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ANALYSIS OF ALGERIAN STUDENTS ENGLISH INTONATION DEVIATIONS WITH THE EMPLOYMENT OF SPEECH ANALYZER AND PRAAT PROGRAMMES

Abstract

Learners' mispronunciations can be detected easily in a long stretch of speech in which the listener can discriminate differences in vowels, consonants, and prosody productions compared to native speakers' English. Algerian students employing inappropriate intonation contours, which differentiate grammatical categories and speakers' intentions, may lead to comprehension and communication problems. This paper aims at investigating the intonational errors produced by Algerian English as a Foreign Language (EFL) students and the extent to which Algerian Arabic interferes in the learning process of English tonal categories. This quasi-experimental study reports on the effect of providing audio-visual feedback to students' pronunciations of English intonation with the use of Speech Analyzer, and the retrieval of pitch and intensity values with Praat during the third semester of the phonetic course at the Department of English, University of Guelma, Algeria. The experimental group of second year students (N=10) productions were compared to native speakers of American English control group (N= six, at the Diderot Paris 7 University, France) renditions in which both groups were subjected to non-random assignment. The applicability and contribution of these speech-processing programs in data manipulation, analysis, and synthesis are evaluated. The results display that the students' intonation deviations were interpreted in terms of Algerian Arabic transfer or individual differences; therefore, their performances were perceived with a foreign accent. The implementation of these devices in teaching English intonation enables to estimate the degree to which such technologies are useful.

Keywords: Algerian Arabic, EFL, intonation deviation, speech-processing programme.

1. Introduction

The domain of Second Language Acquisition (SLA) overlooked research in prosody and mainly intonation to a considerable degree. In the 1950s and 1960s, the researchers' goal was primarily pedagogical, in which they aimed at developing the ways of Second Language (L2) teaching. However, the 1970s knew a shift of focus to find out how L2 was learnt with respect to learner-centered rather than teacher-centered approaches. In the 1980s, more attention was given to communicative and cognitive approaches over pronunciation teaching. The proficiency approach emphasizes the improvement of the speaking competence; however, no clear instructions were provided regarding the teaching of pronunciation. Recent studies in Applied Linguistics revealed a growing interest towards the acquisition/learning of L2/Foreign Language (FL) phonology and communicative competence. Today, the intonation feature is recognized as an integral part of communicative and linguistic competence. The shift of focus encouraged the application of instructional tools as computer programs in the teaching of pronunciation and intonation, in addition to studying intonation in terms of discourse functions beyond the sentence level. Non-native speakers learning the Target

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Language (TL) face challenges in picking up its sound system and prosodic features. In the light of this, researchers seek to understand the properties of L2/FL renditions and explain the reasons behind the occurrence of such structures.

2. Review of Literature

2.1. Intonation

Intonation is defined as sentence or speech melody in terms of modulations and pitch variations. Prosody deals with pitch, loudness, speech rate, tempo, duration, pause, and rhythm. Pitch is viewed in terms of intonation contours, and it is determined as the auditory sensation of human speech sounds ranged on a scale from *high* to *low* as it also refers to the acoustic frequency of vocal folds (or cords) vibration. The frequency stands for the number of times the vocal folds are completely close or open in a given moment and it is acoustically measured in *Hertz* (Hz) values. Loudness is recognized in the shape of stress placement at the level of a single syllable or longer stretches of speech. It is elucidated in sense of the sound auditory *intensity* level that is measured in *decibels* (db), and it is acoustically analyzed and presented in waveforms. Stress perception and realization depends on the syllable or sentence loudness, in which a prominent syllable/sentence is determined with an increase in pitch and loudness accompanied with duration. Time or duration is measured at the level of a single syllable and it is either clipped or lengthened. The production of longer stretches of speech requires speakers to make use of two parameters. First, the speech rate is about the syllables' speed rendition per second in which the performance of a large number of syllables is considered *fast* and a limited number is seen *slow*. Second, the speech tempo is explained with respect to syllables duration within an utterance in the sense that short syllables are perceived as *fast* and long syllables are heard as *slow* (Reed, 2007, pp.4-8). Rhythm in English is described in terms of strong beats indicated by the stressed syllables within the utterance, in which the prominent units occur at regular intervals and this regularity is perceived in relation to stressed vs. unstressed syllables (Crystal, 1975).

Since the 16th century, it is believed that grammar and intonation are linked in which the tune (rising, falling) and sentence type (exclamation, statement, question) are interrelated. Halliday (1964) portrayed this relationship as *central* in which "only those distinctions which are shown in the grammatical description to be meaningful are represented in the phonological analysis" (p.169). On this basis, the interpretation of intonation contours in this study is explained in relation to the grammatical categories these pitch patterns are associated with.

2.2. Intonation in Algerian Arabic

According to Odisho (2005, p. 66), success or failure in learning L2 and/or FL features is related to the non-native speakers' dialectal background. Algerian Arabic or *Darja* and Berber are spoken by nearly 99% of the population. Darja is dominated by 72% of Algerians, (Leclec, 2009; Maamri, 2009) and it is the main language of communication among the subjects who took part in the research.

Arabic Dialects are characterized with an intonation contour that occurs at the word-accented syllable. This notion has been confirmed in Modern Standard Arabic (Haydar & Mrayati, 1985), Egyptian Arabic (Norlin, 1989), Jordanian Arabic (Rammuny, 1989), Moroccan Arabic (Benkirane, 1998), and Lebanese Arabic (Chahal, 2001). Georgin (1980) noted that declaratives in Algerian Arabic are pronounced with a falling tone at the final syllable to indicate finality and a rise to express continuation. Similarly, Aït Oumeziane (1981) examined in his thesis the Arabic speech of Constantine and he provided a description of its intonational and accented characteristics. Further, Guella (1983) discussed the

integration of theme-rheme principle in which *theme* is what is already known from the preceding utterance, whereas the *rheme* refers to the newly introduced information and it is the part that receives the nuclear accent or the tonic. Guella (1984) presented the intonation of Algerian dialect spoken in Nedroma (near Oran) in which the intonational patterns are analyzed from a pragmatic standpoint and in terms of theme/rheme organization, nucleus placement, and contrasted focus. The author (1984, p. 12) illustrated the theme-rheme organization in which the *tonic accent* is emphasized as presented in the following example:

/(ʔ:næ) qutli:k matsxabru:ʃ/

(I told you not to inform him)

In the coming example the intonation center is positioned at the final syllable to stress *contrast* and "the center of intonation is in its automatic position" (p. 12).

/(ʔ:næ) qutli:k matsxabru:ʃ (ma:ʃi mætsxamru:ʃ)/

(I told you not to inform him) (and not to get him drunk)

According to Guella, word-order may be utilized in the context for theme-rheme organization (p. 12). For instance:

/matsxabru:ʃ qutli:k/

(Don't inform him, I told you)

Another illustration demonstrates the shift in the center of intonation which is "in a de-automatized position" (p. 12), and it is placed on *I* to highlight contrast.

/ʔ:næ qutli:k matsxabru:ʃ/

I told you not to inform him

Guella provided another example in which the tonic is carried on the function word [li:k] which is emphasized although it is unstressed in this context to contrast with [li:ɦæ] (p. 12).

/(ʔ:næ) qutli:k li:k matsxabru:ʃ (ma:ʃi li:ɦæ)/

I told you (not her) not to inform him.

According to Guella, statements are rendered with a falling tone that spreads over the syllables of the tone group (as cited in Benrabah, 1987, p. 81). In the following statement, the tonic syllable is /jəmma:ɦ/ which is the last long syllable (Guella, 1984, p. 13).

/ʤama:l ra:ɦ jəʕa:win jəmma:ɦ/

Djamel is helping his mother

Commands and exclamations make use of a falling intonation contour; however, commands are characterized with a higher falling tone (Guella, 1984, p. 14). The following example demonstrates the tone pattern of command and exclamation, respectively.

billəʕ fummək	Shut your mouth !
ki smi:n	how fat (he is) !

In yes/no Questions, the pitch glides up at the beginning of the tonic syllable; thus, this type of questions is performed with a rising tone as presented in the following example (Guella, 1984, p. 14).

/ʃri :t l-xubz / ?

Did you buy bread?

In this connection, Guella (1984) claimed that polite questions, enquiry or strong doubt (high pitch) necessitating definite response, and probability (low pitch) are produced with a rising tone. By contrast, wh-questions, questions or request aiming at satisfactory answer, questions implying demand for disapproval or insistence, and questions expressing certainty are rendered with a falling intonation pattern. The present examples illustrate these linguistic forms respectively (pp.14-16).

/ mʃa: m ʕa:ħ / ?	Did he go with him?
/ ba:la:k / ?	May be ? (High-rise)
/ ba:la:k / ?	May be? (signifying Is it possible?) (low-rise)
/ ʃku:n dʒa:ts / ?	Who came ? (singular, female)
/ i:wa ts qulli walla l : la / ?	Well, are you (singular) going to tell me or not ?
/ drəbtsu / ?	You (singular) hit him ?
/ ʕla:ʃ drəbtsu / ?	Why did you hit him ?

Benrabah (1987) added that listing items and interjections are produced by Algerian speakers with a rising tone, and in terms of attitudinal meaning the rising-falling contour is employed to show surprise as in the example / ˆʒi:t / (you have come!) (p. 83). For Benrabah, the speakers' attempt to focus on a particular utterance or portion of speech to direct the listeners' attention towards specific meanings that are conveyed with the application of intonational, grammatical, and lexical forms or the integration of each (p. 76). With respect to the intonation feature, focus can be realized in terms of nucleus placement in the utterance. Phonetically, the last accented syllable serves as the nucleus; in addition, at the semantic level the latter signals the syntactic element that carries a greater information in the sentence. The

nucleus occurs in the lexical item conveying new information in which the last stressed syllable is the tonic. However, contrastivity can mark the focus and it may take place at a non-final syllable as it may specify old information depending on contextual and pragmatic conditions.

According to Benrabah, Algerian Arabic is characterized by the utilization of nucleus shift and word-order to indicate the focus. Algerian Arabic has two possible forms of word-order that are VSO (Verb Subject Object) and SVO (Subject Verb Object) in which the nucleus is associated with the object. In other forms of word-order the nucleus placement highlights contrast leading to shift in focus as displayed in the following examples (pp. 79-78).

VSO order e.g. (a) / ʃraʕəmi ˋdda:r / (my uncle bought the HOUSE)

SVO order e.g. (b) / ʕəmiʃra ˋdda:r / (my uncle bought the house)

OVS order e.g. (c) / dda:r ʃrafia ˋʕəmi / (my UNCLE bought the house)

OSV order e.g. (d) / dda:r ʕəmi ˋʃrafia/ (my uncle BOUGHT the house)

Benali (2015) conducted a study on the prosody of focus in Algiers and Oran dialects in which he analyzed the prosodic aspects related to a particular focus. His acoustic examination of data revealed that Algerian speakers of Algiers and Oran dialects differ in *emphatic focus* and *interrogative focus* that take place at final position in the tone group. The emphatic focus is rendered in Algiers variety with a rising-falling pattern, and in Oran speech, it is achieved with a slight rise or fall and flat intonation. Regarding the interrogative focus, Algiers speakers tend to amplify the intonation contour, while Oran speakers place a rising pattern on the last syllable that is preceded by a falling pitch. In addition, he reported that the contrastive focus varied among speakers of the same variety and the broad focus was produced with equivalent intonation contours in the two dialects.

Consequently, understanding how Algerian Arabic intonational system functions serves as the basis for the interpretation of data that is retrieved in the present quasi-experimental study.

2.3. Integration of Speech Processing Programmes

Since the 1970s, computer devices have been employed to visualize the learners' intonational productions. During the 1980s, software and hardware became more attainable involving pronunciation tutors, speech digitizers that provide graphic representation of intonation curves and pitch tracking. In this regard, Esling (1992) claimed that these tools can be utilized for prosody synthesis in contrast to the deliberate didactic method; in addition, the cross-referencing function of auditory and written data permits combining symbols with the corresponding sounds. Similarly, Chun (1998) as cited in Chun (2002, p.120) pointed out four functions to incorporate technology in research and teaching instruction. Chun claimed that computers and computer software aim:

1) to provide learners with visualizations of their intonational patterns and with specific feedback to help them perceive the meaningful contrasts between L1 and L2 so that they can improve their speech production;
2) to provide learners with authentic and extensive speech and cultural input and in turn to hone learners' perceptual abilities;
3) to facilitate, record, and analyze interactions between and among speakers; to build tools for research purposes, e.g., data collection tools to record student performance, progress, and steps toward self-correction.

3. Methodology

The systemic functional approach states that linguistic analysis of spoken or written language corpora is significant in order to retrieve relevant information about the difficulties encountered by non-native speakers learning FL. A quasi-experimental design is used in this research to monitor consistently the influence of a specific treatment on a definite population and sample; therefore, to discover whether or not a particular treatment results in a given impact (Velluntino & Schatschneider, 2004). The quasi-experiment is built on the treatment which is the innovation that the researcher or teacher wants to evaluate its results in his/her classroom. The unit of assignment includes the things or people that the teacher studies and the outcome measure is a type of test that offers numerical data. However, unlike the true experiment, the quasi-experiment lacks the factor of random assignment or equivalent participants in both control and experimental groups (Cook & Campbell, 1979, p.5).

3.1. Context

The prosodic features of English are predominant in comprehending and creating meaning in which these speech signals serve as the clues to process charts of spoken language. Learners employing inappropriate intonation patterns may sound rude or abrupt and this may hinder communication and result in a misunderstanding on the part of the listener. The adopted research method is used to investigate the computer-based approach as a pedagogical tool to cope with the complexity of intonation instruction.

In light of this, this study is centered on the hypothesis that the students' intonational errors are overcome with the application of signal analysis software and extraction of their speech acoustic characteristics. This raises the research questions: What are Algerian students' deviations of English intonation? Does the audio-visualization of pitch curves enable the Algerian students to enhance their productions and perceptions of English intonation patterns? Thus, the research intends to raise awareness among Algerian EFL students and teachers of phonetics towards the important application of speech analysis software and audiovisual feedback technology in EFL classroom. Further, it is meant to increase the students' confidence towards the use of English intonation in discoursal situations for communicating meanings effectively and improving their oral proficiency.

3.2. Participants

The EFL subjects and American native speakers who participated in the quasi-experiment were not selected randomly. The control group of American native speakers involves six participants (four males and two females) with an age range of 18 to 34 years old working as teaching assistants at Diderot-Paris7 University, France. The experimental group of Algerian non-native speakers contains ten second year students (six males and four females), and they were aged between 19 to 25 years old. The students were tested during a third semester Phonetics course, at the Department of English, University of Guelma 8 Mai

1945, Algeria. The chosen sample was minimized due to the complexity of data recording and manipulation as it is agreed that the value for each parameter is at least ten participants (Schreiber, Nora, Stage, Barlow, & King, 2006).

3.3. Procedures and Materials

The intervention was achieved with the audio-visual representation of recorded speech provided by Speech Analyzer, and pitch and intensity values extraction with Praat programs (Appendix A). The control group participants were integrated in the quasi-experiment for the purpose of comparison and they received no treatment, unlike the experimental group to whom the innovation was administered. The results of both control and experimental groups are compared in the pre-test (the student-participants recorded their productions) and post-test phases (the participants were allowed to listen, visualize, and compare their pronunciations with NAE native speakers renditions and re-record their performances). The annotated linguistic structures (Appendix B) are the most commonly used in English spontaneous speech following the International Phonetic Alphabet (IPA) transcription system of intonation (Figure 1).

Figure 1

The Tone Chart Used in the International Phonetic Alphabet (IPA) (Adapted from International Phonetic Association, 1999)

4. Results and Discussion

4.1. Rising-falling Contour

Rising-falling intonation tone falls on the most prominent element in the utterance; it starts at mid-level and reaches high level. This contour ends with either a nonterminal fall at a middle level that signals uncertainty, usually demonstrated in a suspense mood, incomplete idea, or unfinished sentence, or with a terminal fall at a low level that represents certainty and a finished statement (Celce-Murcia , Brinton, & Goodwin, 1996). The utterances that employ this intonation pattern are declarative statements, requests and commands, wh-questions and tag questions eliciting agreement.

4.1. 1. Declarative Statements

A declarative statement stands for an utterance that presents a state of affair in which the speaker's attitude or emotional status is neutral regarding the information and the last stressed syllable receives a regular fall (Celce-Murcia et al., 1996, p.186). The following example illustrates the rising-falling contour that begins at middle level (2), then rises to high level (3) and falls to low level (1).

3
2 My name is Steve
1

A large number of the students (N=9/10) performed the declarative statements with a falling tone but the pitch does not fall as low as in English in which the utterance sounds to be unfinished and that the speaker has more to say. The transfer of the intonational pattern from Algerian Arabic into English gives the impression that the sentence final pitch tone is sustained, that is, there is more to follow (Figure 2).

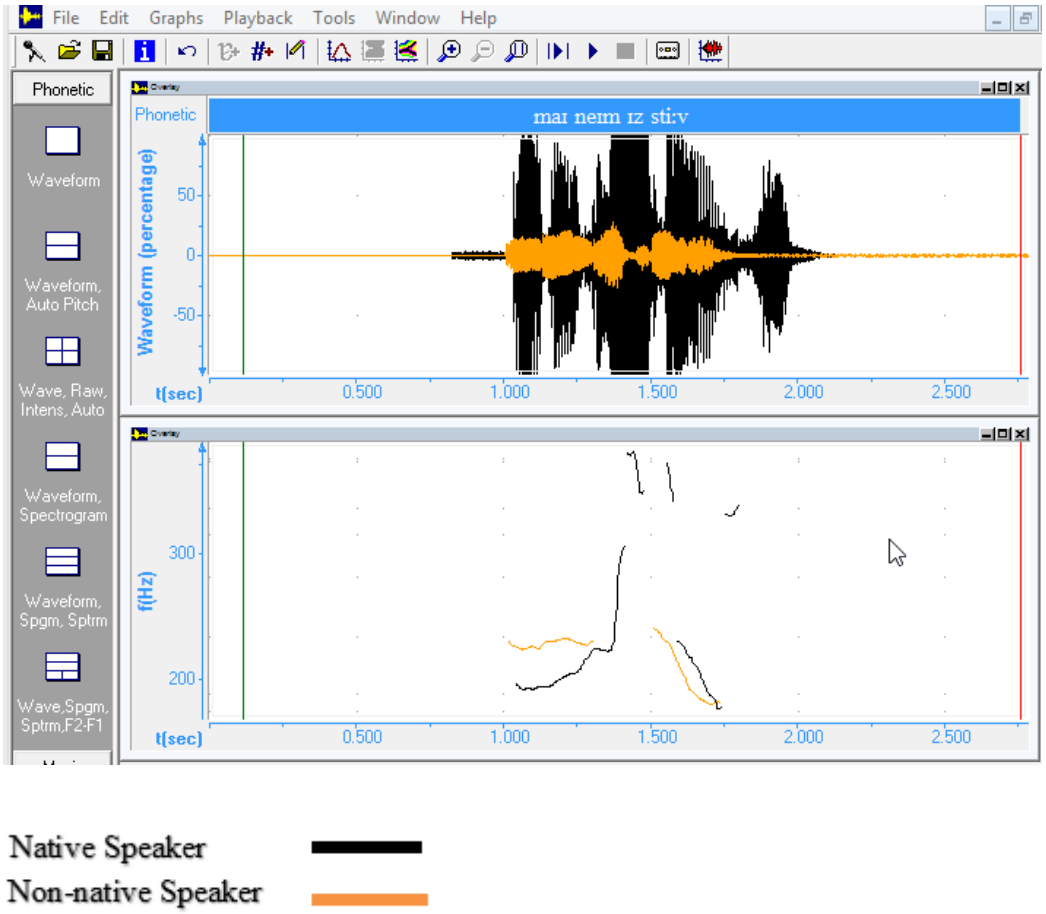


Figure 2

Declarative Statement Pitch Contour Produced by American Native Speaker (1) and Algerian Non-native Speaker (2) Analyzed with Speech Analyzer

4.1.2. Requests and commands

Requests and commands in English and Algerian Arabic receive a final falling contour (Celce-Murcia et al., 1996, p.186; Benrabah, 1987). The following example presents the pitch rising from midle to high levels then it falls to a low level.

3
2 Be quick
1

The Algerian learners tended to render the English requests and commands with a falling pitch but it is not as low as it is pronounced by native speakers (Figure 3).

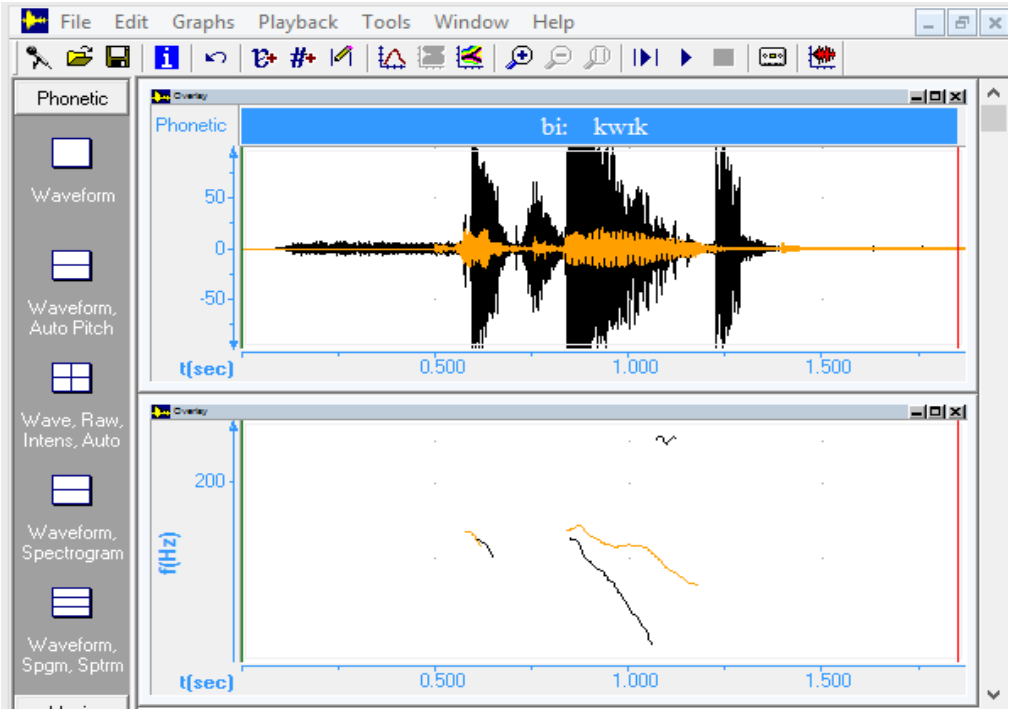


Figure 3

Requests and Commands Pitch Contour Performed by (1) and (2)

4.1.3. Wh-questions

English Wh-questions end with a falling tone in which the contour center is moveable in relation to the focus of attention (Celce-Murcia et al., 1996, p.186). In the following example, Wh-questions are associated with the pitch pattern of 2-3-1 that indicates certainty, in which the tone starts at middle level then it rises to high level then it falls to low level.

3
2 Where did you go?
1

The Algerian students uttering Wh-questions tended to stress the interrogative word whatever is the center of the intonation contour. All the participants used a falling tone but it does not fall as low as in English as displayed in Figure 4 (Hamlaoui & Bengrait, 2016).

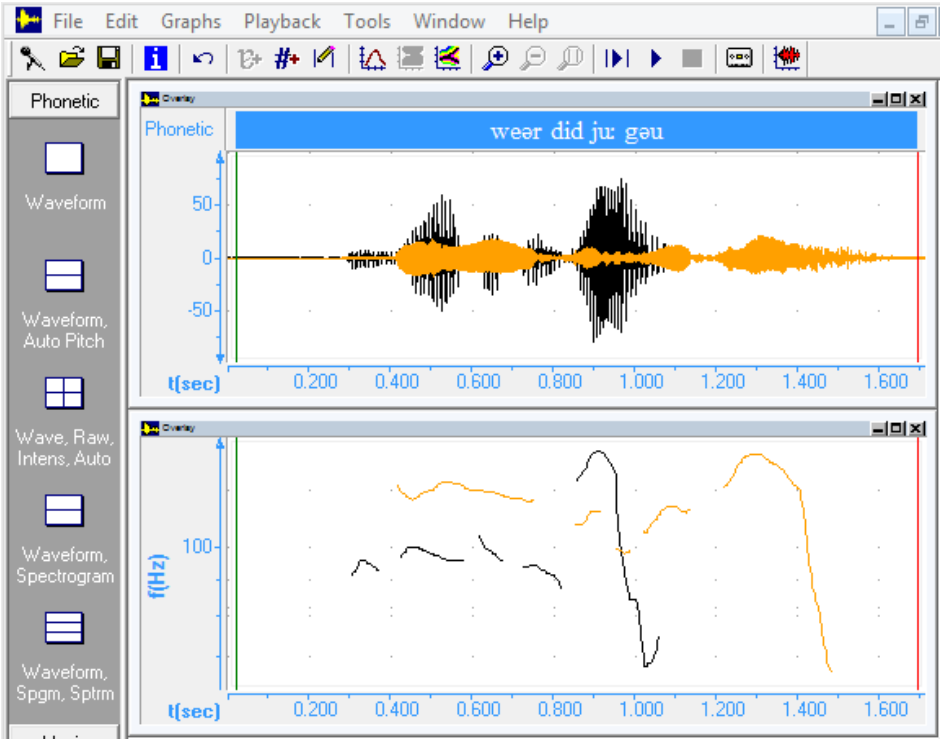


Figure 4

Wh-questions Pitch Contour Rendered by (1) and (2)

4.1.4. Tag-questions Signaling Certainty

The type of tag questions *eliciting agreement* employs the 2-3-1 contour for the utterance and 3-1 pattern for the tag or the interrogative fragment (Celce-Murcia et al., 1996, p.187). The speaker expects confirmation of the information by the interlocutor signaling certainty as displayed in the following example.

3
2 The picture is nice, isn't it?
1

The majority (N=9/10) of the Algerian students performed the phrase in the tag-question with 2-3-1 pitch pattern; however, the interrogative fragment was rendered with a rising tone (Figure 5). This tendency is interpreted as the participants transfer into English the rising contour that is adopted in the pronunciation of tag-questions in Algerian Arabic (Hamlaoui & Bengrait, 2016).

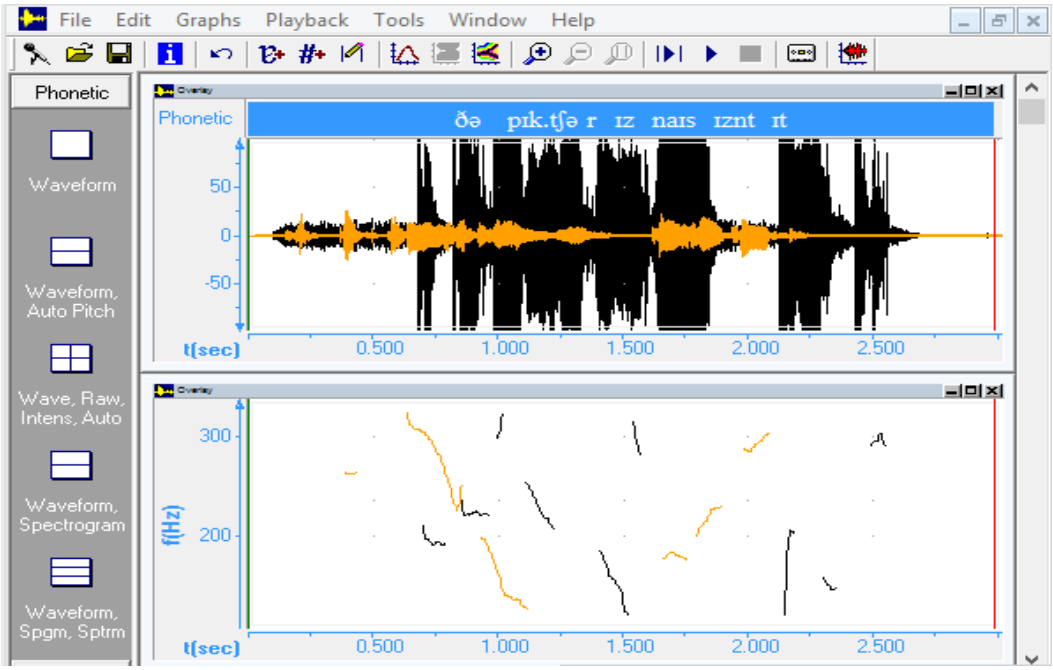


Figure 5

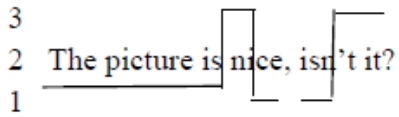
Tag-question with Certainty Pitch Contour Produced by (1) and (2)

4.2. Rising Intonation Contour

The rise intonation pattern in English starts at the prominent syllable in discourse and it spreads over until the end of the utterance. There are two distinct rising intonation contours; the one that rises from low to middle level (1-2 pattern) and another that begins at middle and it moves to high level (2-3 or 2-4 pattern), in which the latter indicates uncertainty and it is employed according to the amount of expressed emotions (Celce-Murcia et al., 1996). The grammatical structures that are characterized with a rising intonation pattern are:

4.2.1. Tag questions signaling uncertainty

This type of tag-questions allows the speaker to respond with either *yes* or *no* as s/he may already have a preconceived knowledge, giving the impression that the utterance is more likely a yes/no question type (Celce-Murcia et al., 1996, p.189). In the following example, the speaker expects information rather than confirmation.



A large number (N=8/10) of the participants were found to use a rising contour in the renditions of tag questions signaling uncertainty but it is much higher than the pitch rise produced by the American native speakers as illustrated in Figure 6.

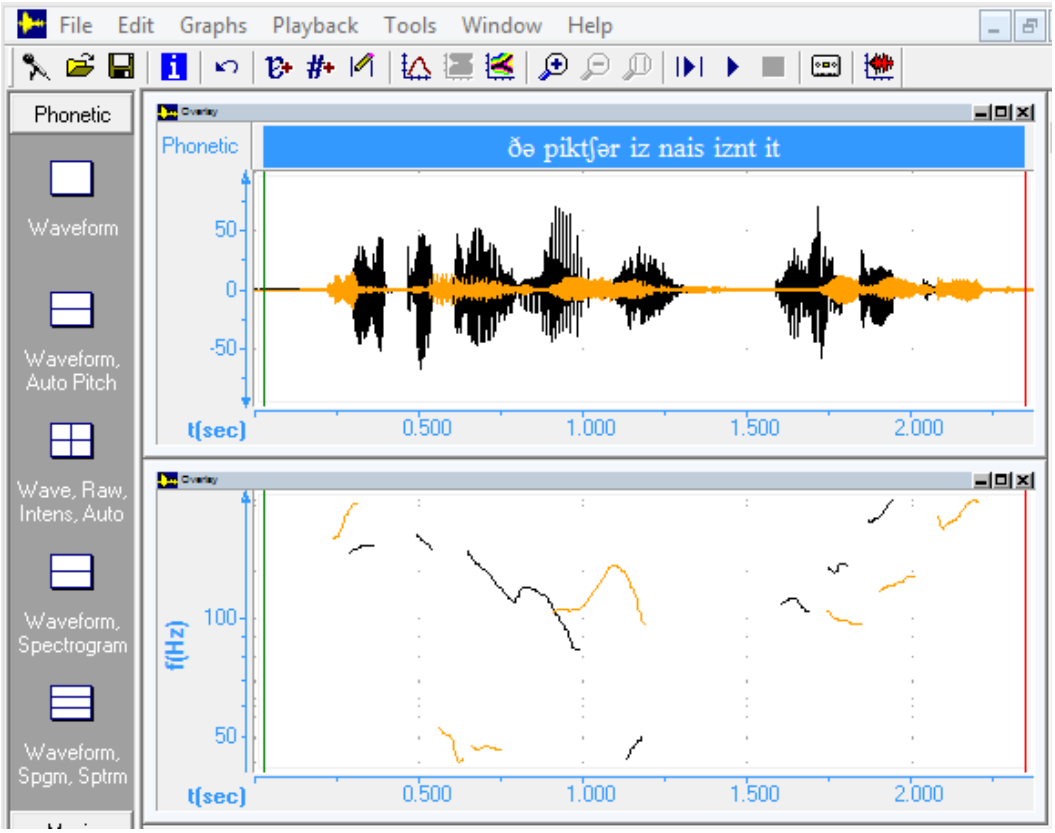


Figure 6

Tag-question with Uncertainty Pitch Contour Uttered by (1) and (2)

4.2.2. Yes/No questions

The English yes/no questions with *a question word order* are performed with a rise at the most prominent word or the rise continues until the end of the question, in which the speaker is expected to answer with *yes* or *no* (Celce-Murcia et al., 1996, p.188) as demonstrated in the following example.

3
2 Is the test easy?
1

There is a category of sentences that are structured as a statement but function as a question. These sentences differ from yes/no question in that the speaker has already a preconceived knowledge to confirm the information. The yes/no questions with *statement word order* use the rise contours of 2-3 or 2-4 patterns in which the former presents a neutral confirmation and the latter expresses disbelief or surprise as displayed in the following example (Celce-Murcia et al., 1996, p.188).

4
3
2 The plane LEFT already
1

All the Algerian students employed a rising contour when reading the yes/no questions with a question word order/statement word order similar to the pronunciation of yes/no questions in Algerian Arabic (Figure 7, Figure 8, and Figure 9).

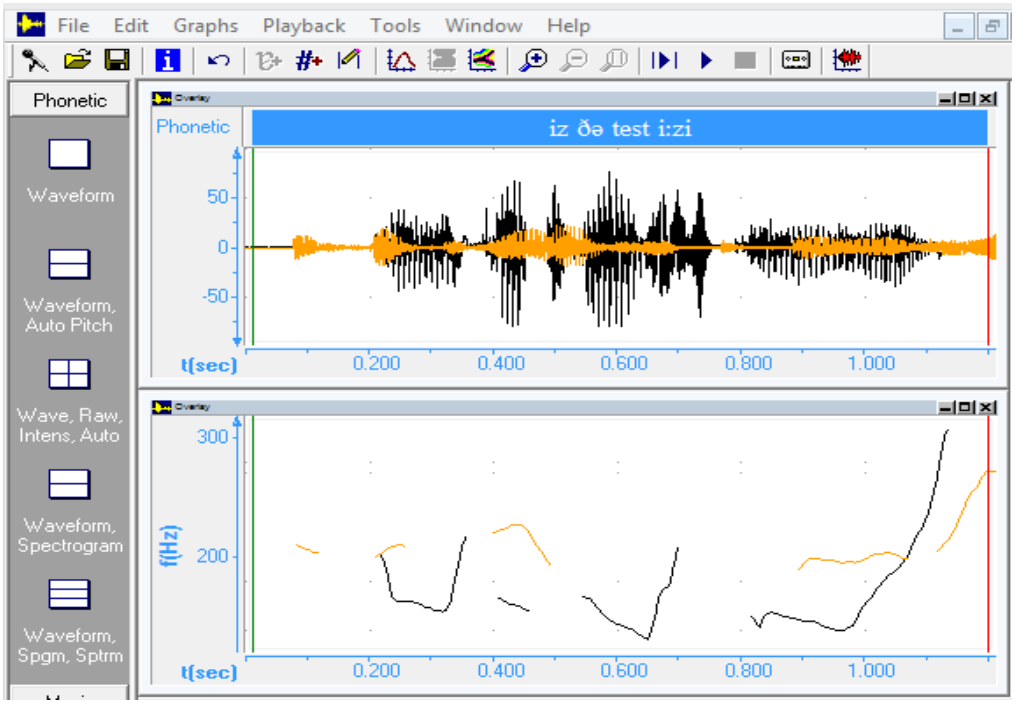


Figure 7

Pitch Contour of Yes/No Questions of Question Word Order Read by (1) and (2)

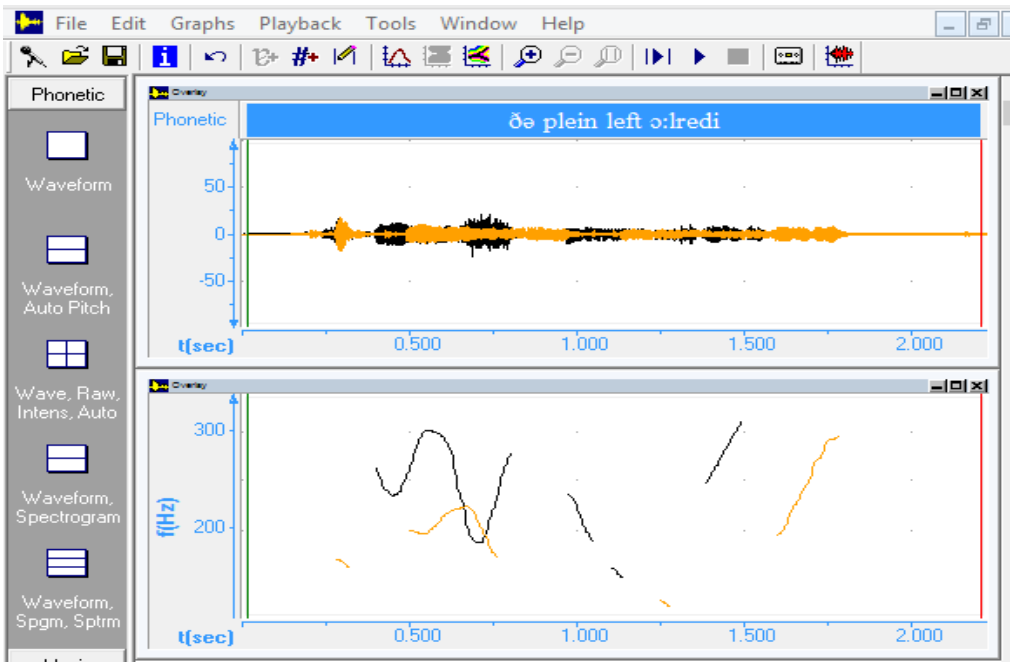


Figure 8

Yes/No Questions of 2-3 Pattern Pitch Contour Read by (1) and (2)

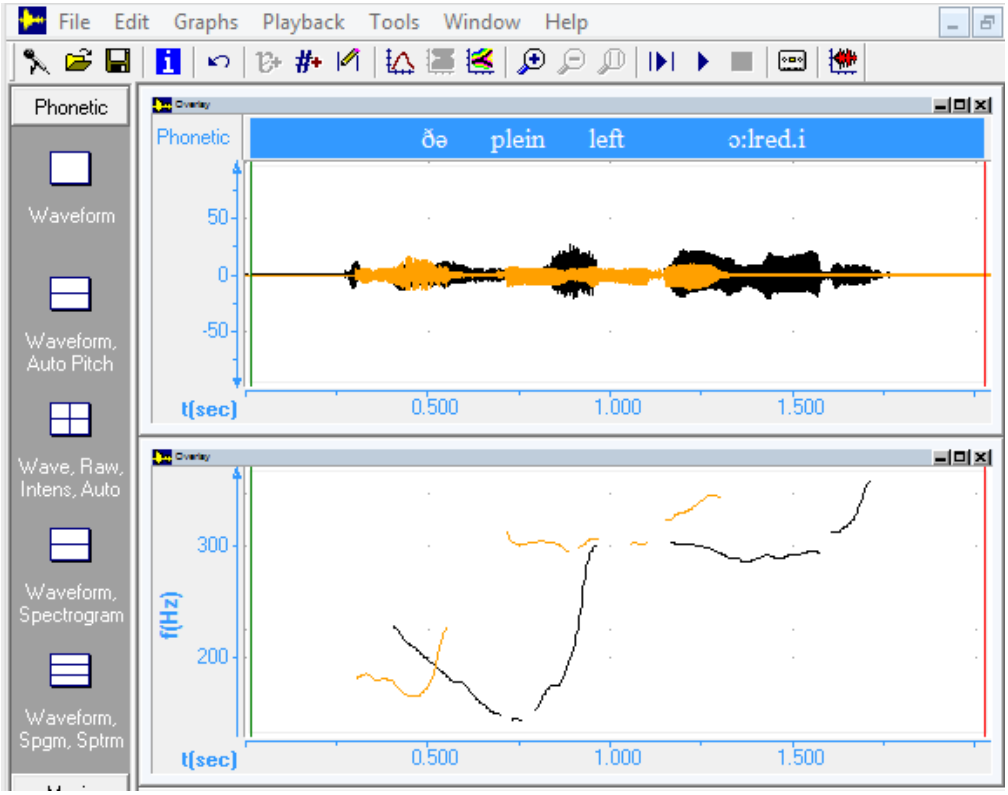


Figure 9

Yes/No Questions of 2-4 Pattern Pitch Contour Read by (1) and (2)

4.2.3. Alternative questions

Alternative questions involve two distinct categories. The open-choice alternative questions in English are rendered with a 2-3 rising pattern in which the listener is offered a free choice and s/he may select from the available options or reject the alternatives (Celce-Murcia et al., 1996, p.190), as illustrated in the following example.

3
2 Are you going to pay with Master Card or Visa?
1
(Open Choice: Are you going to pay with a credit card?)

The cited items in closed-choice alternative questions receive a rising contour of 2-3 pattern until the final element, in which the latter is produced with a 2-3-1 rise-falling pattern (Celce-Murcia et al., 1996, p.190). The following example presents these contours.

3
2 Are you going to pay with Master Card or Visa?
1

A large number (N=9/10) of the Algerian students produced both the open-choice and closed-choice alternative questions with a final rising contour and they expressed no difference in meaning. However, a minority placed 2-3 pitch pattern on the word *or* and end the sentence with a falling pitch below middle level by adopting a similar tendency of pronouncing the alternative questions sometimes in Algerian Arabic as illustrated in Figure 10 and Figure 11, respectively.

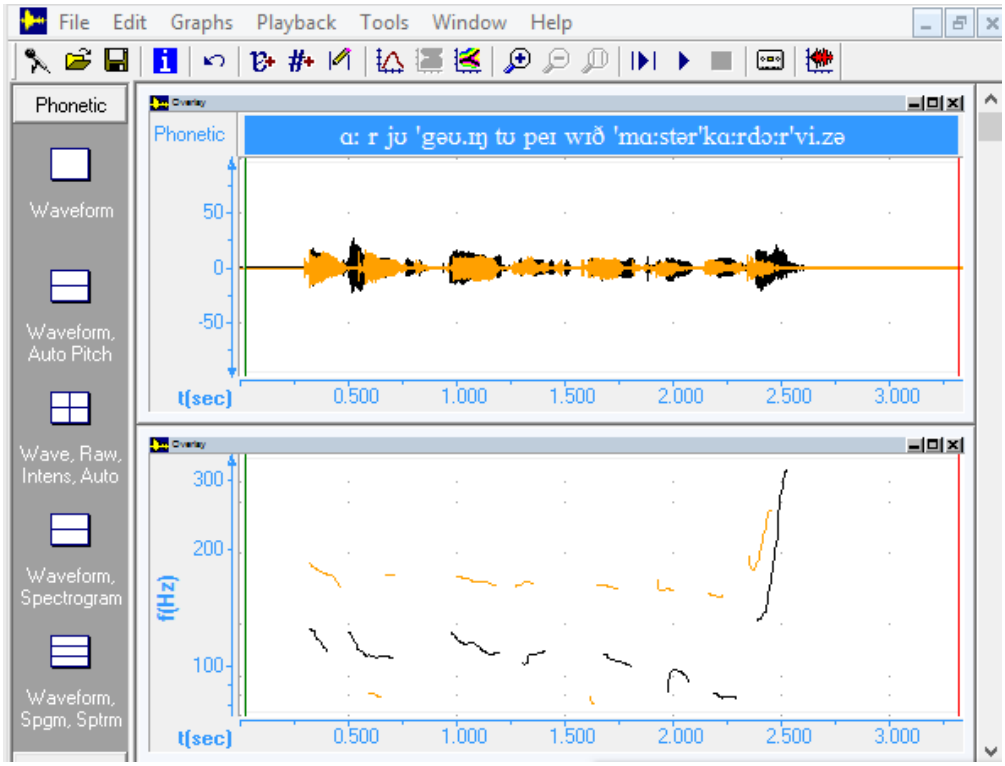


Figure 10

Pitch Contour of Alternative Open-choice Questions Produced by (1) and (2)

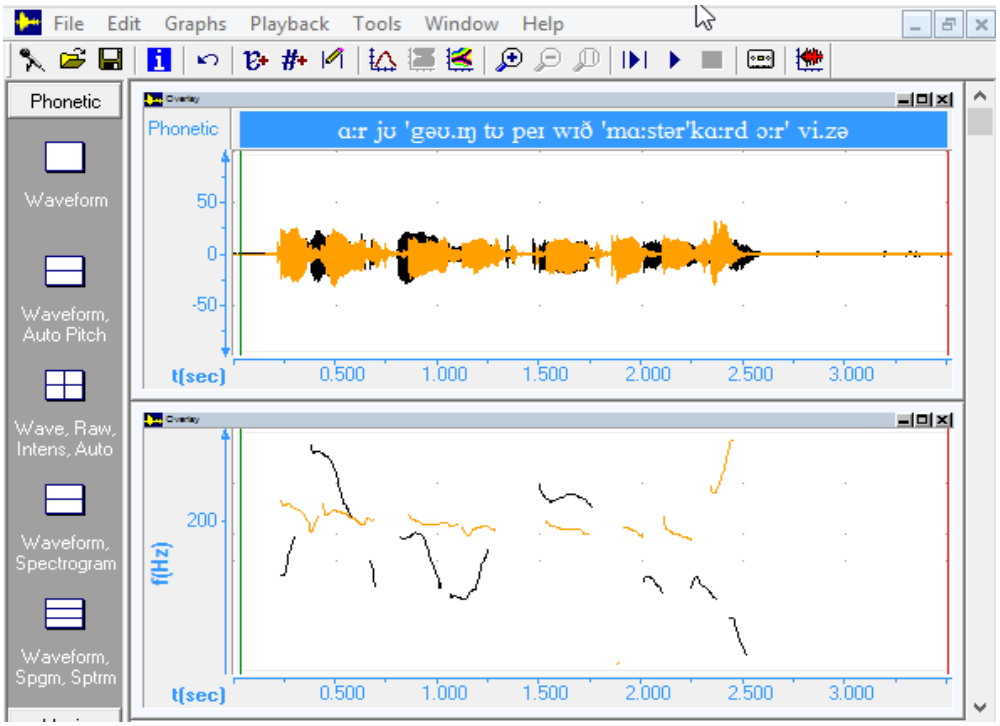


Figure 11

Pitch Contour of Alternative Closed-choice Questions Rendered by (1) and (2)

Echo Questions

Echo questions type occurs in a conversation when the speaker uses the strategy of asking a question before providing an answer. In English, echo questions are performed with a high pitch of 2-3 rising pattern as demonstrated in the following example (Celce-Murcia et al., 1996, p.188):

3
2 What am I doing? I am going skiing
1

In Algerian Arabic, echo questions are produced with a falling tone, thus all Algerian students may have transferred the falling pitch from their L1 into English instead of a rising pitch as presented in Figure 12.

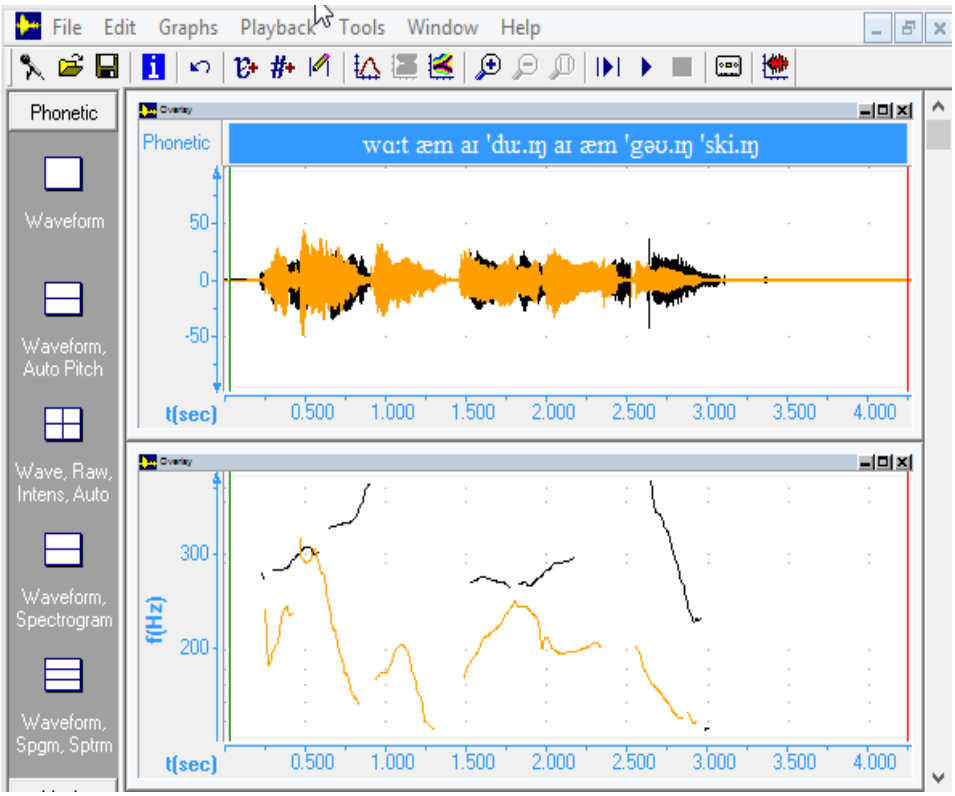


Figure 12

Pitch Contour of Echo Questions Performed by (1) and (2)

Repeated questions

English *repeated/repetition* questions end with a high rising contour (Celce-Murcia et al., 1996) in which the hearer expresses disbelief or asks to repeat what has been said as illustrated in the following example:

What's his name?

The majority (N=9/10) of the Algerian students tended to realize the repeated questions with a falling tone instead of a rising pitch; this inclination is due to the transfer of the falling contour from their native language Algerian Arabic (Figure 13).

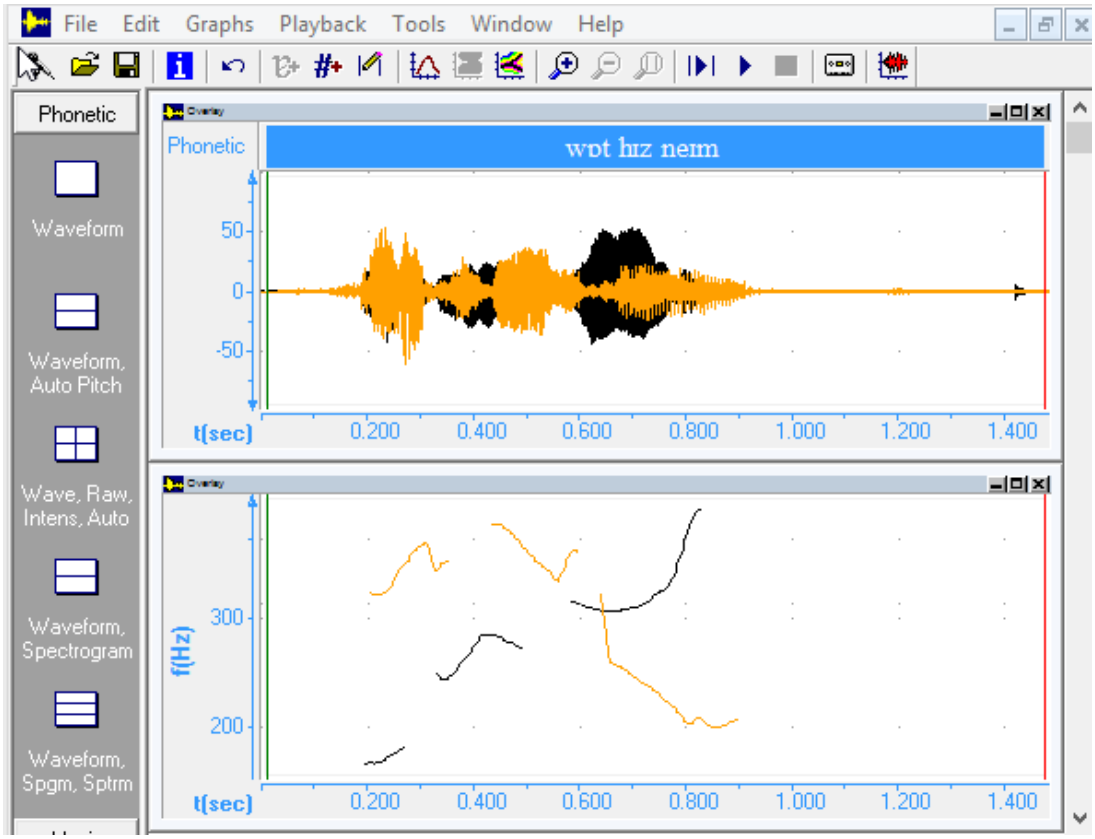


Figure 13

Pitch Contour of Repeated Questions Rendered by (1) and (2)

4.2.4. Other intonation patterns

As mentioned previously, this section deals with various intonation contours that can be employed for the same syntactic structure to convey different meanings in which the pitch height levels are dependent on discourse context. Focus or prominent words have an interrelationship with pitch and this determines the corresponding tonal pattern.

4.2.4.1. Greetings

English greetings are characterized with either a possible fall that implies politeness or a rise that encourages to get more personal in a conversation (Wells, 2006, p.66), as presented in the following example.

3
2 Good morning
1

(falling contour: I am greeting you)

3
2 Good morning
1

(Rising contour: as I greet you, I am acknowledging you)

The pronunciation of English greetings of 2-3-1 intonation pattern produced by the Algerian students presents a similar tendency to that of native speakers because they usually end the sentence with a falling tone (Figure 14) which is transferred in the production of greetings type with 2-3 rising pattern (Figure 15). However, the falling contour in Algerian Arabic does not fall as low as in English, which influences the performance of the English greetings' intonation patterns.

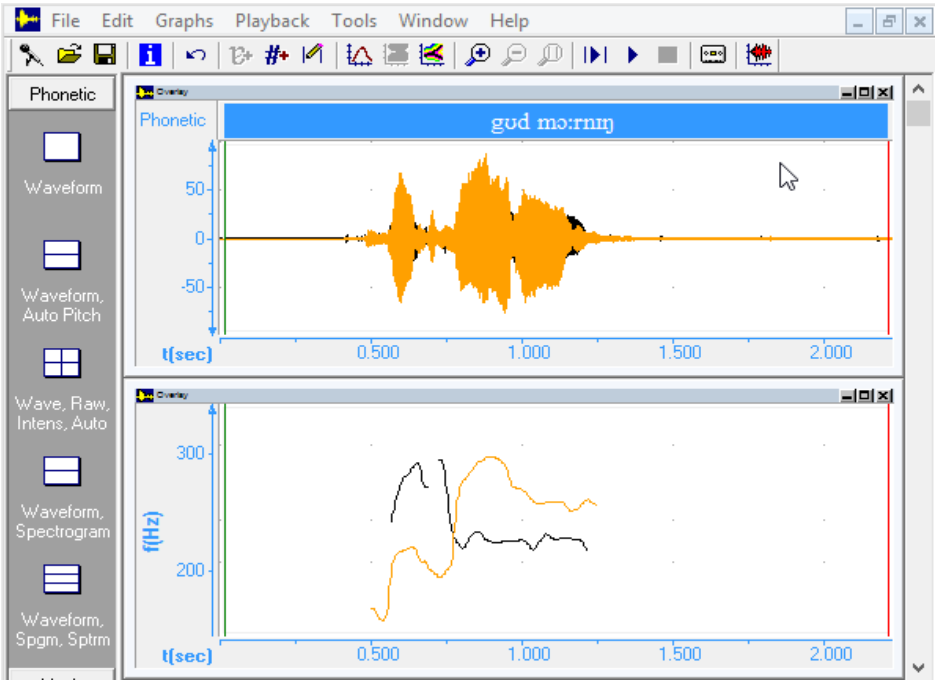


Figure 14

Greetings with 2-3-1 Pitch Contour Read by (1) and (2)

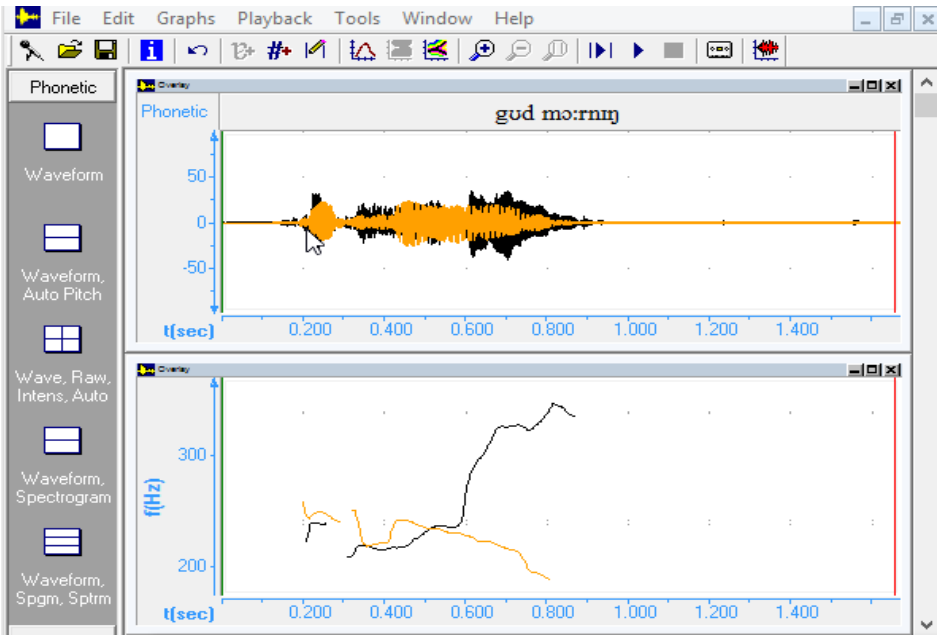


Figure 15

Greetings with 2-3 Pitch Contour Performed by (1) and (2)

4.2.4.2. Exclamations

English exclamatory sentences expressing excitement, anger, or surprise are pronounced with a falling contour (Wells, 2006, p.60). This kind of exclamations is initiated with *how* or *what* and the sentence ends with an exclamation mark. In addition, a high-rise may be employed to indicate surprise, disbelief, or enthusiasm as illustrated in the second example of echo question.

3
2 What a pity!
1

(Exclamatory fall: indicates surprise)

4
3
2 What? You lost my book?
1
(Extra high contour indicating disbelief)

The majority (N=9/10) of the Algerian students adopted the high-fall pitch when rendering English exclamations of 2-3-1 pattern in order to express strong emotions of surprise or disbelief (Figure 16) and a high-rise in 2-3-4 contour (Figure 17). The transfer of Algerian Arabic exclamatory sentences intonational pattern makes the Algerian subjects sound more emphatic than their English native counterparts.

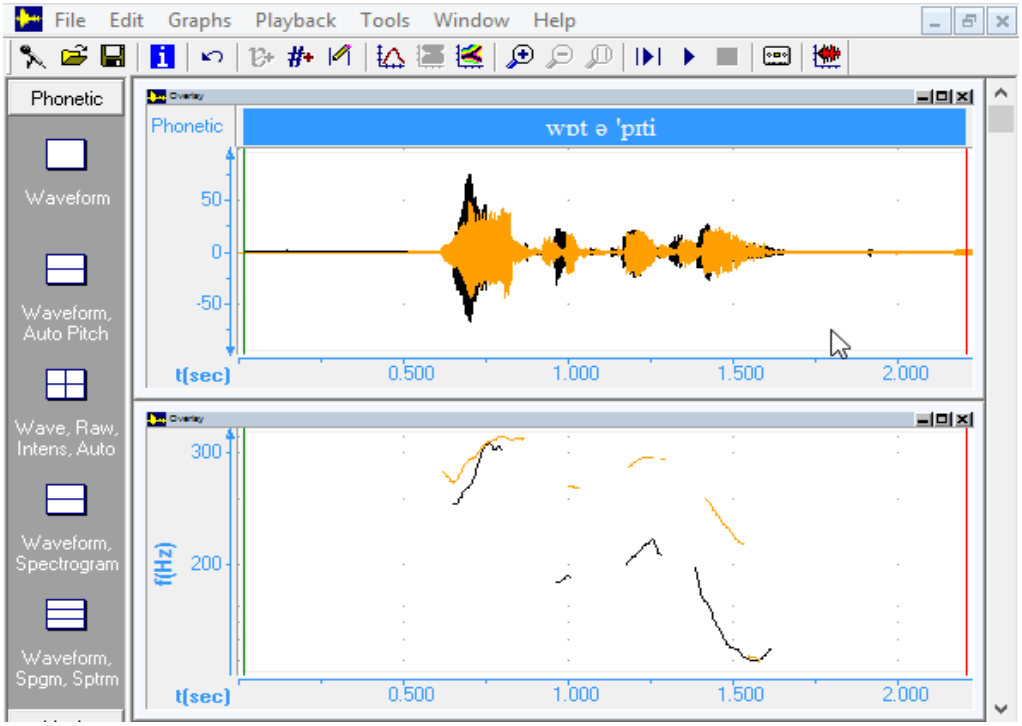


Figure 16

Exclamations with 2-3-1 Pitch Contour Rendered by (1) and (2)

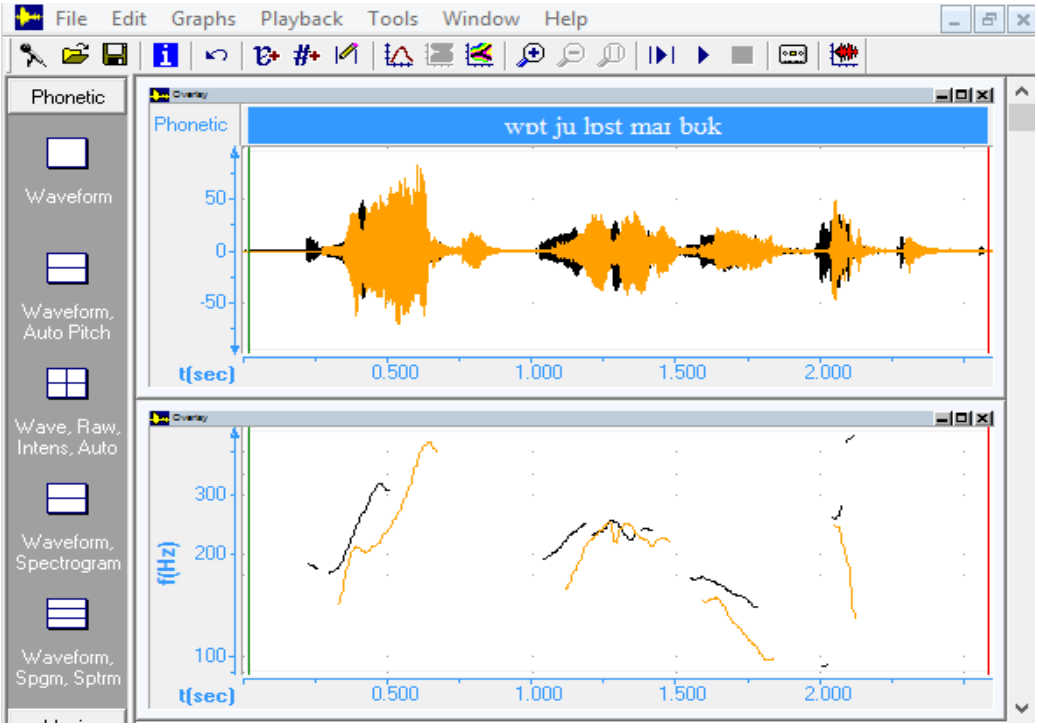


Figure 17

Exclamations with 2-3-4 Pitch Contour Pronounced by (1) and (2)

4.2.4.3. Contrastive Situations

In English, sentences indicating contrastive situations, with respect to numerals and verbs, are associated with a falling contour that falls on the numeral second digit and the auxiliary verb (Paterno, 2003). The following examples demonstrate this intonation pattern.

3
2 I said forty-five not forty-three
1
(Falling pitch on the second digit of the numeral)

3
2 But, I have lived in Alabama before I moved to New York
1
(Falling pitch on the auxiliary verb)

The Algerian students placed the 2-3-2 and 2-3-1 falling intonation pattern on the first digit of the numeral and the main verb of the sentence, respectively, presenting contrastive situations (Figure 18 and Figure 19). In Algerian Arabic, structures for contrastive situations

do not exist but Algerian subjects tended to emphasize *forty* in the case of the numerals and verb form *lived* instead of the auxiliary verb.

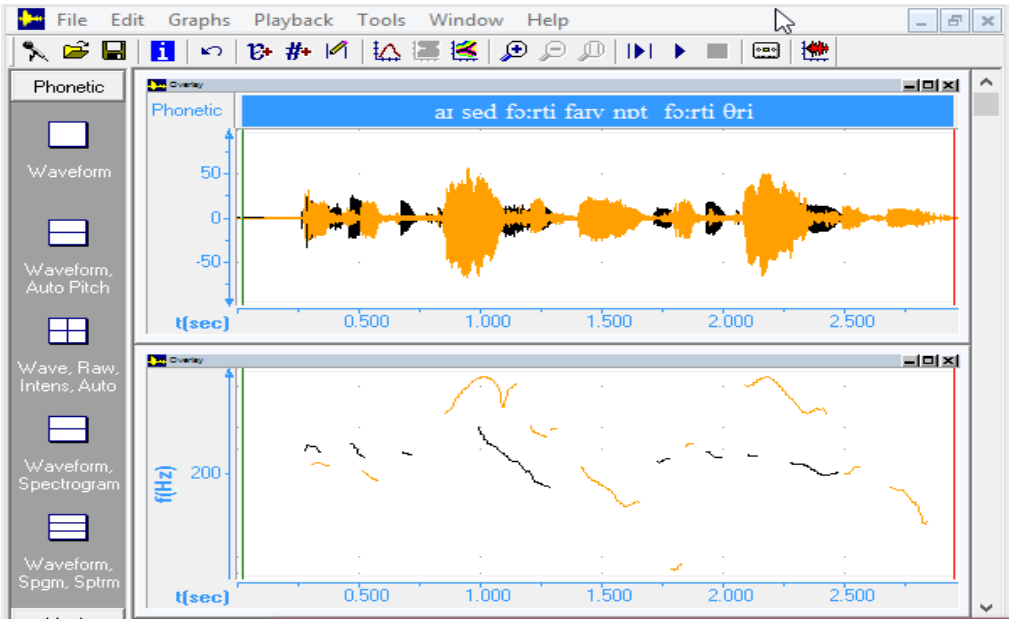


Figure 18

Contrastive Situations with 2-3-2 Pitch Contour Rendered by (1) and (2)

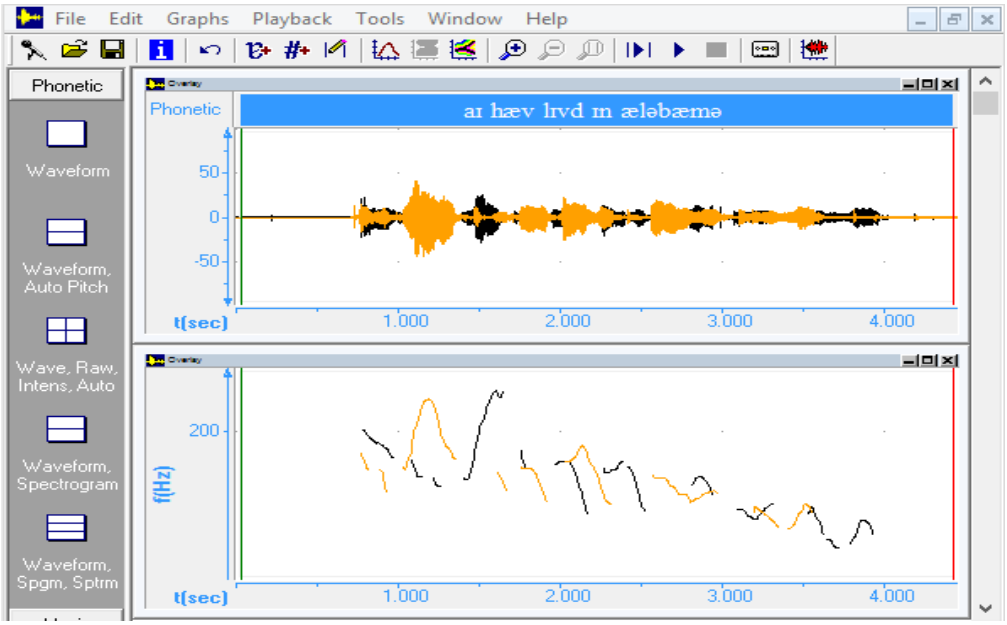


Figure 19

Contrastive Situations with 2-3-1 Pitch Contour Rendered by (1) and (2)

Amazement Expressed with a Question

The feeling of amazement is expressed in English with a question in which the most prominent words are produced with a high pitch signaling a great surprise (Celce-Murcia et al., 1996), as illustrated in the following example.

3
2 Do you really like to eat Chinese food?
1

An important difference is observed in the employed pitch contour to express amazement by the Algerian students. They tended to transfer level pitch pattern that marks Algerian Arabic amazement constructions into English; as a result, the students sounded rather angry (Figure 20).

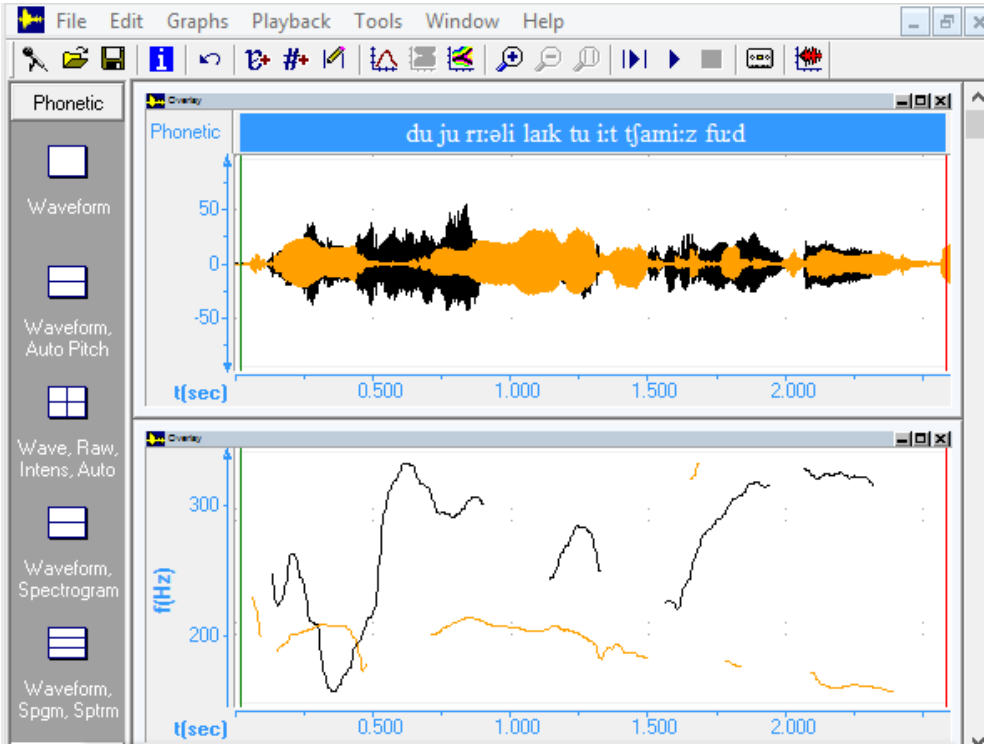


Figure 20

Pitch Contour of Amazement Expressed with a Question Rendered by (1) and (2)

4.2.4.4. Listing items

Listing a series of items is characterized in English with a pitch rise for each stressed syllable except the last one that is produced with a falling contour. In this context, the rise signals more to follow and the fall marks the end of the list (Grant, 2001, p.112). The following illustration is retrieved from BetterAccent Tutor program (Appendix C). In *A*, a high-rise is associated with *Alex*, whereas *Jing* and *Carlos* are performed with a low-rise, and *Michelle* is rendered with a falling pattern. In *B*, the items *Alex*, *Jing*, and *Carlos* are pronounced with a low-rise that descents slowly over the sequence of syllables; however, *Michelle* receives a high-rise. Example *B* is a yes/no question that involves listing items and this explains the rise placed at the final syllable of the tone group.

A) I invited Alex, Jing, Carlos and Michelle

B) Did you invite Alex, Jing, Carlos and Michelle?

Obviously the Algerian students did not face much difficulty in the intonational performance of both examples *A* and *B*. Algerian Arabic has in common with English the rising contour assigned to listing items with the exception of a falling pitch at the final syllable as illustrated in *A* (Figure 21). Although *B* requires a yes/no response and listing the elements would be confusing, the students succeeded in maintaining the rise at the last syllable of the speech chart (Figure 22).

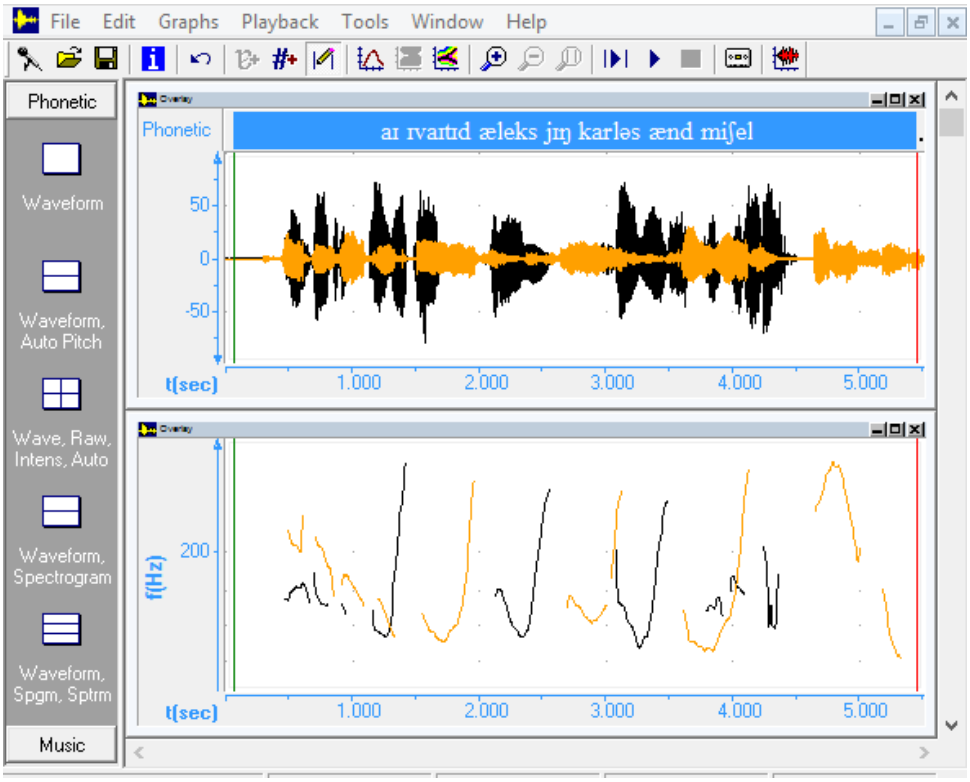


Figure 21

Listing Items Intonation Contours Performed by (1) and (2)

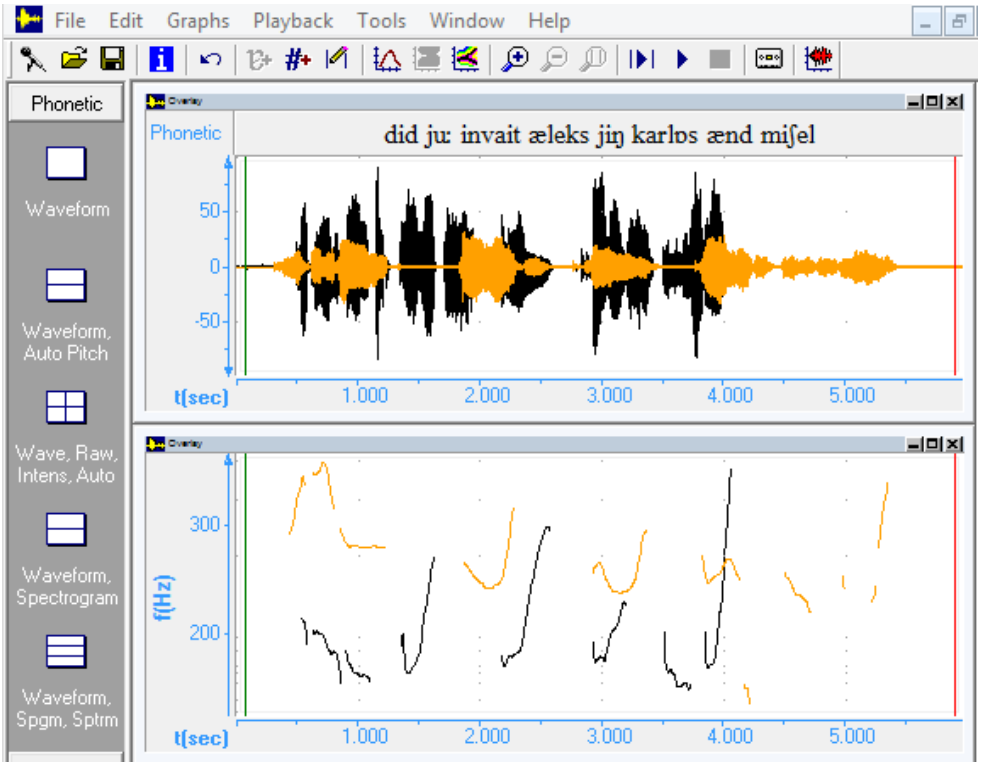


Figure 22

Example of Yes/No Comprises Listing Items Produced by (1) and (2)

4.2.4.5. Direct address

Employing direct address at the end of the utterance necessitates the name of the person to be situated separately and produced with a slight rise that is signaled with a preceding comma (Celce-Murcia , 1996; Grant, 2001). The following examples display two possible intonation patterns that express two different meanings in which in *A* Tom is being spoken *to*, and in *B* Tom is being spoken *about*.

A) Don't you see, Tom?

B) Don't you see Tom?

The collected information revealed that the Algerian non-native speakers (N=9/10) tended to adopt high pitch in both examples showing no difference at *Tom* with a low-rise in direct address *A* or *Tom* with high-rise in *B* (Figure 23 and Figure 24). Moreover, the renditions of *A* and *B* seemed to be identical requesting *yes* or *no* as a response. This attempt may indicate that the students followed the same tendency as in the production of yes/no questions in Algerian Arabic, and overgeneralized the process to direct address in English preceded by yes/no question as presented in example *A* and *B*.

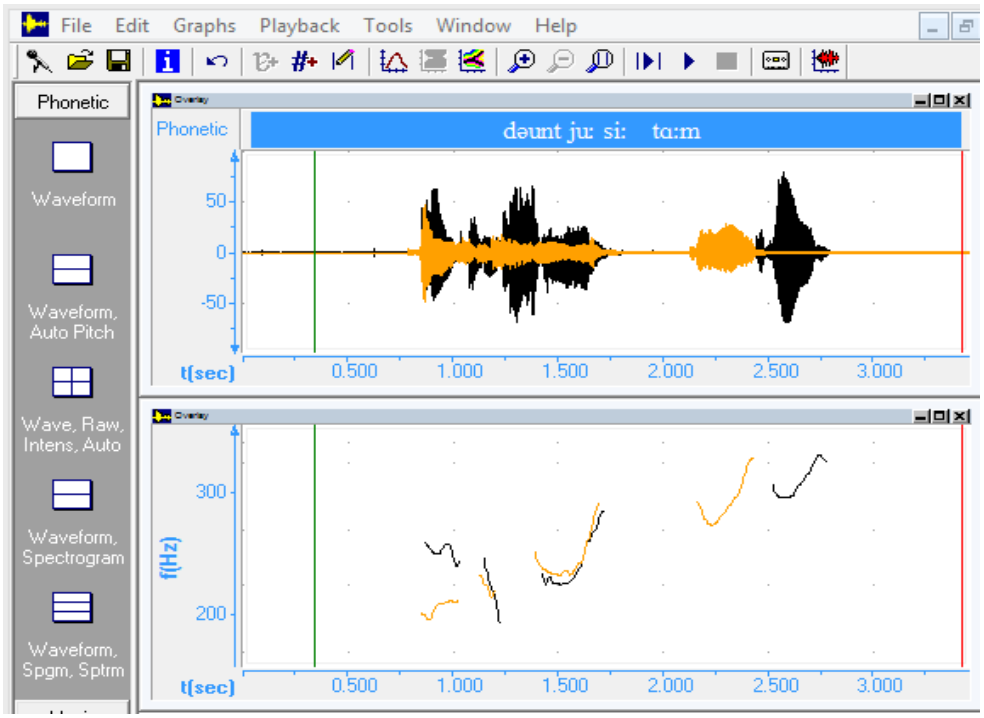


Figure 23

Illustration of Direct Address in *A* Performed by (1) and (2)

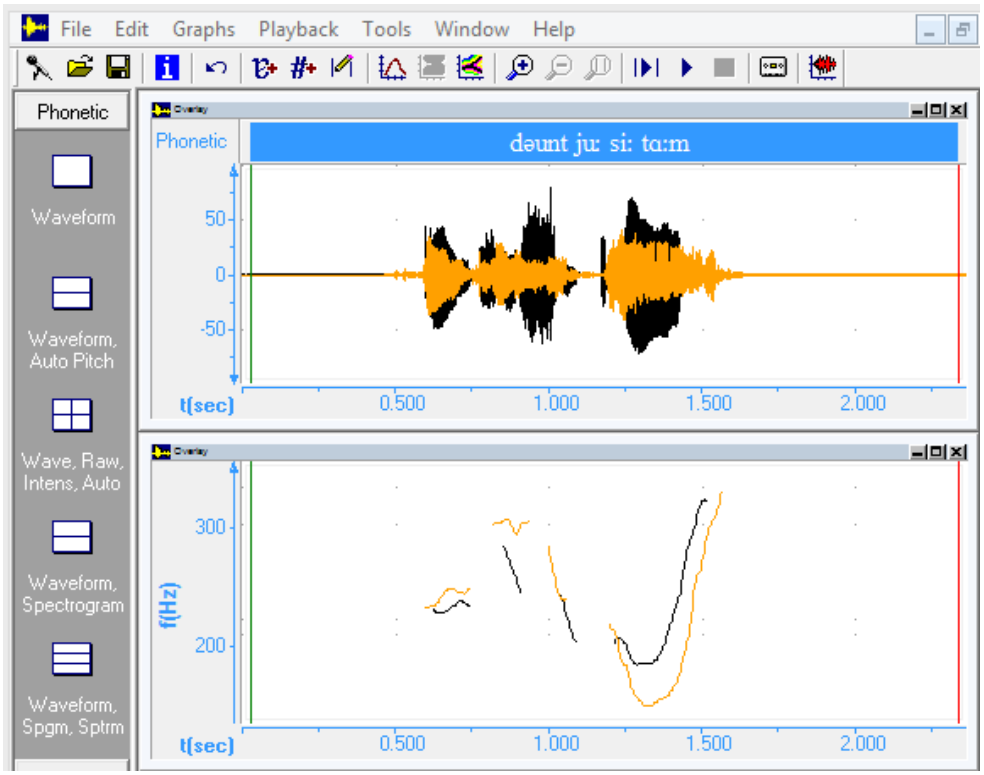


Figure 24

Illustration of Direct Address in *B* Pronounced by (1) and (2)

4.2.4.6. Statement with different falling pitch levels

One of intonation functions is to express emotions and attitudes. In the following illustration, a simple sentence is performed with different degrees of *fall* to convey particular meanings as in *A* the comment of the speaker is *perfunctory*, however in *B* the dropping pitch from high to low denotes *enthusiasm*, and the flat intonation contour adopted in *C* indicates *sarcasm* from the speaker's part (Celce-Murcia et al., 1996, p. 185).

A. Great

B. Great

C. G r e a t

The overall productions of the Algerian learners' intonation contours of the three statements are considered successful in terms of pitch fall; however, the degree to which the tone drops down in each structure was problematic. The simple statements were not used in particular context while being listened to and visualized acoustically prior to the recording phase, and this confused the learners. Furthermore, the pitch produced by the Algerian participants does not fall as low as the one rendered by the American native speakers (Figure 25, Figure 26, and Figure 27).

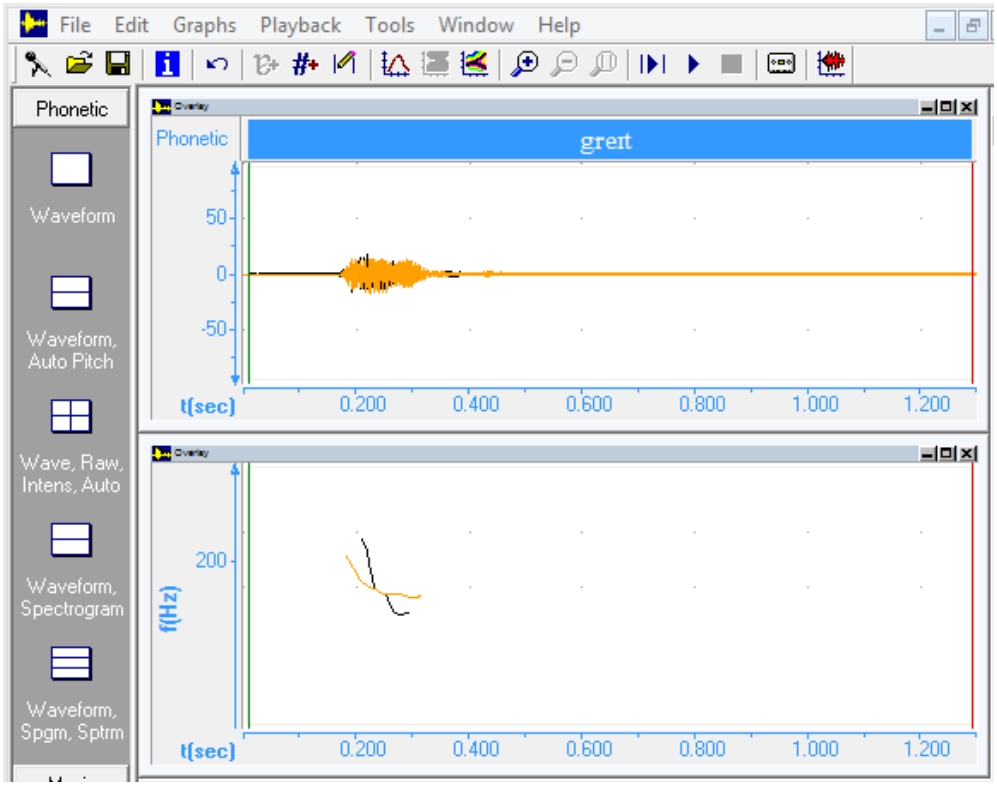


Figure 25

Sample of Statement Conveying Perfunctory Meaning Produced by (1) and (2)

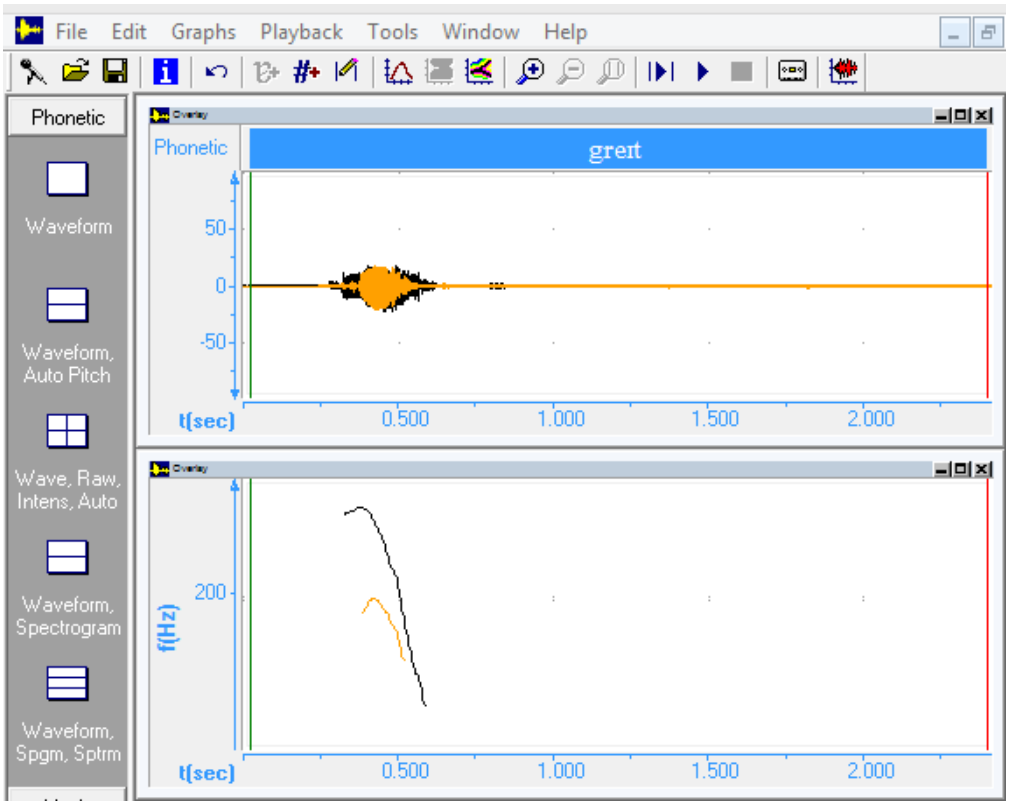


Figure 26

Example of Statement Expressing Enthusiastic meaning Pronounced by (1) and (2)

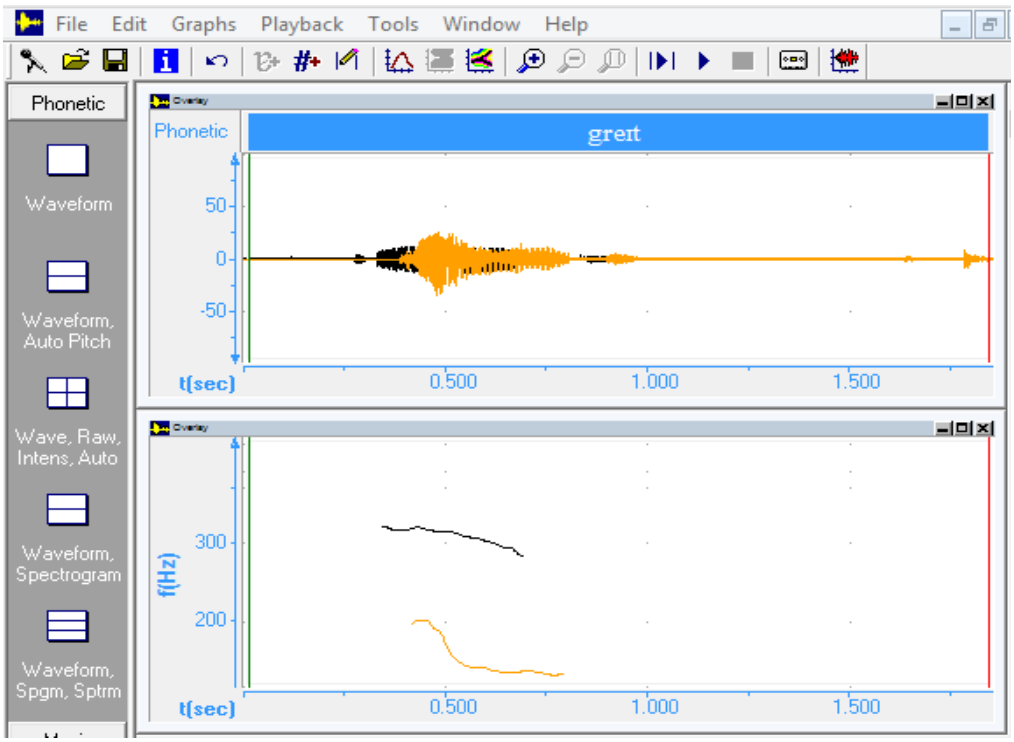


Figure 27

Illustrating Statement that Carries Sarcastic meaning Rendered by (1) and (2)

4.2.4.7. Statement in a question form type

In English, a statement can be used with a rising pattern to indicate disbelief or surprise. The statement is in the form of a question and the tonic syllable is usually the last content word. The following example *B* reveals the difference in meaning dependent on the type of pitch contour (Grant, 2001, p.113).

A) She's a grandmother

B) She's a grandmother? (You're kidding, she looks so young)

The compiled information points out that the Algerian subjects performed this type of syntactic structure with a rising-falling intonation pattern rather than a rising pitch. Expressing the attitude of surprise or disbelief in this context is influenced by the intonational system of Algerian Arabic (Benrabah, 1987, p.83). However, some students fulfilled the task successfully by adopting the rise at the first stressed syllable of the final focus word *grandmother* (Figure 28).

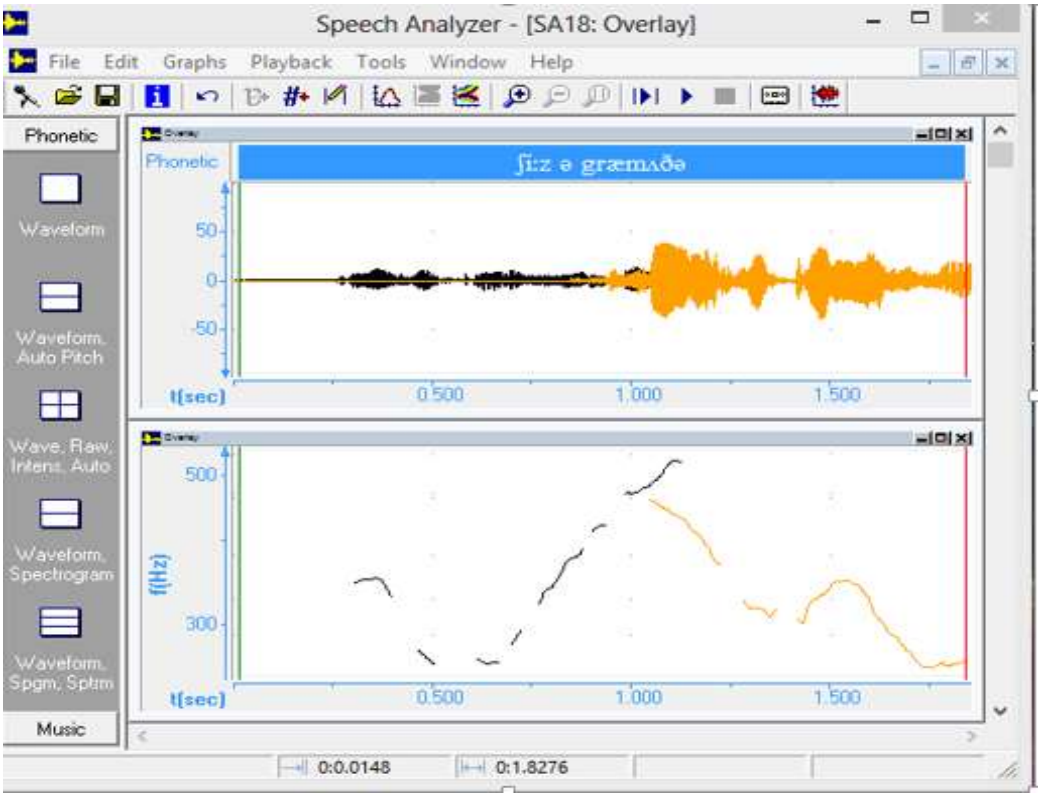


Figure 28

Example of Statement Denoting Disbelief or Surprise Pronounced by (1) and (2)

The present quasi-experimental study permitted to classify the possible sources of the intonational deviations produced by Algerian students and therefore to provide the appropriate corrective feedback. The selected English language structures revealed certain types of intonation errors that may be the result of the mother tongue transfer or related to particular individual intonation mispronunciations. In addition, the experimental group at the posttest

phase achieved better results than in the pretest phase; thus, the audio-representation of spoken English with Speech Analyzer may have helped the Algerian learners to enhance their pronunciations of the selected English language structures.

In discourse situations, foreign accents of intonational compositions are easily observed when Algerian learners render English utterances with inappropriate tonal pattern as the productions of repeated questions, amazement expressions, tag-questions eliciting agreement, echo questions, greetings, direct address, statements with different falling pitch levels, and statements denoting surprise or disbelief. Furthermore, similarities between English and Algerian Arabic in some prosodic structures facilitate the acquisition of some English intonational categories such as declarative statements, requests and commands, tag-questions signaling uncertainty, yes/no questions, and listing items. In this regard, Algerian learners may transfer not only the pitch contour but also the intonational-syntactic structures functionality from their L1 into English as in stressing the interrogative word in English wh-questions following a similar tendency of Algerian Arabic.

Some deviated structures may not be due to Algerian Arabic transfer as these errors may not have a similar form and it may occur in particular discourse situation and not in the other. For instance, Algerian EFL participants used equivalent falling pattern as their American native counterparts when rendering contrastive situations utterances; however, they misplaced the center of the intonation contour and emphasized the numeral first digit or the main verb of the sentence. Additionally, there are some exceptions related to certain tonal patterns that cannot be overgeneralized as the case of alternative questions (closed/open choice) which are usually produced by the students with a rising pitch, but in few cases, some subjects tend to adopt a pitch below middle level. Therefore, we may assume that the Algerian learners' individual differences or psychological state during the experiment stages may have affected their performances resulting in an input that cannot be clearly linked to Algerian Arabic transfer.

The comparison of American native speakers with Algerian non-native speakers' average pitch and intensity values helped to measure the extent of difficulty and success in producing English intonation patterns. The results reveal that the Algerian learners succeeded in performing certain English sentences with the appropriate tonal patterns and they achieved almost equivalent mean pitch and intensity to that of native speakers of English. Speech Analyzer allowed to contrast Algerian students' productions with their native speakers' counterparts as speech synthesis was displayed in one screen window. Praat was used mainly to extract pitch and intensity amounts of the participants' recorded renditions that are estimated automatically (Table 1 and Table 2).

Table 1

Extraction of Pitch and Intensity Values with Praat of Rising-falling and Rising Contours

Declarative Statements				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	107		79	
Algerian Student	100		75	
Requests and Commands				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	187		79	
Algerian Student	170		62	
Wh-questions Mean Pitch				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	102		76	
Algerian Student	111		74	
Tag-questions Eliciting Agreement				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	198		83	
Algerian Student	205		65	
Tag-questions Signaling Uncertainty				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	142		83	
Algerian Student	208		68	
Yes/no Questions				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	219		73	
Algerian Student	189		69	
Open-choice and Closed-choice Alternative Questions				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	Open-choice	201	Open-choice	79
	Closed-choice	188	Closed-choice	74
Algerian Student	Open-choice	197	Open-choice	77
	Closed-choice	213	Closed-choice	72
Echo Questions				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	244		71	
Algerian Student	201		69	
Repeated Questions				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	307		78	
Algerian Student	180		65	

Table 2

Extraction of Pitch and Intensity Values of Other Intonation Patterns

Greetings				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	2-3-1 Contour	209	2-3-1 Contour	67
	2-3 Contour	198	2-3 Contour	73
Algerian Student	2-3-1 Contour	258	2-3-1 Contour	64
	2-3 Contour	188	2-3 Contour	69
Exclamations				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	2-3-1 Contour	132	2-3-1 Contour	76
	2-3-4 Contour	178	2-3-4 Contour	79
Algerian Student	2-3-1 Contour	144	2-3-1 Contour	69
	2-3-4 Contour	203	2-3-4 Contour	73
Contrastive Situation Sentences				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	2-3-2 Contour	186	2-3-2 Contour	68
	2-3-1 Contour	172	2-3-1 Contour	68
Algerian Student	2-3-2 Contour	180	2-3-2 Contour	73
	2-3-1 Contour	174	2-3-1 Contour	71
Amazement Expressions				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	225		71	
Algerian Student	199		69	
Listing Items				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	104		72	
Algerian Student	178		65	
Yes/No Questions Type with Listing Items				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	101		72	
Algerian Student	172		60	
Direct Address Preceded by Comma				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	244		72	
Algerian Student	236		64	
Direct Address in Yes/No Question Type				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	211		72	
Algerian non-native speaker	212		60	
Perfunctory Attitude with Statement				
Participants	***Mean Pitch (Hz)***		***Average Intensity (db)***	
Native Speaker	209		59	
Algerian non-native speaker	201		57	

Enthusiastic Attitude with Statement		
Participants	***Mean Pitch (Hz)***	***Average Intensity (db)***
Native Speaker	263	73
Algerian Student	198	61
Sarcastic Attitude with Statement		
Participants	***Mean Pitch (Hz)***	***Average Intensity (db)***
Native Speaker	305	51
Algerian Student	198	63
Disbelief and Surprise with a Statement		
Participants	***Mean Pitch (Hz)***	***Average Intensity (db)***
Native Speaker	274	68
Algerian Student	230	67

5. Conclusion

Intonation as an indispensable feature in EFL oral communication and discourse was targeted in this research with respect to the pedagogical use of speech analysis programs Speech Analyzer and Praat. These tools facilitated the synthesis and retrieval of acoustic data and figuring out the areas of difficulty. The Algerian students' misuse of the intonation contours can result in a foreign accent that may cause misunderstanding and communication breakdowns between interlocutors. In this regard, Algerian teachers should attempt to overcome this hurdle by integrating intonation computer-based materials in EFL teaching curriculum and supplementing the traditional techniques of teaching prosody. Moreover, some accented intonation constructions may be the result of other factors besides individual differences and psychological state as the way English intonation is perceived and interpreted by Algerian students. The EFL teacher should address these issues in order to implement appropriate pronunciation instruction that fit Algerian students' needs.

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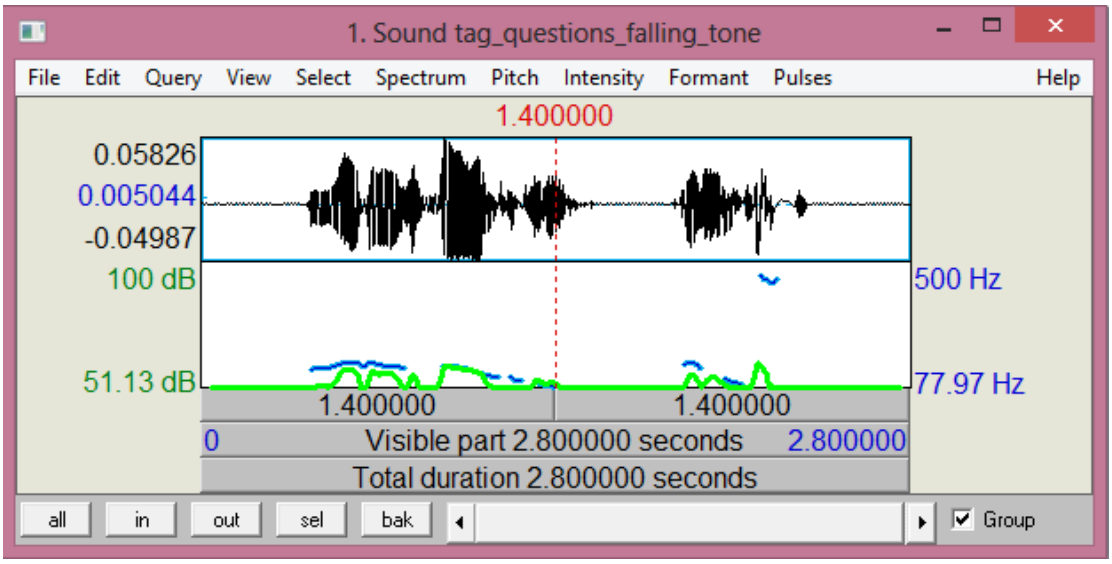
Appendix A

Praat



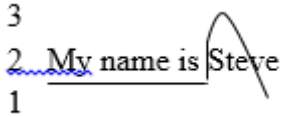
Intensity 51.13 dB

Pitch 77.97 Hz

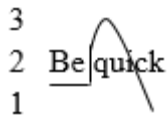
Appendix B

English Speech Corpus

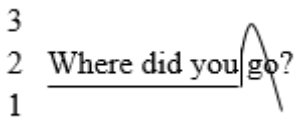
1. **Declarative Statement**



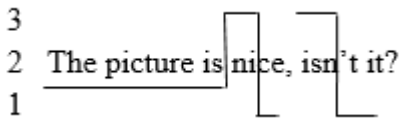
2. **Requests and Commands**



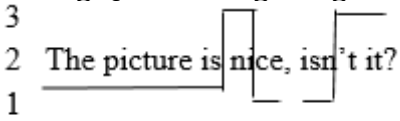
3. **Wh-questions**



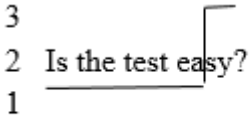
4. **Tag-questions Signaling Certainty**

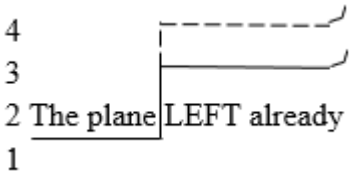


5. Tag Questions Signaling Uncertainty

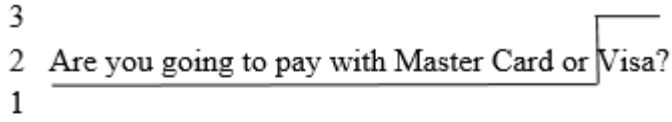


6. Yes/No Questions

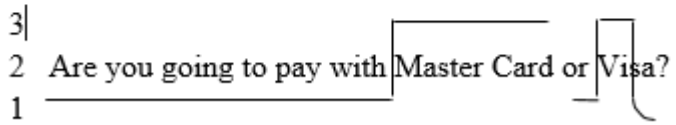




7. Alternative Questions

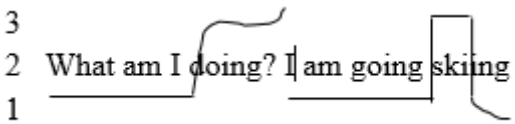


(Open Choice: Are going to pay with a credit card?)



(Closed-choice: Which credit card are you going to pay with Master Card or Visa?)

8. Echo Questions

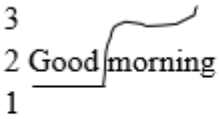


9. Repeated Questions

What's his name?

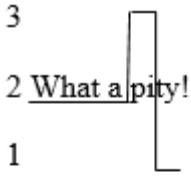
10. Greetings

(Falling contour: I am greeting you)

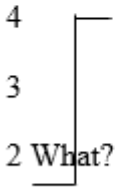


(Rising contour: as I greet you, I am acknowledging you)

11. Exclamations



(Exclamatory fall: indicates surprise)



(Extra high contour indicating disbelief)

12. Contrastive Situations

3
2 I said forty-five not forty-three
1

(Falling pitch on the second digit of the numeral)

3
2 But, I have lived in Alabama before I moved to New York
1

(Falling pitch on the auxiliary verb)

13.Amazement Expressed with a Question

3
2 Do you really like to eat Chinese food?
1

14.Listing Items

A) I invited Alex, Jing, Carlos and Michelle

B) Did you invite Alex, Jing, Carlos and Michelle?

15. Direct Address

Don't you see, Tom?

Don't you see Tom?

16. Statement with Different Falling Pitch Levels

Great

Great

G r e a t

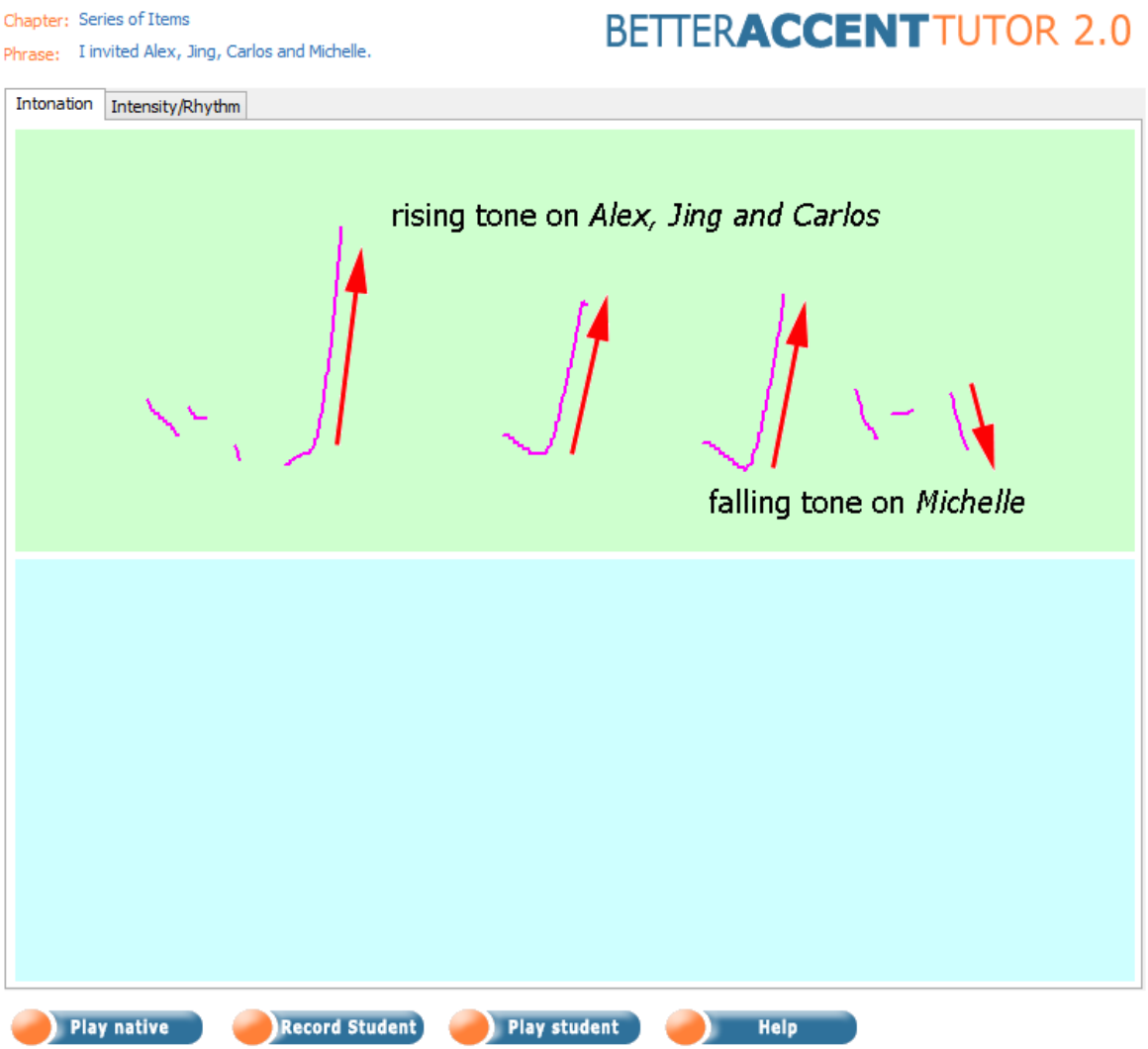
17. Statement in a Question Form Type

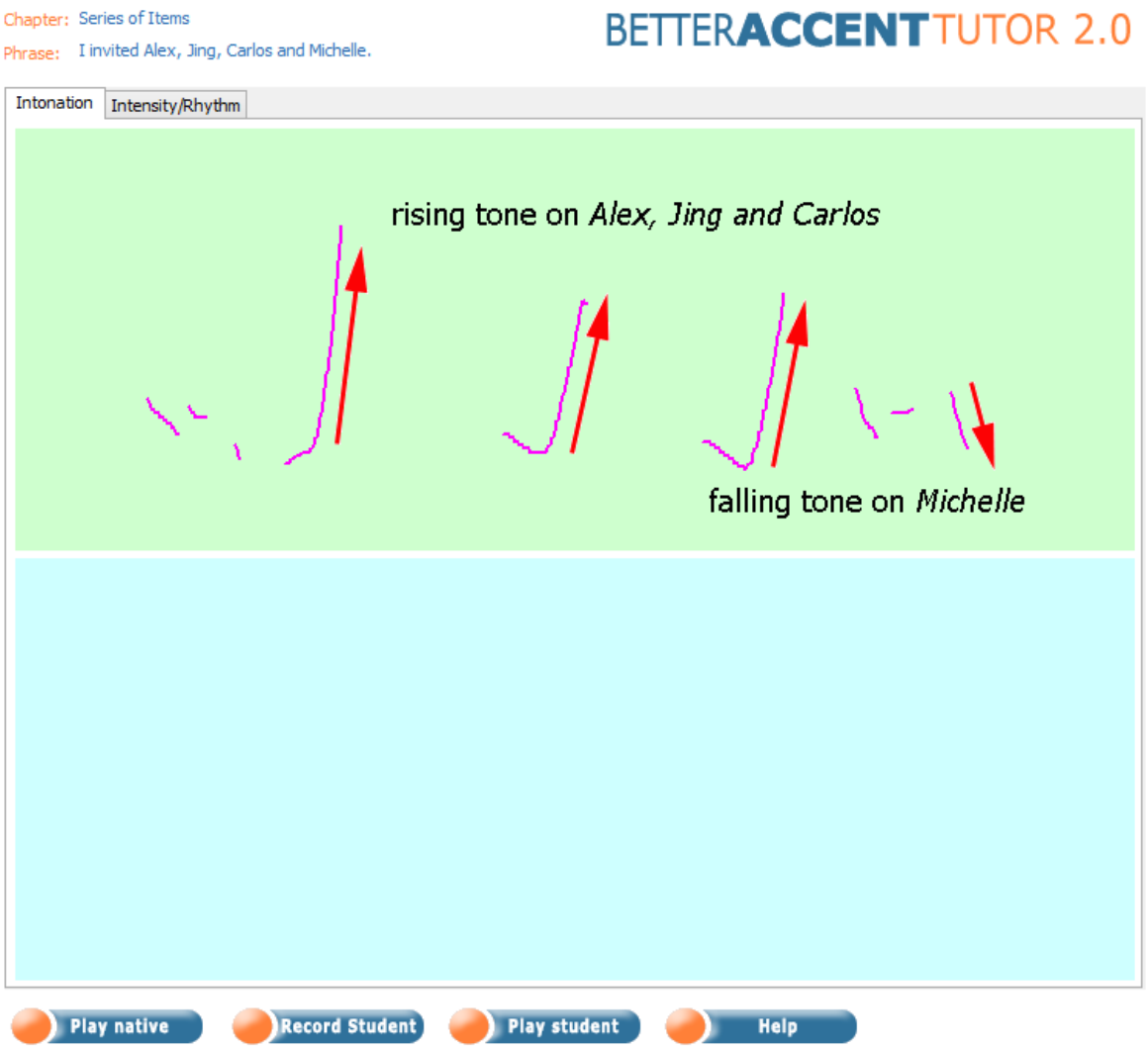
She's a grandmother

She's a grandmother? (You're kidding, she looks so young)

Appendix C

BetterAccent Tutor Linguistic Structures




Chapter: Series of Items
Phrase: I invited Alex, Jing, Carlos and Michelle.
BETTERACCENTTUTOR 2.0
Intonation
Intensity/Rhythm
rising tone on Alex, Jing and Carlos
falling tone on Michelle
Play native
Record Student
Play student
Help