F
formalize	48	substitute	48
dignify	48	universe	48
quantify	48	dramatize	49
testify	48	notify	49
gramophone	48	magnify	49
autograph	48	horrify	50
latitude	48	unify	50
Total		679	

There are 7 items that end in /aɪ /, the third most frequent error in the pre-test. Here, we have 342 (48.8%) correct transcriptions with antepenultimate primary stress. Conversely, we have only 7 (1.0%) wrong transcriptions with ultimate primary stress. There are 3 instances that end in /aɪ z/, 8 that end in syllables having the long vowels /ɑ :/, /u:/ and /ɜ :/, and 2 that end in the diphthong /əʊ /. These instances provide 337 (48.1%) correct transcriptions and only 13 (1.9%) wrong ones. The stress on the ultimate syllable produces only 12 (1.7%) cases with a needless antepenultimate secondary stress.

Again, the analysis of tables 13, 14 and 15 shows that in the post-test, the most difficult type in the items that include an ultimate tertiary stress is that which ends in a syllable with the vowel /eɪ /, [-ate], especially when the past-tense morpheme [-ed] is suffixed to these verbs. This agrees with what we have seen in the previous section (tables 10, 11 and 12) for the pre-test analysis. The next most difficult type is that which ends in /aɪ z/, spelled as [-ize] or [-yze]. This also agrees, though to a slightly lesser extent, with what we have seen in the previous section for the pre-test analysis. The third most difficult type is that which ends in /aɪ /. This also agrees, at least relatively, with what we have seen in the previous section. This hierarchy emphasizes what has been suggested

above: a specific, graded, order should be followed when introducing the concept of the tertiary stress and when composing and constructing drills on the tertiary stress. The pre-test and the post-test point to one-and-the same direction: in teaching stress in English, priority must be given to quality rather than to quantity. This may not agree with the treatment of stress in the informants' L¹, that quantity often takes precedence over quality.

2.7. Antepenultimate Vowel Length vs. Stress Placement

This section investigates the relationship between correct stress placement and the quantity of the vowel in the antepenultimate syllable. Table 16 gives the proportions of stress allocation to antepenultimates syllables in relation to whether the vowel in them is short or long.

Table 16. Antepenultimate Syllable Vowel Length

Test		Short	Long
WrPst	F	639	1236
	%	91.3	88.3
RcPst	F	270	548
	%	38.6	39.1
WrPre	F	83	447
	%	20.8	26.3
RcPre	F	80	413
	%	20.0	24.3

The general tendency, especially in the pre-tests and the RcPst, is that the informants are inclined under the influence of their L¹ to deal with length (quantity) as the main correlate of stress. The proportions of correct antepenultimate stress with a long vowel or a diphthong (26.3, 24.3 and 39.1% for the WrPre, the RcPre and the RcPst respectively) are higher than those with a short vowel (20.8, 24.3 and 38.6% for the same tests). The only exception to this rule is that this order is reversed in the WrPst. The proportions of correct antepenultimate stress with a long vowel or a diphthong (88.3%) are lower than that with a short vowel (91.3%). This reversal reflects only the graphological improvement, which represents competence, not actual performance.

Table 17 shows the items in which the informants give correct antepenultimate primary stress in both written and tape-recorded tests, with some degree of improvement in the latter ones:

Table 17. Frequent Antepenultimate Long-Vowel Items

Vowel Type	Pre/Post	Item	Antepenultimate	Test
Diphthongs	Pre-test	focalize	10	RcPre
			11	WrPre
		photograph	12	WrPre
			13	RcPre
	Post-test	finalize	22	RcPst
			48	WrPst
		idolize	22	RcPst
			47	WrPst
		notify	27	RcPst
			49	WrPst
Long Vowel	Pre-test	versify	15	RcPre
			18	WrPre
	Post-test	autograph	19	RcPst
			48	WrPst
		beautify	23	RcPst
			47	WrPst
		carbonize	22	RcPst
			47	WrPst
		formalize	16	RcPst
			48	WrPst
		legalize	15	RcPst
			47	WrPst
		unify	30	RcPst
			50	WrPst
		universe	18	RcPst
			48	WrPst

These are the easiest items for the informants in the four tests held so far. There are five other items that are less easy, occurring with high proportions in one of the four tests. They are shown in the table 18 below:

Table 18. Other Frequent Items

Vowel Type	Pre/Post	Item	Antepenultimate	Test
Diphthong	Pre-test	localize	10	WrPre
Long	Pre-test	authorize	11	WrPre

vowel		harmonize	14	RcPre
		uniform	11	RcPre
	Post-test	journalize	18	RcPst

This means that when curriculum designers start composing tertiary stress lessons and drills, they should take into account what lexical items to introduce and what to delay: the ones with an antepenultimate long vowel take precedence over those with short vowel. At this stage, we can start examining the results of the post-native tape-recorded test, which is the third stage of this paper.

2.8. Post-Native Tape-Recorded Test

The corpus discussed so far for the four tests (WrPre, WrPst, RcPre and RcPst) includes 42 informants each. The corpus for the tape-recorded post-native test (henceforth RcPstNtv) includes 14 junior, 7 senior and 7 MA informants. This reduction of the corpus is to avoid repetition and lengthy discussion. The comparison held in this section includes the three tape-recorded tests to see how far performance improves.

2.8.1 Performance in the Tape-Recorded Tests

Table 19 shows the overall improvement from the first to the second to the third recorded test:

Table 19: Tape-Recorded Performance

Stress	RcPre		RcPst		RcPstNtv	
	F	%	F	%	F	%
Antepenultimate	493	23.5	818	39.0	708	60.2
Penultimate	37	1.8	5	0.2	1	0.1
Ultimate	1570	74.8	1277	60.8	467	39.7

The poor performance of the students in the RcPre is highlighted. They have 23.5% of the cases with correct antepenultimate but 74.8% with wrong ultimate primary stress. There is some improvement in the performance of the students in the RcPst. They have 39.0% of the cases with correct antepenultimate but 60.8% with wrong ultimate primary stress. More improvement in the performance of the students in the RcPstNtv is found. They have 60.2% of the cases with correct antepenultimate but 39.7% with wrong ultimate primary stress. Thus, there is steady improvement as we move from the first to the second to the third tape-recorded test.

2.8.2. Student Groups in the Tape-Recorded Tests

Table 20 shows the improvement from the first to the second to the third recorded test in the three student groups. First, the performance of

the junior students is the lowest in all the three tape-recorded tests, ranging from 15.2 to 50.2%. Second, the performance of the senior students is better, ranging from 27.4 to 58.5%. Third, the performance of the MA students is the best of the three groups, ranging from 44.5 to 83.0%.

Table 20: Faculty Groups in the Recorded Pre-Tests

Faculty & University	RcPre		RcPst		RcPstNtv	
	F	%	F	%		
Junior	191	15.2	351	27.9	295	50.2
Senior	115	27.4	165	39.3	172	58.5
MA	187	44.5	302	71.9	244	83.0
Total	493	23.48	818	38.95	711	60.5

2.8.3. Ultimate Syllable Vowel in the Recorded Tests

Table 21 shows the degrees of improvement in the different types of ultimate syllable vowel from the first to the second to the third recorded test:

Table 21: Final-Syllable Vowels in the Recorded Tests

Vowel	Primary Stress					
	RecPre		RecPst		RecPstNtv	
	F	%	F	%	F	%
/eɪ /	35	6.4	102	18.5	141	45.8
/aɪ z/	109	19.8	213	38.7	190	61.7
Long Vowel	70	28.0	111	44.4	98	31.8
/aɪ /	164	32.8	269	53.8	185	60.1
/əʊ /, /ɪ ə/orShort Vowel	115	46.0	123	49.2	97	31.5
Total	493	23.5	818	39.0	711	60.5

There is a relatively steady improvement in all types of ultimate vowel. However, there are two exceptions to this general tendency: the items with a long vowel and those with /əʊ /, /ɪ ə/ or short vowel in the ultimate syllable. This means that ultimate syllables with long vowels, short qualitative vowels, or with /əʊ / and /ɪ ə/ require special attention and practice, accompanied by native speaker recordings of more items having the same or similar features.

2.8.4. Antepenultimate Vowel Length vs. Stress Placement in the Recorded Tests

Table 21 shows the degrees of improvement in the different types of ultimate syllable vowel from the first to the second to the third recorded test:

Table 22. Antepenultimate syllable Vowel Length

Test		Short	Long
RcPre	F	80	413
	%	20.0	24.3
RcPst	F	270	548
	%	38.6	39.1
RcPstNtv	F	240	471
	%	20.4	40.1

The table shows that the steady relationship between the RcPre and the RcPst is far from being so when we consider the RcPstNtv. The informants have benefited by the native speaker recordings in the items with a long vowel or a diphthong in the antepenultimate syllable. Their performance in the items with a short vowel in the antepenultimate syllable actually worsens. The improvement in the first group, though slight, reinforces the idea that, in the viewpoint of Arab informants, antepenultimate syllables with a long vowel or a diphthong are more likely to receive stress. Conversely, more practice on antepenultimate syllables with a short vowel is demanding.

2.8.5. Hierarchy of Difficulty in the RcPstNtv

In almost complete agreement with the hierarchy of difficulty discussed in 2.6.1 for the WrPre and in 2.6.1 for the WrPst above, the division of the test items into three groups according to the same continuum of difficulty produces quite similar results. The most difficult group is shown in table 23 below.

Table 23. RcPstNtv Most Difficult Items

Word	F	Word	F
decorated	6	classify	14
compensated	7	liquidize	14
confiscated	10	atmosphere	15
animated	11	cultivated	15
contemplated	12	hibernated	15
hyphenated	12	automated	16
dramatize	13	handicap	16
Total	176		15%

It contains 9 words that end in /eɪ tɪ d/. As in 2.6 above, the final /tɪ d/ tips the balance in favor of an ultimate primary stress given to the syllable containing the vowel /eɪ / in the present tense verb. Thus, we have only 176 (15%) correct transcriptions with antepenultimate primary stress in the present tense of these verbs. Conversely, we have as many as 216 (55.7%) wrong transcriptions with ultimate primary stress. There are 2 items that end in /aɪ z/, one that ends in /aɪ /, and two other items.

Table 24 below presents the less difficult group. It shows that there are 6 items that end in /aɪ z/, the second most frequent error (after the ending /eɪ t/). In addition there are 2 items that end in /eɪ t/, 4 that end in /aɪ / (an indication of what the majority will be like in table 25 below) and 2 that end in a long vowel. In this group, we have as many as 244 (20.7%) correct transcriptions with antepenultimate primary stress. Conversely, we have as many as only 148 (12.6%) wrong transcriptions with ultimate primary stress.

Table 24. RcPstNtv Less Difficult Items

Word	F	Word	F
notify	16	beautify	18
quantify	16	horrify	18
universe	16	idolize	18
carbonize	17	journalize	18
finalize	17	latitude	18
formalize	17	magnetize	18
aspirated	18	celebrated	19
Total	244		20.7

Table 25 below shows the least difficult group. It shows that there are five items ending in /aɪ / (the third most frequent error in the WrPre), three items ending in /aɪ z/, three items that ending in a long vowel, one that ends in the diphthong /əʊ / and two that end in a short vowel. In this group, we have as many as 291 (24.7%) correct transcriptions with antepenultimate primary stress. Conversely, we have only 100 (8.5%) wrong transcriptions with ultimate primary stress.

Table 25. RcPstNtv Less Difficult Items

Word	F	Word	F
civilize	19	gramophone	20
legalize	19	magnify	21
simplify	19	telegraph	21
anglicize	20	unify	21

autograph	20	testify	22
democrat	20	substitute	23
dignify	20	monologue	26
Total		291	24.7

3. Conclusions and Recommendations

3.1. Stress in English

There is no all-inclusive definition of stress that encompasses all its causes and effects. Degrees of stress vary from one phonetician to another, ranging from two to five. Stress is an essential part of word-shape. Interference from phonological, etymological, derivational and inflectional rules makes it difficult for EFL learner to learn where to place the stress. The prediction of stress in English is a far-fetched goal. Perception of stress precedes its production.

The correlates of stress include quantity, loudness, vowel quality, muscular energy and pitch. Perception of stress by the hearer depends on the way in which the speaker puts some or all of these correlates in producing a given syllable. In trisyllabic English words with frequently quantitative or rarely qualitative vowel in the ultimate syllable, the Arab learner tends to align the stress to the rightmost syllable.

3.2. Overall Performance

The overall performance in the four first tests is 3790 (45.1%) correct transcriptions and pronunciations out of 8400 items. The WrPre number of correct stress placement is 530 (25.2%) and that of the WrPst 1949 (92.8%), which shows a significantly high response to the concept of the tertiary stress. In the RcPre and the RcPst, the improvement is much less: 493 (23.5%) in the former but 818 (39%) in the latter. There is more need for oral practice. The informants cannot easily perceive what stress practically is. They can understand where the primary stress falls but cannot produce it in the right way. (2.3.1)

3.3. Student Groups

3.3.1 The Written Tests

Performance in the written tests is relatively level-bound; it is somewhat hierarchical: better in higher and worse in lower levels. The WrPre performance ranges from 19.1 for the junior group up to 38.8 for the senior group, with the MA group falling in between: 30.2%. Stress for the informants works more on a quantitative than on a qualitative basis. The insertion of antepenultimate secondary stress shows the negative effect of the wrong practice of the right alignment of the stress. The

WrPst performance ranges from 97.9 for the junior group down to 74.8 for the Senior group, with the MA groups in between: 95.7%. The informants can comprehend what it graphically means not to allot the stress on the basis of quantity.

3.3.2 The Tape-Recorded Tests

Performance in the recorded tests is relatively level-bound. In the RcPre, the performance of the MA group is highest (44.5), with that of the senior group falling next (27.4) and the junior group lowest (15.2%). Similarly, in the RcPst the MA group is still highest (71.9), with the senior group falling next (39.35) and the junior group lowest (27.9%). (2.3.3)

3.4. Ultimate Syllable Vowels

3.4.1 In the WrPre

In the WrPre, the items containing /eɪ /, /aɪ z/ or a long vowel are difficult. Those containing a long vowel or the diphthong /aɪ / are easier, while those containing /ɪ ə/, /ʊ ə/ or a short vowel are easiest. The wrongly-stressed syllables have the following structures: /veɪ /, /leɪ /, /streɪ /, /geɪ /, /teɪ / and /keɪ / (when followed by [-ed]); /saɪ z/, /naɪ z/, /daɪ z/, /laɪ z/, /maɪ z/ and /raɪ z/; /fɔ :m/, /tju:d/, /grɑ :f/ and, /tju:t/; /sfɪ ə/ and /fəʊ n/; /faɪ /; and /tæt/, /lɒ g/, and /bæt/. (2.4.1)

The causes of difficulty in the WrPre are (i) the long vowels and diphthongs, (ii) the past tense [-ed] when attached to the verbs ending in [-ate], (iii) the coda /z/ in the syllable /saɪ z/ when compared with the open-ended /faɪ /, (iv) the onset phoneme clusters /tj/, /gr/ and /sf/, (v) L¹ interference in the coda letter cluster [rm] and in the vowels /æ/ and /ɒ / (reduced as /ɔ :/ in telephone), and (vii) initial phoneme complexity. (2.4.1)

3.4.2 In the RcPre

Firstly, in /eɪ / the RcPre performance is poorer than that of the WrPre. The main causes are (i) the affixation with past tense [-ed] and (ii) the combination in illustrated of the letter cluster [ll] with the vowel /ʌ /, which is associated with dark, velarized consonants. In the items that end in /aɪ z/ the RcPre performance is generally poorer than in the WrPre. (2.5.1)

Secondly, in ultimate long vowels the RcPre performance is better than that of the WrPre, except for the item institute because of the consonant cluster /nst/. The performance in ultimate diphthongs /əʊ / and /ɪ ə/ or short vowels /æ/ and /ɒ / is still better. The item stratosphere is an

exception; phonological and graphological complexity accounts for this poor performance. In ultimate /aɪ /, the students' performance generally improves. (2.5.1)

3.4.3 In the WrPst

In the WrPst, ultimate /eɪ / has the lowest improvement (86%) while the remaining types range from about 93 to 97%. It also has the highest proportions of ultimate (11.8%) and penultimate stress (2.2%). Again, it has the highest proportions of antepenultimate secondary stress (8.9%). Ultimate /aɪ z/ is the next highest proportions of ultimate stress (5.5%) and of antepenultimate secondary stress (2.4%). (2.4.2)

The main cause of the difficulty is the consonant clusters /mpəns/, /ntəmp/ and /nfr sk/ around the penultimate vowel. The errors are less frequent when there is only one cluster before or after the penultimate vowel. L¹ interference is behind a non-existent cluster before the penultimate vowel in journalize /rɒl/. (2.4.2)

3.4.4 In the RcPst

The performance in the RcPst is much better than in the RcPre. The improvement is lowest in the items with /əʊ /, /ɪ ə/ or a short vowel (3.2%) but highest in those with /aɪ z/ and /aɪ / (18.9% and 21.0% respectively). This improvement is ascribable to the existence in Arabic of an equivalent combination of the short vowel /ʌ / or /æ/ + the consonant /j/, producing /ʌ j/ when preceded by dark, velarized consonants and /æj/ elsewhere. The improvement is less in /eɪ /, which does not have an equivalent structure in Arabic. The items with /eɪ / still has the lowest proportion in both the RcPre and the RcPst. (2.5.2)

3.5. Test-Item Difficulty

3.5.1 in the WrPre

Out of the most difficult 14 items, 10 end in /eɪ tɪ d/. The main cause of difficulty is the final /tɪ d/. Another cause is uncommonness of the items fantasize, harmonize, and feminize. In the item uniform, the letter cluster [rm] is an additional case of L¹ interference. (2.6.1)

The group with the less difficult items includes 8 items that end in /aɪ z/. There are a few instances with the long vowels /ɑ :/ and /u:/. The ultimate stress in the 14 items of this group produces 269 (38.4%) cases with an inserted antepenultimate secondary stress. (2.6.1)

The group with the least difficult items includes 9 items that end in /aɪ /. There are a few instances that end with the short vowels /ɒ / and

/æ/. The ultimate stress in the 14 items of this group produces 243 (34.7%) cases with an inserted antepenultimate secondary stress. (2.6.1)

3.5.2 in the WrPst

In the WrPst, the most difficult type is ultimate /eɪ /, [-ate], with the affixation of [-ed]. The next most difficult type /aɪ z/. The third most difficult type is /aɪ /. This hierarchy agrees with the WrPre and emphasizes the proposition that a specific, graded, order should be followed when introducing the concept of the tertiary stress. The results show that priority must be given to quality not only to quantity. (2.6.2)

3.6. Antepenultimate Vowel Length vs. Stress Placement

In the informants L¹, quantity is the main correlate of stress. The proportions of correct antepenultimate stress with a long vowel or a diphthong are higher than those with a short vowel. This order is reversed in the WrPst. The easiest items for the informants in two of the four tests are focalize, photograph, finalize, idolize, notify, versify, autograph, beautify, carbonize, formalize, legalize, unify and universe. There are five other items that are less easy, occurring with high proportions in one of the four tests: localize, authorize, harmonize, uniform and journalize. (2.7)

Thus, when composing tertiary stress lessons and drills, curriculum designers should take into account what lexical items to introduce and what to delay for later, more advanced stages: the ones with an antepenultimate long vowel take precedence over those with short vowel. (2.7)

3.7. Post-Native Tape-Recorded Test

The performance in the RcPre is poor. There is some improvement in the RcPst, but more improvement in the RcPstNtv. Thus, there is steady improvement as we move from the first to the second then to the third tape-recorded test. (2.8.1)

The performance of the junior students is lowest in all the three tape-recorded tests. That of the senior students is higher. That of the MA students is the highest of the three groups. Both performance and improvement are level-bound. (2.8.2)

There is a relatively steady improvement in all the types of ultimate vowel. There are two exceptions to this general tendency: the types with a long vowel and those with /əʊ /, /ɪ ə/ or short vowel in the ultimate syllable. They require more practice with native speaker recordings. (2.8.3)

Because the informants associate stress with quantity, they have benefited from the native speaker recording in the types with a long vowel or a diphthong in the antepenultimate syllable. However, their performance in the type with a short vowel worsens. Thus, more practice on this type is demanding. (2.8.4)

There is almost complete agreement between the RcPstNtv and the WrPre (2.6.1) and the WrPst (2.6.2) in the hierarchy of difficulty. The division of the test items into 3 groups according to the same continuum of difficulty produces quite similar results. (2.8.5)

The most difficult RcPstNtv group contains a majority of items ending in /eɪ tɪ d/. As in 2.6 above, the final /tɪ d/ tips the balance in favour of an ultimate stress for /eɪ /. The less difficult RcPstNtv group contains a majority of items that end with /aɪ z/. The least difficult RcPstNtv group contains many items that end in /aɪ /.

The RcPostNtv results agree with those of the previous tests. This lays further emphasis on the hopefully now-established fact that curriculum designers should follow a specific order when introducing the concept of the tertiary stress or constructing drills on it. The three stages of the test ascertain that in teaching stress in English, priority must be given to quality rather than to quantity. This goes against the informants' L¹, where quantity often takes advantage of quality. (2.8.5)

The lack of direct contact with native speakers of English leaves its negative impact on their performance of tertiary stress. Authentic drilling is an indispensable means of enhancement.

References

- Abercrombie, D. (1967). *Elements of General Phonetics*. Edinburgh: Edinburgh University Press.
- Allen, W. S. (1973). *Accent and Rhythm*. London: Cambridge University Press.
- Backley, P and Nasukawa, K. (2009). "Headship as melodic strength." In Nasukawa, K. and Backley, P. (Eds.). *Strength Relations in Phonology*. Berlin: Mouton de Gruyter, pp. 47-77.
- Bermudez-Otero, Ricardo and April McMahon (2006). "English phonology and morphology." In: Aarts, Bas, & McMahon, April (2006). *The handbook of English linguistics*. Oxford: Blackwell.
- Blevins, J. (2004). *Evolutionary Phonology: The Emergence of Sound Patterns*. Cambridge University Press.
- Bloch, B. and Trager, G. L. (1942). *Outline of Linguistic Analysis*. Baltimore: Waverley Press.
- Bloomfield, L. (1933). *Language*. London: Allen and Unwin.
- Bolinger, D. (1958). "A Theory of Pitch Accent." In *Word* 14: 109- 149.
- Bolinger, D. (1964). "Around the Edge of Language: Intonation." *Harvard Educational Review*. (Cambridge, Mass.) Vol. 34: 282-96.
- Brown, G. (1977). *Listening to Spoken English*. London: Longmans.
- Chomsky, N. and Halle, M. (1968). *The Sound Pattern of English*. New York: Harper & Row, Publishers, Incorporated.
- Clark, J. and Yallop, C. (1995). *An Introduction to Phonetics and Phonology*, 2nd edn. Oxford: Blackwell.
- Crystal, D. (1969). *Prosodic Systems and Intonation in English*. London: Cambridge University Press.
- (1985). *A Dictionary of Linguistics and Phonetics*. Oxford: Basil Blackwell Ltd.
- Fry, D. B. (1960). "Linguistics Theory and Experimental Research." In Lehiste, I. ed. (1975). *Readings in Acoustic Phonetics*.
- Gimson, A. C. (1973). "The Linguistic Relevance of Stress in English." In Jones and Laver (1973).
- (1980). *An Introduction of the Pronunciation of English*. London: Edward Arnold Ltd.
- Hale, M. and Reiss, C. (2008). *The Phonological Enterprise*. Oxford University Press.
- Halle, M. and Vergnaud, J. R. (1978). "Metrical Structure in Phonology." Mimeo, MIT, Cambridge.
- Hansen, J. G. (2006). *Acquiring a Non-native Phonology: Linguistic Constraints and Social Barriers*. London: Continuum.
- Hyman, L. (1975). *Phonology Theory and Analysis*. Holt: Rinehart and Winston.

- Jespersen, O. (1933). "Notes on Metre." In *Linguistica* (1933).
- Jones, D. (1975). *An Outline of English Phonetics*. 9thedn. London: Cambridge University Press.
- Kharna, N. and Hajjaj, A. (1997). *Errors in English among Arabic Speakers: Analysis and Remedy*. Beirut: Librairie du Liban Publishers.
- Kiparsky, P. (1979). "Metrical Structure Assignment is Cyclic." In *Linguistic Inquiry*. Vol. 10: 421-441.
- Ladefoged, P. (1967). *Three Areas in Experimental Phonetics*. London: Oxford University Press.
- (1982). *A Course in Phonetics*. New York: Harcourt Brace Jovanovich, Inc.
- Lehiste, I. (1970). *Suprasegmentals*. The MIT Press.
- Lieberman, M. And Prince, A. (1977). "On Stress and Linguistic Rhythm." In *Linguistic Inquiry*. Vol. 8: 249- 336.
- Major, R.C. (2008). "Transfer in second language phonology: A review." In Edwards, Jette G. Hansen and Mary L. Zampini (Eds.). *Phonology and Second Language Acquisition*. Amsterdam: John Benjamins Publishing Company.
- McMahon, A. (2002). *An Introduction to English Phonology*. Edinburgh University Press.
- O'Connor, J. D. (1973). *Phonetics*. England: Penguin.
- Roach, P. (1991). *English Phonetics and Phonology: A Practical Course*, 2ndedn. London: Cambridge University Press.
- Roach, P. (2002). *A Little Encyclopaedia of Phonetics*. <http://www.personal.reading.ac.uk/~llsroach/peter/>
- Robins, R. H, (1964). *General Linguistics: An Introductory Survey*. Landon: Longmans, Green & Co. Ltd.
- Stetson, R. H. (1951). *Motor Phonetics*. 2ndedn. Amsterdam: North Holland Publishing Co.
- Trager, G. L. and Smith, H. L. (1951). *An Outline of English Structure*. Washington DC: American Council of learned Societies.
- Traugott, E. C. and Pratt, M. L. (1980). *Linguistics for Students of Literature*. New York: Harcourt Brace Jovanovich, Inc.

Appendix A: The Pre-Test

A corpus of 42 English trisyllabic words containing final tertiary stress for the preliminary, diagnostic written test, accompanied by the first tape-recorded test, conducted on the same day at the beginning of the semester.

1	minimize	edify	advocated
2	agonize	photograph	uniform
3	stratosphere	calculated	feminize
4	justify	attitude	fantasize
5	focalize	stratify	conjugated
6	copulated	habitat	satisfy
7	demonstrated	harmonize	pacify
8	acrobat	imitated	institute
9	clarify	activated	analyze
10	catalogue	annotated	authorize
11	gratify	captivated	modify
12	fossilize	versify	paragraph
13	jeopardize	signify	formulated
14	localize	telephone	illustrated

Appendix B: The Post-Test

A corpus of 42 English trisyllabic words containing final tertiary stress for the second stage: the written post-test, accompanied by the second tape-recorded test. Both tests were also conducted consecutively on one and the same day, six weeks after the diagnostic tests.

15	dramatize	compensated	classify
16	notify	latitude	hibernated
17	autograph	contemplated	formalize
18	finalize	beautify	handicap
19	confiscated	liquidize	quantify
20	dignify	cultivated	monologue
21	magnetize	gramophone	hyphenated

22	simplify	civilize	atmosphere
23	animated	horrify	carbonize
24	substitute	unify	celebrated
25	magnify	aspirated	idolize
26	telegraph	automated	legalize
27	journalize	universe	democrat
28	testify	anglicize	decorated

These were followed by the third stage: a tape-recorded test conducted two weeks after the second stage, aided by a tape-recorded reading of the test items by two native speakers of English working in the Cairo British Council. The total number of transcriptions provided for this study is 4200 (84 words multiplied by 50 students). They are divided into two equal groups: 42 for the pre-tests and 42 for the post-tests.