

Teaching Word Stress Patterns Of English Using A Musically-simulated Technique

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Abstract

The correct placement of word-level stress is a main concern in EFL speech intelligibility training. It is particularly important for EFL learners who have a drastically different stress system in their L1 (e.g. Persian). These learners usually misplace the primary stress in their L2 which subsequently may interrupt the flow of communication and leads to unintelligibility. Therefore, the present study explored the effect of musically-simulated patterns, as a new teaching technique, on the learning of word stress patterns of English. Musically-simulated patterns were defined in the context of the study as impressionistic patterns which were acoustically similar to word stress patterns of English. 30 Iranian EFL elementary learners at a language institute participated in the study. The new technique was used to teach four stress patterns of two- and three-syllable English words. The results of the posttest indicated that the participants in the experimental group (who listened to musically-simulated patterns) obtained significantly higher scores. Moreover, two-syllable words appeared to be more positively influenced by these musical patterns. It is suggested that L1 negative transfer and the inherent cognitive complexity of the stress patterns may contribute to the varying effect of these musical patterns. Finally, the possible applications of using this technique at both levels of material development and classroom practice are discussed.

Keywords: word stress, Iranian EFL learners, musically-simulated patterns, Persian language, teaching stress.

Introduction

As Celce-Murcia et al. (1996) state word-level stress plays a major role in EFL speech-intelligibility training. In fact, for comfortable intelligibility which is needed for the interaction between native and non-native speakers, correct word stress is essential. Since

polysyllabic words permeate English lexical system, EFL learners need to be familiar with—and to be able to work with—word-level stress if their speech is to be comprehensible to proficient English speakers (Murphy, 2004). Patterns of word-level stress provide essential signals to English language listeners as they attempt to make sense of incoming messages (Aitchison, 1994). Word stress is also an important aspect of vocabulary knowledge (Nation, 2001). Even young infants store the stress information about the words, including the position in which the stressed syllable occurs in their memory (Curtin, 2010). Moreover, EFL learners who correctly place the primary stress of new vocabulary have a greater chance to remember and use the same vocabulary in their L2 speech (Aitchison, 1994; Levelt, 1993). Additionally, they are more likely to be successful at phrase, sentence, and even broader discourse levels. Finally, EFL learners with adequate control over word stress placement can be better L2 listeners since English stress and rhythm patterns are navigational guides for listening (Gilbert, 1994).

In English, word stress must be assigned to over 90% of all words to be regarded as correct in terms of pronunciation and their syntactic, semantic aspects. (Arciuli *et al*, 2010). In a polysyllabic English word, primary stress often falls on the first syllable while other syllables receive no or weaker degrees of stress. (Ladefoged, 2006). Therefore, word stress system of English is predominantly ‘trochaic’. That is to say, English words begin with a strong syllable. An English listener is three times more likely to encounter a word with the primary stress on the first syllable than on other syllables (Cutler and Carter 1987).

The trochaic nature of English stress system (i.e. with primary stress on the first syllable) is in contrast with Persian stress system where instead of the first syllable, it is often, the *final* syllable which receives the primary stress. This cross-linguistic difference results in Iranian learners’ misplacement of word stress in English words (Yarmohammadi, 2005). As a result, Iranian EFL learners quite frequently mispronounce English words by placing the primary stress on the final syllable. Such an error cannot be ignored because it may interrupt the flow of communication and leads to unintelligibility (Yarmohammadi, 2005). Therefore, it seems essential to teach English stress patterns to Iranian EFL learners as well as other EFL learners whose first language (L1) is significantly different from English in terms of word stress patterns.

Literature Review

Nowadays, the communicative function of suprasegmental features of English is widely recognized (Goodwin, 2001). Moreover, beginning in 1980s, there is, now, a greater emphasis on teaching broader aspects of phonology than isolated sounds (Pennington & Richards, 1986). While ELT writers have vastly replied to this communicative resurgence of pronunciation in general and word stress in particular, little variation can be observed in their teaching materials and books in comparison with those of the past (Gilbert, 1994). That is to say, in such materials, primary stress is almost invariably indicated by bolding, underlining, capitalizing the corresponding syllable or more recently by putting different-sized circles on the stressed and unstressed syllables. However, such techniques have

important drawbacks which may cause further confusion on the part of learners. For instance, they entail a decision on syllable boundaries which is not an easy matter in English (Kenworthy, 1987).

A common characteristic of these techniques is that they are all *visual*. Interestingly, however, Chela Flores (1998) has proposed an auditory technique in which learners first listen to their teachers saying nonsense syllables with varying loudness to indicate primary stress. For instance, the teacher may say 'ti TA ti' with the second syllable ('TA') louder to indicate a three-syllable word with the primary stress on the second syllable such as 'director'. As Goodwin (2001) points out through such technique we may be able to assure that EFL learners have specifically paid attention to the stress pattern of a given word before tapping other aspects of its use.

Although somewhat different in her approach, Fischler (2005) also investigated whether the overall non-native speakers' intelligibility and allocation of word stress patterns could be improved through explicit instruction of stress rules and practice with rap music. Through a four-week course with six ESL learners (including one with Persian as his/her L1), having instructed the word stress patterns rules, the researcher asked the participants to practice rap songs in and out of class. They were also asked to pay attention to the placement of primary stress in the words of the lyrics. In addition, the participants were required to give their feedback on this new practice. The researcher finally concluded that the participants' stress assignment improved and they liked the practice in general.

In accordance with the notion that learners may benefit from learning word stress patterns first out of context and the possible effects of music and language integration, the present study, explored the effect of a new auditory technique (musically-simulated patterns) in teaching four word stress patterns of English. While it is widely accepted that many acoustic features of speech such as pitch, tone, duration and prominence resemble those of musical melodies (Ladefoged, 2006), the idea of using musical patterns to simulate speech prosodic properties is, to the best of the researchers' knowledge, still novel and intact. In fact this is the very point at which this study aims.

Aspects of music-language relationship

There are long-established historical, cultural and (to a less extent) cognitive links between language and music (see Jackendoff, 2009 for further information on different aspects of music and language relationship). However, in the following section only the cognitive aspect of language and music relationship is briefly considered to see to what extent recent research indicates that language and music are similar in terms of brain's mental processes.

Neurological perspective

Despite the fact that biomusicology is rather young, research in this field indicates that language and music share some significant cognitive processes (McMullen & Saffran, 2004; Jackendoff, 2009). For instance, Patel (2008) presents experimental evidence that

the hierarchical structures of language and music, although formally distinct, are integrated by the same part of the brain, roughly the Broca's area. Vuust *et al* (2011) also suggest that the processing of metric elements in music relies on the brain areas that are also involved in language processing. In addition, it seems there are similar developmental cognitive underpinnings in both language and music. Therefore, as McMullen & Saffran (2004) indicates, similar mechanisms of learning and memory might subserve the acquisition of knowledge in these two domains. Furthermore, it seems the violations of rules and memory in music correspond to those observed in language (Ullman, 2007). Studies conducted so far also indicate to some extent that there are similar priming effects, auditory structuring, conscious and subconscious processes involved in the recognition and interpretation of music and language (see Mc Kevitt *et al*, 2002 for a review of these studies). As Ullman (2007) points out, these findings open up exciting new ways of thinking about and investigating the relationship between language and music, two fundamental human capacities.

The Study

To investigate the effect of musically-simulated patterns on the learning of word stress patterns of English, four word stress patterns were taken into account:

1. Two-syllable words with the primary stress on the first syllable (e.g. pi.lot).
2. Two-syllable words with the primary stress on the second syllable (e.g. Ja.pan).
3. Three-syllable words with the primary stress on the first syllable. (e.g. com.pa.ny).
4. Three-syllable words with the primary stress on the second syllable (e.g. di.rec.tor).

Methodology

This study employed an experimental design in which 30 participants were randomly divided into two equal-sized groups: Group one (who received musically-simulated input) and Group two (who did not receive any musical input). Both groups went through a similar teaching procedure except that group one (the experimental group) was exposed to the musically-simulated patterns of word stress while group two (the control group) was deprived of it (see section 4 for further information on how the actual teaching took place).

This study was carried out based on the following questions:

1. What effect do musically-simulated patterns (the proposed technique) have on learners' correct placement of primary stress in English words?
2. Do these musical patterns affect two- and three-syllable words to the same extent?
3. Which musically-simulated pattern is the most effective one?
4. What do learners think of the new technique? Do they suggest its use in future?

Participants

The participants of the study were 30 Iranian elementary EFL learners at a language institute in Isfahan, Iran during the spring semester of 2010. All the final participants in this study were male junior high school students. Thus, they had quite the same educational background. Moreover, their age ranged from 13 to 16 years old (with an average of 14.5 years old). In addition, all the final participants were from the same hometown, Isfahan, and with no notable difference in their social class. Furthermore, since this study was somehow concerned with the possible positive and particularly negative effect of L1 on L2, the population was scrutinized carefully to discern the participants' linguistic background. Through this process, few learners were removed from the researcher's scope because they spoke a notably different accent or language in comparison with Persian. For instance, three learners were removed because although they were fluent Persian speakers, they dominantly spoke Turkish. Therefore, the final 30 participants came from the same linguistic background.

Finally, since any prior knowledge or experience regarding music could affect their performance on the task, the participants were asked to indicate if they had already received any instruction on music or not. Four learners were removed from the scope of this study because they had already attended music classes for sometime ranging from six months to three years. An interview with the teaching board of the language institute on the participants' English background; was also made to ensure that none of the final participants had prior instructed familiarity with the aforementioned word stress patterns.

Instruments and materials

Placement test

Longman Placement Test designed by Longman Pearson Education was used to ascertain learners' current level of language proficiency. This multi-skill test neatly placed learners into one of the four proficiency levels (Elementary, Lower intermediate, Intermediate, Upper intermediate). The reason for choosing this placement test was that the test was constructed based on Longman Top Notch English books (also published by Longman Pearson Education) which were used as the teaching material at the institute. Therefore, content and context validity of the test was more certain. In addition, the test's reliability was estimated sufficiently high (0.83). Finally, the institute's records of previously administered Longman Placement Tests showed that Longman Placement Tests had high criterion validity in comparison with Oxford Placement Test and Nelson Test.

Musically-simulated patterns

Guitar Pro 5, a musical software was used to produce and export the intended musically-simulated patterns in appropriate file formats. To do so, each syllable in a given word was replaced by a musical note in the software. Therefore, a three-syllable word such as

‘director’ was represented by three musical notes. On the whole, the musical notes used in the simulations were B, C and G (see Appendix A for information on their relevant acoustic characteristics). The reason behind this selection was quite impressionistic in nature. That is to say, after trying different musical note combinations, these notes seemed to represent the intended syllable distinctions better than other possible notes. While this selection was mainly based on the researchers’ musical intuition at first, in the piloting phase, music experts were also consulted with in this regard. To indicate word stress musically, a musical note with relatively greater loudness (or sound intensity) was chosen to represent the stressed syllable. Moreover, further musical effects were applied on the musical notes to improve the distinction between them (see appendix A). Then, they were produced in two formats: In MIDI which is a kind of audio-file format like Mp3 that was used as the audio input for the participants and BMP which is a common image-file format used here to show how they musical patterns looked like.

It was a priority of high importance to make sure these patterns could sufficiently represent the equivalent word stress patterns under investigation. In so doing, two validation processes were conducted in parallel. Firstly, the musically-simulated patterns were field-tested with a group of 15 elementary EFL learners. They were asked to listen to and comment on how they perceived these musical patterns. Their comments on the patterns and the extent they could realize the word stress patterns led the researchers to make a number of alterations on the musically-simulated patterns at issue. These alterations were mostly concerned with either of the following acoustic features:

1. Acoustic saliency or prominence: During the piloting phase, it was observed that some participants had some difficulty in distinguishing the higher musical note (equivalent to the stressed syllable) from the one or two lower notes (equivalent to the unstressed syllables). Therefore, it was decided that an ‘accent’, (as it is called in musical terms) was to be added, to the higher musical note to increase its relative saliency. ‘Accent’ is actually a type of musical effect that increases the loudness of a musical note that is shown by the symbol “^” in musical notation. In practice, accent is exercised by playing a musical instrument more forcefully (e.g. by plucking a guitar’s string or pressing a piano’s key more forcefully).

2. Acoustic length: During the piloting phase, it was also revealed that a few participants had some difficulty in distinguishing the second musically-simulated pattern representing words such as ‘Japan’ with the primary stress on the second syllable. Therefore, a ‘lengthening effect’ was added to the second or higher musical note so as to increase its acoustic distinction. ‘Lengthening’ is actually a type of musical effect that increases the duration of a musical note that is shown by the symbol “.” in musical notation. In practice, lengthening is exercised by holding a musical instrument in a certain state longer (e.g. by holding down a guitar’s string or pressing constantly a piano’s key longer).

In addition to this validation process, the researchers asked a number of music and language experts at University of Isfahan to comment on the musical patterns at issue.

Fortunately, after some alterations which were, in essence, similar to the ones mentioned by the participants the produced patterns could win the favor of these experts.

The above-mentioned alternations were made and the produced musical patterns were once again field-tested. This time, all the patterns were successfully indentified as the *good-enough* representatives of the intended word stress patterns.

Posttest

An aural recognition posttest was designed to ascertain how group 1 (who received musical input) differed from group 2 (who did not receive it). The posttest had two parts measuring the participants' ability to recognize the four stress patterns of two and three-syllable words. Either part (A and B) contained eight items in which the participants were asked to identify the word that sounded different based on the aural input they listen to (see section 4 for further information on the administration of the test). Four items tested the stress pattern in which the first syllable received the primary stress and the other four items tested the second possible pattern (i.e. the second syllable received the primary stress). The test items were randomly shuffled. Therefore, it could not be guessed which stress pattern was aimed without the necessary knowledge intended. Wrong or unanswered items were not negatively scored, either.

The posttest was also piloted in order to ensure that, among others, the instructions of the test were clear and the items of the test were not ambiguous. Some revisions were made to ensure the appropriateness of the test after the piloting stage (see, however, section 7 for some limitations of and suggestions for the posttest).

Survey

A survey was also designed to ascertain the participants' thoughts about the treatment they had received. In this survey, first, the participants were asked to express their extent of agreement or disagreement on a five-point Likert scale and secondly answer some essay-type questions which, in all, were about the participants' first experience with or exposure to the musically-simulated patterns, and the possible usefulness of the technique and its utilization in future instruction (see appendix C). Since the participants were elementary learners, they might not be able to express their opinions fully in English. Therefore, they were permitted to write either in English or in their first language, Persian.

Target Words

24 English words were selected to be taught to both groups of participants. These words were equally classified into four groups based on the four word-level stress patterns under investigation. Each group of words contained six words with the intended stress pattern (e.g. two-syllable words with primary stress on the first syllable). The selected target words were ensured to be unknown to all of the participants at the time of experiment and within the participants' L2 lexical competence, based on a checklist of

200 words (including the ones in the study) which were previously identified as 'elementary' by the researchers and were also checked 'unknown' by the participants at the time they sat for the placement test.

Procedure

Firstly, 60 EFL learners at the institute sat for the placement test. The test administrators justified the test as a part of the curriculum and sufficient time to answer the test items was allotted. Then, the answer sheets were carefully scored. 45 learners were identified as elementary. Finally, imposing further restrictions on the participants to reach maximum homogeneity, 30 learners were selected for the study (see section 3.2. for further information on the final participants).

Two male EFL teachers with sufficient knowledge of English language especially the correct placement of word stress and experience in teaching English at the institute were chosen as the instructors of the two groups. They were sufficiently informed and instructed by the researchers on how to conduct their teaching in the classroom based on the research design. In particular, the teacher who was going to apply the musically-simulated patterns (group one) was trained so that he would be able to follow the intended teaching procedure by the researchers. Then, during one session and within the framework of the classes' lesson plan, 24 target words were taught by the teachers. The participants were asked to listen to the audio input very carefully. Group one's teacher played the musically-simulated pattern for two syllable-words with primary stress on the first syllable twice. Then, the six related target words (see section 3.3.5 for information on the target words) for this pattern were introduced to the participants and practiced once. The same procedure was followed for the other three patterns under investigation. It is worth mentioning that the graphical notation of the musical simulations (as shown in Appendix A) was not introduced to the participants.

The teacher in group two, however, used the traditional way of teaching English stress. First, the participants were asked to listen to each group of target words carefully. Then, the placement of primary stress was indicated by the teacher. The participants were subsequently asked to repeat the target words after the teacher. Great care was exercised to have the same teaching procedure in terms of the given words, teaching/practice time/amount, etc. so that the possible observed differences between the two groups would be, to the greatest extent, the effect of musically-simulated patterns.

After conducting the treatment, the participants in either group participated in a different task in the classroom for some time to prevent the effect of short-term memory. Afterwards, the participants sat for the posttest in a language laboratory. They listened to each test item twice. There was a three-second interval between each played word in an item and a ten-second interval between the first and the second time of playing each item. In other words, after three seconds the participants listened to the next word in each item and after 10 seconds of silence the words in each item were played for the second time. In addition to this posttest, participants in group one received a survey on the musically-simulated patterns as well. Also, the test and the survey were justified as a part of the

participants' regular classroom activity by the teachers. Therefore, they remained motivated enough throughout the experiment. The total score was 16. Each main section had 8 points and each subsection had 4. The reliability of the test was estimated at 0.79.

Data Analysis and Results

The participants' answer sheets were carefully scored by an experienced colleague and the researchers themselves. The inter-rater reliability was 0.81 for the Placement Test and 0.87 for the posttest. To see whether or not the two groups' performance on the posttest was significantly different, their posttest scores were compared through an independent-samples t-test using SPSS. It is worth mentioning that before running this test, the statistical prerequisites for running a parametric test such as t-test (e.g. normality) were assured. In addition, following American Psychological Association (APA) guidelines which strongly recommends researchers to calculate the 'effect size' for primary outcomes (Dornyei, 2007), the effect size was calculated for the t-test.

Moreover, to see how the participants regarded their experience learning stress patterns through musical input, the survey was analyzed. As for the first part of the survey, the percentage of any statement for each of the five points of the scale was calculated to be used later. As for the second part, the answers were studied carefully and the main themes of the answers were identified for later analyses and discussions.

Comparison of group one and two

To explore the first research question (i.e. what effect does providing learners with musically-simulated patterns may have on their learning of word stress patterns of English), an independent-samples t-test was run on the scores obtained from the posttest for both groups. The difference in the mean scores of the two groups reached statistical significance (Group one: $M= 13.6$, $SD= 1.99$; Group two: $M=9.73$, $SD=2.91$, $t(28)= -4.24$, $p<.05$.)

Since SPSS did not provide the effect size, it was calculated through 'eta-squared' using the following formula (N refers to the size of the groups):

$$t^2 / t^2 + (N1+N2-2)$$

Based on (Dornyei, 2007), the usual interpretation of eta-squared is that .01= small effect, .06= moderate effect and .14= large effect. Here, the eta-squared is .39 which means the difference observed between the groups is not only statistically significant (resulted from T-test procedure) but also notably important (resulted from eta-squared procedure).

Comparison of two and three-syllable words

The second research question addressed the effectiveness of the musically-simulated patterns in regard to two or three-syllable words. To find a plausible answer, a t-test was run on the scores obtained from group one (the experimental group) for two and three-syllable words. Results showed that there was a statistically significant difference in

scores for two-syllable words and three-syllable ones ($M= 2.46$, $SD= 2.03$, $t(14)= -4.7$, $p<.05$) .

Comparison of four stress patterns

As for the third research question regarding the most effective word stress pattern, the study bore mixed results. That is to say, while the musically-simulated patterns appeared to be significantly more effective for two-syllable words with the primary stress on the second syllable ($M= -1.06$, $SD= 1.1$, $t(6)= -3.75$, $p<.05$), the same effect was not observed for three-syllable words regardless of where the primary stress fell ($M= -.4$, $SD= 1.18$, $t(6)= -1.3$, $p<.05$) .

Analysis of the Survey

To investigate the fourth question, the participants' responses to the survey were analyzed and its major themes were drawn as indicated in the two following sections.

Analysis of Likert-scale Statements

The statements in the five-point Likert scale were analyzed to see if the participants generally agreed, disagreed or felt undecided about the treatment (i.e. musically-simulated patterns). Generally, the participants in the experimental group liked the new technique (see Figure 1)

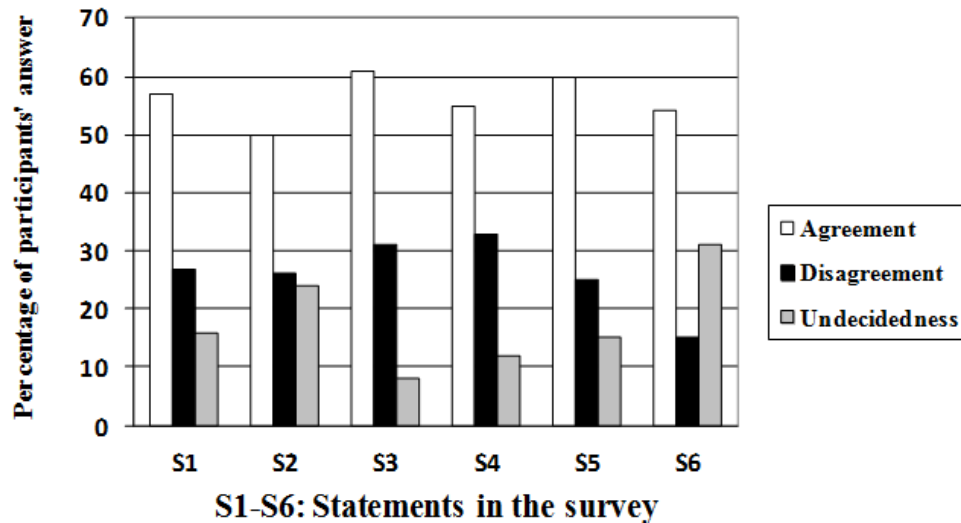


Figure 1: Participants' view on musically-simulated patterns

Analysis of essay-type questions

The second part of the survey contained some essay-type questions. These questions were aimed to shed more light on the learners' perspective and to tap the aspects that were not included in the first part of the survey. In general, the participants mostly referred to few possible technical problems that may arouse in large-scale implementation of such a technique. For instance, since to fully benefit from this technique, the setting (e.g. a language classroom) should be calm and quiet, some participants in a way or another had suggested that the setting should maximally be prepared in advance. In sum, the majority of participants had found this technique interesting and they were in favor of its utilization in future. Yet, subtle differences in their viewpoints almost abound which may be due to differences in learning styles (Wilhelm & Pei, 2008; Chalak & Kassaian, 2010). For example, some participants had suggested a mixture of different techniques. That is to say, they preferred to benefit from both a graphical representation of word stress (e.g. with the use of different-sized circles above words) as well as innovative techniques such as the one proposed in this study (i.e. musical simulations). Furthermore, some others thought that it was more beneficial to use this technique for some specific stress patterns while keeping the traditional techniques for the rest. For instance, some participants had suggested that this technique would be more appropriate for two-syllable words and/or sometimes three-syllable ones. They thought for three- or more syllable words, it might not be easy to understand the stress distinctions made in musical simulations.

Discussion

The first research question was concerned with the overall effectiveness of musically-simulated patterns as a new technique to teach various word stress patterns of English to EFL learners especially those whose first language stress system is drastically different. On the whole, the findings of the study showed that these musical patterns can be very helpful in this regard. Yet, any generalization based on this study should be done with caution (see section 7 for information on the limitations of the study).

Regarding the second research question, the findings revealed that musically-simulated patterns were more effective for two-syllable words than three-syllable ones. While further research is definitely needed, the simpler structure of two-syllable words with their somewhat less cognitive load may be the reason (see Balota and Marsh, 2004 for a related discussion). Likewise, musically-simulated patterns representing two-syllable words may be inherently more distinctive and easy to understand than those of three-syllable words.

The third research question sought to find out which stress pattern enjoyed the highest effectiveness. In this regard, the findings revealed that musically-simulated patterns were most effective for two-syllable words with the primary stress on the second syllable which might be due to the negative transfer from L1 because in Persian the primary stress often falls on the final syllable (Yu & Andruski, 2010). Musical patterns, however, had the same effect on three-syllable words no matter where the stress fell perhaps because

firstly, the aforementioned effect of the participants' L1 could not be applied and secondly the musical patterns for three-syllable words had no acoustic advantage over each other.

As for the fourth research question, More than 60 percent of the participants were in favor of musically-simulated patterns. Furthermore, the remaining 40 percent felt more undecided about this new technique rather than being completely disagreed. Perhaps, with some adjustments, they would like the musical patterns as well.

Finally, based on the participants' responses to the essay-type questions of the survey, it seems essential to equip language classrooms with high-quality players so that learners can hear the musical input well. Moreover, as far as possible, there should be no extra noise from outside of the classroom while listening to musical simulations.

Conclusion

The primary aim of this research was to investigate the effect of musically-simulated patterns on the learning of word stress patterns of English. The results showed that the proposed technique may be notably beneficial to EFL learners particularly the ones who have a quite different stress system in their mother tongue as it is the case with Iranian learners of English. Although the overall effectiveness of musical patterns was empirically reinforced to some extent through this study, it is still worth noting that even via this technique the learners' success in learning the stress patterns of English might be partial. However, this technique seems to have the potential of excelling the traditional techniques currently used. Simple production of these musical patterns makes this technique quite feasible to be exploited by English teachers in language classrooms. Moreover, at material development level, ELT writers can make use of this technique as a part of their English books to teach word stress pattern of English words.

The present study had a number of limitations which should be taken into account before any generalization. Firstly, the study was conducted with 30 learners at one language institute which is minimally acceptable. Secondly, only male teenagers at an elementary level of language proficiency took part in the study. Finally, the posttest merely assessed the participants' ability to *recognize* different word stress patterns based on the aural input.

Future studies can undertake a similar experiment including female participants or other proficiency levels such as intermediate to see to what extent the proposed technique can be helpful. Additionally, a different age group such as children or adults can be chosen as the participants of the future's studies to see how its effectiveness differs within different age groups. Finally, interested researchers can also make use of oral tests to measure the possible effect(s) of musically-simulated patterns both in recognition (as in this study) as well as *production* of different word stress patterns.

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Appendix A

Musically-simulated Patterns

When necessary, two musical effects were added to the highest musical notes to increase their relative saliency. These effects are shown by the symbols “^” (for accent) & “.” (for lengthening) in musical simulations. Accent increases the intensity whereas lengthening increases the length of musical notes.

The frequency of musical notes used in the simulations is: G= 783.99, B= 493.88 and C=523.25 Hz (assuming A₄ = 440 Hz, speed of sound = 345 m/s and ‘Middle C’= C₄ as reference).

Simulation1: Two-syllable word with the primary stress on the first syllable

Simulation 2: Two-syllable word with the primary stress on the second syllable

Simulation3: Three-syllable word with the primary stress on the first syllable

Simulation 4: Three-syllable word with the primary stress on the second syllable

Appendix B

Word Stress Patterns Posttest

Instruction: Listen to each set of words in parts A and B carefully. Then listen again and underline the one with a different stress pattern.

Example: a. Teacher b. Police c. Funny d. Husband

A.

- | | | | |
|------------|--------------|-------------|-----------|
| a. Pilot | b. Copy | c. Japan | d. Water |
| a. Routine | b. Delete | c. Forget | d. Finish |
| a. Beside | b. Borrow | c. Hotel | d. Reply |
| a. Pencil | b. Ruler | c. Daughter | d. Design |
| a. Return | b. Dollar | c. Sister | d. Cookie |
| a. Believe | b. Motel | c. Thirty | d. Behind |
| a. Quiet | b. Technique | c. Manner | d. Player |
| a. Sunny | b. Sixteen | c. Mistake | d. Occur |

B.

- | | | | |
|---------------|--------------|---------------|---------------|
| a. Company | b. Hamburger | c. Motorcycle | d. Director |
| a. Computer | b. Deliver | c. Reference | d. Eleven |
| a. Restaurant | b. Intention | c. Explosive | d. Examine |
| a. General | b. Important | c. Telephone | d. Digital |
| a. Dinosaur | b. Beautiful | c. Argument | d. Suggestion |
| a. Helicopter | b. Harmonic | c. Inversion | d. Terrific |
| a. Citizen | b. Follower | c. Chicago | d. Orchestra |
| a. Apartment | b. Internet | c. Potato | d. Relation |

Appendix C

Musically-simulated Patterns Survey

Dear respondent,

This survey is intended to investigate ‘musically-simulated patterns’ a technique in teaching and learning word stress patterns of English as a foreign language to Iranian learners.

Instructions

A. Indicate the extent of your agreement or disagreement with the following statements by checking the appropriate place corresponding to your opinion about each statement.

Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1. I found this technique interesting.					
2. The musical patterns were hard to understand.					
3. It helped me learn the stress patterns easier.					
4. It helped me remember the stress patterns easier.					
5. I could match the musical patterns with the words.					
6. I think it should be used in teaching stress patterns in future.					

B. Answer the following questions (either in English or Persian).

1. Did you face any problems during this technique? If so, what were they?
2. What are the negative or positive points about this technique?
3. What do you suggest to improve it?

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