The Effect of Music Composed as an Input Mode on High Intermediate L2 Learners' Knowledge and Retention of the Meaning of Difficult English Words

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Abstract

The present quantitatively-driven mixed methods study aimed at exploring the effect of musical input as a mode on intermediate L2 learners' knowledge and retention of difficult words. The data were collected in two phases. In the experimental phase, quantitative data were collected from 40 learners. An innovative method was used for the purpose of developing the treatment in the quantitative phase. That is, we composed music for each difficult word to be utilized as an input mode in the treatment condition. In the qualitative phase, a subset of the quantitative sample took part in the semi-structured interviews. The quantitative results of this explanatory mixed methods study showed that the use of music as a mode positively affected the learners' learning and retention of the meaning of difficult words. However, the qualitative findings did not fully confirm the quantitative results.

1. Introduction

Research in the past decades has shown that music can boost brain development and learning, particularly at a younger age (Caulfield. 1999). Not only does exposure to music affect brain plasticity—promoting oral production (Besson, Chobert, Astésano, & Marie, 2015)—it also enhances cognitive development, regulates emotions, and interconnects with affectivity (Cook, Roy, & Welker, 2017; Dingle, Hodhes, & Kunde, 2016). For example, having explored the processing of "timbral, tonal, and rhythmic" features of musical input, Alluri et al. (2012) found associations between the processing of timbral features and triggering of the brain cognitive areas, and between rhythm and tonality processing and cognitive, motor, and emotion-related circuits (p. 3687).

More specifically, Schellenberg and Weiss (2013) show that the learning of verbal content and memory can be enhanced through music. Researchers have also explored the connection between music and language and the potential of music in language education. Specifically, music and language have been compared and contrasted in terms of their structure and function. Patel (2008) points to the structural and functional similarities between music and language by making comparisons between their horizontal (syntactic) structure (i.e., comparing musical sentences and linguistic sentences) and their vertical function (i.e., chord-based structures in music and functional components in language). Patel (2008) also explores similarities and differences among the features common to both music and language including sound system, rhythm, melody, prosodic patterns, meaning, and expression of emotion.

Music has been used both directly and indirectly in second language (L2) education, to improve language learning and teaching. More specifically, the use of music in language teaching and learning seems to have fulfilled three major functions: music as a facilitating tool (e.g., background music), music as a complimentary technique or "stimulus" (Ferrari & Verga)—e.g., songs and chants—and music as an active mode (e.g., music composed for a particular language learning purpose to interact with other modes).

The indirect use of background music can be attributed to the contribution of Suggestopedia in the 1970s. Since then, researchers have explored whether background music can affect language learners' cognitive abilities, task performance, and test performance (see Cassidy & MacDonald, 2007; Kang & Williamson, 2013). This type of music is primarily used to decrease learner anxiety and stress (Dolean, 2016) and to facilitate concentration.

As a part of a lesson, music as a complementary technique or stimulus plays a supplementary and marginal role and supports the learning process by making it more

interesting, lively, active, and effective—evoking the learners' emotions and/or reactions. In this category, music has a subordinate role to language in terms of pedagogical and cognitive functioning and is in the service of teaching or learning the language. This function corresponds to the "weak version of multimodality" that considers the use of a nonlinguistic mode as a support or a "temporary scaffold" for language development (Grapin, 2019, p. 33). Using songs and chants are examples of this function (see Ludke, 2016). According to Ferrari and Vergas (2016), songs as stimuli can be used both passively (i.e., learners' exposed to the song as a vehicle for presenting the content) or actively (i.e., learners singing along with music).

Music as a mode, which has been less commonly used in language education, becomes as important as the language input. According to Kress and Jewitt (2003, p. 1), a mode is a "meaning-making" resource such as "image, gaze, gesture, movement, music, speech, and sound-effect." Performing linguistic and/or nonlinguistic functions, modes have been considered very useful elements in educational contexts. Serving a nonlinguistic or nonverbal function, instrumental music (i.e., music without lyrics) is a mode with an equal pedagogical and cognitive status as the linguistic mode in focus, interacting with language in a bimodal or multimodal condition. From a semiotic perspective, this function relates to what Grapin (2019, p. 34) calls the "strong version of multimodality" in which both the linguistic and nonlinguistic modes (e.g., music) become essential components of meaning making in L2 teaching and learning. In this sense, the teachers and learners "make strategic and deliberate" use of two or more modes, "taking into account the affordances and limitations of each mode" (Grapin, 2019, p. 35).

In L2 education, although research has explored the role of music as a facilitating tool (Kang & Williamson, 2013) or as a supplementary technique (Ludke, 2016) and positive effects were found, a limited number of studies utilized musical input as a mode equal to the language input. Furthermore, the use of music as a mode in teaching and learning difficult words has not been explored so far. Thus, the purpose of the present study was to investigate the effect of musical input as a mode on high intermediate learners' knowledge and retention of the meaning of difficult vocabulary items and their attitudes toward the use of such musical input. To this aim, two quantitative research questions and one qualitative research question were addressed in the context of the present study:

Quantitative Research Questions:

1. What is the effect of musical input as a mode on high intermediate learners' learning of the meaning of difficult vocabulary items?

2. What is the effect of musical input as a mode on high intermediate learners' retention of difficult vocabulary items?

Qualitative Research Question:

What are the learners' attitudes toward the use of musical input in teaching difficult vocabulary items?

1.1. Music and L2 Vocabulary Learning

Generally speaking, prior research findings regarding the impact of music on the learning and teaching of language skills and components are somewhat mixed and inconsistent. Although research found distractive effects of music on cognitive performance of learners in cases of increased amplitude of music (e.g., Avila, Furnham, & McClelland, 2012), a good number of studies, particularly in second language contexts, report positive effects of non-disruptive, stimulating music for learning the language skills (see Kang & Williamson, 2013; Rose, 2016).

A limited number of papers report empirical aspects of using music with respect to learning, recall, retrieval, and forgetting of L2 vocabulary. Most of the studies address the role of music as a background tool or as a complementary technique in the process of teaching and learning L2 vocabulary. In an early study, Smith (1985) used classical music (a Mozart concerto) and jazz music to investigate how they influenced word learning and found facilitative effects of music on memory in the process of lexical encoding and retrieval. Felix (1993) reported positive effects of background music—particularly baroque and classical music—on vocabulary learning and retention. The effect of background music on vocabulary learning was further examined in another study by using an experimental design with 36 adult participants who were first-year psychology students (de Groot, 2006). In her study, de Groot (2006) used a music condition treatment group and a no-music condition control group. The students in the treatment group were exposed to a baroque piece as background music while learning. The study results indicated large music effects; in addition, the findings showed that more L2 words were learned in the music condition compared to the no-music condition (de Groot, 2006). In their study, Schön et al. (2008) addressed the question whether music can help adults identify lexical boundaries. They investigated the learning of pseudo-words through songs and spoken modes and found that music had significant learning effects. Extending the scope of Schön et al. (2008), Francoise and Schön (2010) designed two conditions: the musical test and the spoken test conditions—utilizing behavioral and EEG measures. They combined

eleven syllables to create six tri-syllabic sung words, each syllable associating with a distinct tone. As for the spoken streams, the words were pronounced with a flat tone without any melodic pattern. Francoise and Schön's (2010) findings indicated that the musical structures were actually learned in a more effective way than performed on a behavioral test. Using functional near-infrared spectroscopy (fNIRS), Ferreri, Bigand, Bard, and Bugaiska (2015) provided nineteen participants with different lists of verbal stimuli consisting of ninety unrelated concrete nouns in two auditory conditions: music (i.e., an instrumental jazz piece) and silence. The participants were supposed to memorize the lists and were, then, asked to recall as many of the previously seen words as possible. Among an array of results, the major themes reported by Ferreri et al. (2015) pointed to significant behavioral results in terms of creating more consistent chunks in the music condition. However, the fNIRS evidence regarding encoding and recall showed more active effects for the silence condition. Overall, according to Ferrari et al. (2015, p. 1) "music can positively influence both episodic encoding and retrieval of verbal information."

More specifically, most of the studies that have explored the effect of music on vocabulary learning and achievement used songs as musical input and conducted their research in teaching English to young learners' (TEYL) contexts—in fact, a few studies addressed the impact of using music on adult second language learners (e.g., Rose, 2016). For instance, using a series of song-based tasks, Coyle and Gómez (2014) studied vocabulary acquisition among 25 preschool children between 5 and 6 years of age in Spain. They used a famous English song with the potential for engaging the learners through repetition and action. Coyle and Gómez (2014) reported that using song-based lessons enhanced the young learners' receptive vocabulary knowledge. Džanić and Pejić (2016) investigated the effect of using songs on vocabulary retention of young learners. They found that songs had positive effects on the retention of vocabulary as well as motivation of young learners with different learning styles. Shekarian et al. (2016) studied whether advanced learners' favorite pop songs had an effect on their learning and retention of new English words. In their study, the musical-input experimental group outperformed the control group in both learning and retention of the new vocabulary items. The learners in the experimental group also developed a more positive attitude toward learning.

Research has also addressed whether music, especially the use of songs, can affect incidental vocabulary learning in respect to various aspects of depth and breadth of vocabulary knowledge in different contexts. Using a song as an instructional medium, Medina (1993) compared the effect of musical and nonmusical input as treatments on vocabulary learning of

48 Spanish-speaking elementary school students. The results showed that music significantly promoted the students' vocabulary learning. Medina (1993) also discussed that the use of illustrations can enhance the effects of using musical input. Reporting a case study, Milton (2008) explored the vocabulary uptake of a single subject. As a result of exposure to 23 songs (with 2225 tokens and 574 types) and the equivalent of the new words during an eight-week learning period and after completion of translation tests and a delayed test (after a three-month period), the learner showed significant rate and amount of vocabulary achievement (Milton, 2008). Although the positive effects of incidental exposure to language through various informal tasks were found in a series of projects in the study, Milton (2008) argued that in order for such activities to have optimum impact they should be complemented with focus on form tasks. Schwartz (2012) investigated whether the use of pop songs had an impact on Austrian intermediate EFL students' incidental vocabulary learning. Results of this mixed methods study obtained from pretests, posttests, and questionnaire data together with qualitative evidence revealed that exposure to pop songs outside school had a positive effect on the students' incidental vocabulary learning and the student reports showed that they confirmed the effectiveness of music. In a recent and more focused study, Pavia, Webb, and Faez (2019) explored the effects of musical input on incidental vocabulary learning of three hundred 10-to-14-year-old students in Thailand. Pavia et al. (2019) used two English songs with eight single words and eight collocations as the target vocabulary items and a multiple-choice vocabulary test as the pretest, immediate posttest, and delayed posttest. Pavia et al. (2019) found that using popular songs enhanced the students' incidental vocabulary learning in terms of "gains of spoken form recognition, form-meaning connection, and collocation recognition" (p. 16).

1.2. The Challenge of Learning and Teaching Difficult Words

Difficult words in first and second language learning are determined on the basis of a number of criteria such as low frequency of use, orthographic complexity, pronunciation complexity, length of the word, low level of concertedness, polysemy, domain specificity, etc. (Cervetti, Hiebert, Pearson, & McClung, 2015; Nation, 2001; Read, 2000). Surprisingly, most of the studies on L2 vocabulary acquisition address the learning of high frequency words rather than less frequently used difficult vocabulary items; and there is not sufficient evidence to rely on when it comes to dealing with the instruction and acquisition of the difficult words. However, the few studies that addressed the acquisition of difficult words revealed that a number of factors such as the amount of exposure, repetition, sustained reading, and use of

other modes such as illustration can promote the learning of difficult lexical items (Day, Omura, & Hiramatsu, 1991; Gu, 2003).

Learning difficult words is crucial to high intermediate and advanced language learners, particularly in academic contexts, as it expands language learners' breadth of vocabulary knowledge, thus, creating considerable educational opportunities for them. Learning new words and less frequently used lexical items, by extension, is one of the factors that can help language learners expand their knowledge of phenomena and concepts in a first or second language in various disciplines (Cervetti, et al., 2015). Cervatti at al. (2015, p. 155) draw upon Beck, McKeown, and Kucan, (2013) to further justify the significance of developing one's vocabulary knowledge by asserting that having access to more lexical items functions as a "semiotic capital" for the learners.

Considering the value and challenges of learning difficult words and given the fact that little research addressed whether multimodal or bimodal instruction of difficult words, specifically including music composed as a mode, can affect knowledge of the words, we planned to conduct the present study. Another rationale for conducting the present study was the gap in previous research with regards to exploring the effect of music composed as a mode (not as a background tool or an instructional support) on the learners' vocabulary knowledge. A question can be raised as to why one should bother compose music for teaching vocabulary as there are simpler ways such as using illustrations, translations, definitions, etc. Simply, abstract, difficult words are not easy to teach and learn in a second language. For teaching an abstract concept like "ubiquitous", it is hardly possible to use pictures and actions. Similarly, definitions and translations are fugitive and may lead to confusion or forgetting as research has demonstrated that using translation into the first language (L1) or L1 equivalents for the purpose of learning concrete high frequency words is essentially more effective than applying translation for leaning low frequency abstract words (de Groot, 2006; Lawson & Hogben, 1998).

In fact, what makes adults' word learning challengingly different form that of children is that adults learn the word's form, meaning, and concept separately but for children the acquisition of the words is geared to conceptual and semantic development (Jiang, 2000). Perhaps this type of dis-integrated learning can be related to research findings that reveal that learners may repeatedly forget difficult words even after multiple efforts to learn or memorize them, thus placing a focus on the role of long-term memory and working memory (Nemati, 2009). Hence, if musical input can enhance verbal learning and memory (Ferreri & Verga, 2016) and if verbal short-term memory can affect vocabulary learning (Gupta & Mac Whinney,

1997), then it would be certainly worth exploring whether musical input as a mode can enhance the learning of difficult words.

1.3. Basic Properties of Music as a Mode for Vocabulary Teaching and Learning

In order to compose music to be utilized as a mode for teaching vocabulary, one needs to take note of its basic properties and potentials such as pitch, melody, rhythm, and dynamics. Pitch refers to the extent to which a sound or tone is low or high considering its frequency; and melody is the tune or a series of notes generated by making use of sounds with different pitches. Rhythm is the way the sounds are arrayed together in terms of their length in time and strength, usually on the basis of a regular pattern. Finally, the quality of a sound or a series of sounds conceived on a soft-to-loud spectrum is called dynamics. Research has shown how these properties are interrelated in music and spoken language. For example, Patel, Iversen, and Rosenberg (2006) compared British English and French in terms of rhythm and speech melody and found that vowel duration, rhythm, and pitch variability are significantly different in the two languages; and this variability can also be observed in English and French music. Comparing musical rhythm and linguistic rhythm, Patel (2008) maintains that "speech and music involve the systematic temporal, accentual, and phrasal patterning of sound. That is, both are rhythmic and their rhythms show both important similarities and differences" (p. 176). Patel (2008) also points out that dynamics is an important tool for presenting meaning and emotion in both music and speech.

2. Method

The present study aimed at exploring the effect of music composed as an input mode on the adult students' knowledge of the meaning and retention of difficult English words.

2.1. Participants

The data were collected in a language center in Tehran. Forty Persian-speaking adult participants (i.e., twenty-one female and nineteen male students) aged 20 to 30 agreed to participate in the study. Due to limitations regarding the number of students at high intermediate and advanced levels in our research context (a language center in Tehran), we were to select participants from a population of 83 high intermediate students. Considering a number of criteria such as the results of the homogeneity test, righthandedness, and no previous training in music, we chose 40 participants to take part in the study. According to Dornyei

(2007), in experimental research we need to have at least 15 participants in each group (i.e., the minimum sample size for a two-group design is 30). All the participants were all right-handed. Their first language was Farsi. They were learning English as a foreign language in the language center. On the basis of self-reports, the participants stated that they had never received any music training. Their level of English proficiency, based on their performance on a test of homogeneity, was high intermediate. The mixed methods sampling procedure used in the study was embedded sampling; that is, a subset of participants was extracted from the quantitative sample to take part in the qualitative phase of the study (see Collins, Onwuegbuzie, & Jiao, 2006). In the quantitative phase and based on convenient sampling, the experimental group included twelve female and eight male students and the control group included nine female and eleven male students. For conducting the interviews in the qualitative phase using purposive sampling, we selected a subset of participants' from the experimental group including five students with the highest scores and five with the lowest scores on the posttests.

2.2. Instruments

Both quantitative and qualitative data were collected in the study. In the quantitative phase, a placement test (an FCE test) and a list of difficult words in the pre-treatment and post-treatment conditions were used.

2.2.1. The FCE Test

The placement test was used in order to homogenize the participants in terms of their level of proficiency, ensuring that they were all at the high intermediate level. To this purpose, the "Reading and Use of English" section of Cambridge FCE (B2 First) test was used. This section has 7 parts with 52 questions. The test is targeted at CEFR level B2 which, in the context of the present study, corresponds to the high intermediate level. Previous research has reported high reliability and validity indices for the FCE test (see Granpayeh, 2004).

2.2.2. The Pre- and Post-Treatment Vocabulary List

The pre- and post-treatment measure was a list of 40 difficult English words with appropriate space in front of each word for the participants to write the meaning (i.e., Persian equivalent) of each word. Although in previous vocabulary research, multiple choice tests were frequently used and advocated by researchers (Nation & Webb, 2011; Pavia et al., 2019), we avoided to use such tests for several reasons; that is, they create a chance for the test taker to guess the answer, they are purely recognition-based, they are co-text-sensitive and the co-text (even at

the level of a sentence in the stem of the item) can affect the learners' choice, and finally the meaning of the word is not elicited directly in multiple choice tests. Thus, in line with the purpose of the present study that was to explore whether the use of musical input as a mode can affect the learners' knowledge of the meaning of difficult words, we chose to use a list of words to directly elicit the meaning of each word. According to Nation (2001), knowing the meaning of a word is among the three major components of depth of vocabulary knowledge (i.e., form, meaning, use). In the context of the present study, we placed the focused on the receptive aspect of meaning; that is, the "meaning" that "the word form signals" (Nation, 2001, p. 27). In this regard, the instrument we used in the form of a list was a measure of receptive word meaning. We decided to elicit the Farsi meaning of the word because the use of English definitions could build a barrier to immediate and independent access of the learners to the exact meaning they had in mind. What further justifies this choice is the fact that lexical knowledge in L1 and L2 are interconnected in the process of learning and recognizing second language words (Dodigovic, Jeaco, & Wei, 2017).

2.3. The List of Difficult Words

We referred to "*The Oxford Dictionary of Difficult Words*" and "*Wordsworth Dictionary of Difficult Words*" to generate a preliminary list of one hundred difficult words. To choose the words, we checked their frequency of use and also considered whether they can lend themselves to musical representation. The initial list of lexical items included adjectives, nouns, verbs, and adverbs. Then we sent out the list to two PhD holders in applied linguistics to choose among them the most relevant difficult words that could be problematic for high intermediate L2 learners. The list generated at this stage included adjectives, nouns, and verbs.

Additionally, we used the list in a pilot phase to gain feedback from high intermediate students. Eight high intermediate students participated in the pilot study. We provided them with a list of the difficult words and asked them to rate the difficulty of each lexical item on a scale of one through five. Additionally, to control for L1 effects, we also presented the learners with a list of the Farsi equivalent of the words and asked them to rate their difficulty on the same scale. As for the list of English words, we chose the ones that were rated 4 or 5 on the scale. However, the participants' ratings of the Farsi equivalents were quite different from that of the English words (on average, they rated the equivalents 3). Thus, we inferred that the Farsi equivalents of the words proved to be consistent in terms of difficulty for the participants in the pilot study. We omitted the words whose Farsi equivalents were rated 1 or 2 in terms of difficulty.

Finally, considering the feedback we gained from the PhD holders and the participants' rating of the difficulty of the words, we selected 40 words (adjectives, nouns, verbs) from the preliminary list to use them in the study (see Appendix 1). The final measure included 40 items. Each item included a difficult word and a space provided next to it (i.e., a blank) in which the learners were supposed to write the Farsi meaning of the word. This format was used to minimize the amount of reading and chances of guessing (see Read, 2000, p. 119). We also supplemented the test with a self-report scale for each item. We borrowed and adapted the scale from the Vocabulary Knowledge Scale (see Paribakht & Wesche, 1997) so that the learners would report how sure they are of what the word means by choosing a relevant choice (i.e., I have not seen the word, I have seen the word but I don't know what it means, I know the meaning of the word).

For assessing the learners' knowledge of meaning and retention of the lexical items we considered only their responses (the Farsi meaning of the words provided by them). We used the supplementary scale for cross validation of the responses and did not include the self-report categories in the statistical analyses. To score the students' performance, we assigned one point to each correct answer, thus using an interval scale. We did not further penalize the learners for wrong answers and no attempts by assigning negative values. Thus, correct word meaning was rated 1 and incorrect meaning or no answer was rated zero.

2.4. The Treatment

The treatment included musical themes composed for each word to be presented to the participants in the experimental group as a mode. The themes were composed by the second author of the present study who has a BA in music composition and an MA in teaching English. Before the themes were composed, we analyzed each vocabulary item considering its meaning, function, and form, with particular attention focused on the literal meaning of the word, its main function, its emotional state, its pronunciation (i.e., vowels, consonants, stress pattern), and the number of syllables in each word. Although the main word feature considered for composing the themes was the emotional state, the composer also tried to take into account the formal aspects mentioned above to use them for creating musical motifs and rhythm wherever possible.

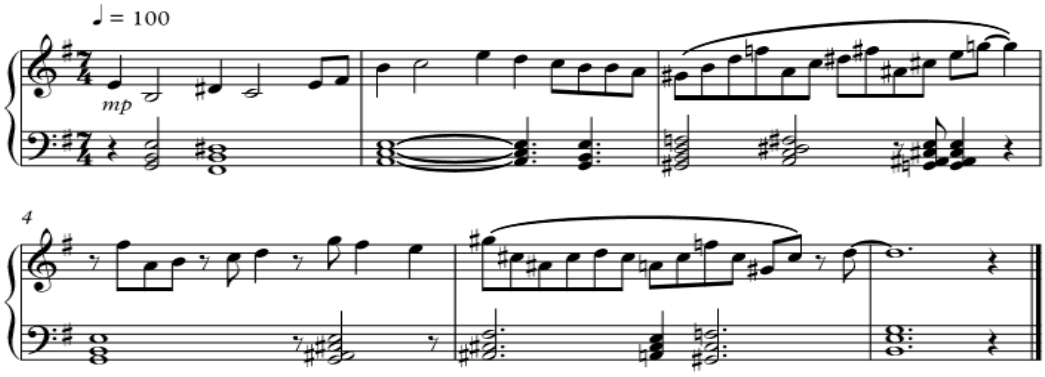
To analyze the emotional load of the vocabulary items, we used Mehrabian and Russel's (1974) Pleasure-Arousal-Dominance (PAD) emotional state model. This model was developed on the basis of three main aspects of emotional states including pleasure/displeasure, arousal/non-arousal, and dominance/submissiveness. Taking into account these dimensions,

we tried to analyze the words in terms of some micro-features that could be relevant to the word's meaning conveying a range of feelings and emotions such as happiness, joy, anger, depression, excitement, boredom, courage, fear, panic, etc. For instance, if a word conveys fear and weakness, it can be closer to the category of submissiveness.

Having analyzed the words using the above model, we tried to connect the word's semantic, emotional, and, if possible, formal features to the rules of developing melodies and chords. Using the results from these analyses, the second author composed the themes. The themes were composed within the genre of classical music and, thus, were similar in terms of style and general compositional complexity. However, the compositional complexity of some of the themes would vary based on the literal meaning and emotional state of the words. After all, with regards to rhythm, pitch, tempo, melodic patterns, and harmony, the compositional complexity had to vary to a fair extent to show the nuances related to the meanings of different lexical items. The musical themes were composed and written in *Sibelius* music notation program, and were performed by Piano sample digitally to achieve the most accurate result. The duration of the compositions was between 10 and 40 seconds depending on the meaning and emotional state of the vocabulary item.

The musical themes were composed in the scale of *G Major*, its' relative minor, *E minor*, and the modes within the same key. The major scale, its relative minor scale, and the corresponding modes were used to convey different emotional states or meanings relevant to the words. For instance, for the word "Abstruse" which means "difficult to understand," the theme was composed in "E minor" to transfer negative valance. In order to convey the feeling to the listeners, the composer used a lot of off-key as well as on-key chords and notes, dissonant as well as consonant harmonies and intervals, rising as well as falling lines to make it "difficult to understand." There are diminished 7th chords, especially in the third measure, in order to have a feeling of suspense and minor chords within an irregular rhythm, to make the theme mysterious in a way to make it unclear and vague (see the figure below).

Figure: The Musical Theme Composed for the Word "Abstruse"



2.5. The Interview

To collect qualitative data, we used semi-structured interviews. The one on one interviews were conducted face-to-face at one time point. The semi-structured interview themes helped us ask the participants about whether they were interested in the use of musical input and to what extent they found it effective. More specifically, the general questions addressed the learners' attitudes toward the use of music in teaching vocabulary, their interest in the method used, and the extent to which they found the treatment successful and effective. The semi-structured nature of the interview allowed for prompts and further questions triggered by each of the participants' responses. To check its credibility, we gained expert judgment by sending the interview to two experts (active qualitative researchers in the field). A sub-sample of the quantitative module, that is, five students with highest and five with the lowest scores on the posttest were selected to take part in the interviews. Each interview took about 20 to 30 minutes.

2.6. Procedure

The data were collected by the second author in a language center in Tehran. In addition to the permission granted by the manager of the center, the researchers also gained the participants' consent. The participants in both control and experimental groups received the pre-treatment list first. Then, the difficult words were instructed during 4 sessions, 10 words each session. The musical input was used as a mode to present the vocabulary items to the learners in the experimental group. In doing so, first the audio was played and the students were exposed to the musical input for each word. Then they were asked to discuss the feelings and emotions conveyed to them by the musical theme. Playing the theme one more time, the teacher would introduce the word and have the students connect the word and music to guess the meaning. The teacher would present the meaning of the word, playing the music for a last time. After that, the students were supposed to reflect upon how the theme could be related to

the word meaning and share their reflections with class. Finally, the list was given to the students as a post-treatment measure of their knowledge of word meaning in the fifth session. The delayed posttest, the same measure, was given to the students after a one-month interval. As for the control group, the words were presented in a similar sequence without the musical input.

2.7. Research Design

A quantitatively-driven mixed methods design was utilized to conduct the study. The qualitative interview functioned as a follow-up component to supplement the quantitative findings. The mixed methods research deign was sequential explanatory. In this two-phase design, first quantitative data are collected and analyzed; then based on the findings of the first phase, qualitative data are gathered and interpreted (Creswell & Plano Clark, 2011). In the present study, the quantitative and qualitative phases included an experimental design and an interview respectively.

3. Results

Quantitative and qualitative findings are summarized in the following sections.

3.1. Quantitative Results

The present study aimed at exploring the immediate and delayed effects of using musical input as a mode on high intermediate English learners' knowledge of difficult word meaning. As the assumptions for using a parametric test was observed, we used *t test* to analyze the data. Based on the results of the pilot study and considering the research purpose, we expected that the students in both control and experimental groups would score very low on the pre-treatment measure as they were not supposed to know the difficult words.

Paired samples *t tests* were utilized to examine whether each group's performance was different in the pre- and post-treatment conditions, thus investigating whether there was any achievement after the instruction for both groups. The preliminary results of the descriptive statistics showed that there was some level of achievement in word meaning knowledge for the experimental group across the pre- (M=0.10, SD=0.30) and pots-treatment (M=6.20, SD=2.01) conditions; however, the control group's performance across the pre- (M=0.15, SD=0.36) and post-treatment (M=3.65, SD=1.22) measure was not as high and significant as that of the experimental group. Upon further analysis using paired sample *t tests*, the results indicated that the achievements of the participants in both groups (i.e., experimental group:

t(19)=-14.65., p=.000. and control group: t(19)=-12.67., p=.000) were significant across the pre- and post-treatment measures.

An independent samples *t test* was conducted to compare the experimental and control groups' achievement of word meaning (i.e., the music and no-music conditions, respectively). With the significance level of .05, the results showed that there was a significant difference in the scores of the participants in the control (M=3.65, SD=1.22) and experimental (M=6.2, SD=2.01) groups; t(38)=−4.83, p=.000. Therefore, the participants in the experimental group who received musical input as treatment outperformed the participants in the control group, indicating that musical input as a mode had a significant effect on the learners' knowledge of difficult word meaning. To calculate the effect size, we used Cohen's d formula and d=1.53 revealed that the effect size was rather large.

Another independent samples *t test* was run to explore the effect of musical input on the retention of difficult word meaning. The results of the *t test* calculated based on the scores obtained from the delayed post-treatment measure indicated that there was a significant difference (with the significance level of .05) in the scores obtained from the control (M=3.35, SD=1.03) and experimental (M=5.65, SD=1.46) groups; t(38)= −5.73, p=.000. With an effect size of d=1.82, the result points to a large effect size. This finding showed that the use of musical input had a significant effect on the learners' retention of the meaning of difficult words.

3.2. Qualitative Results

To explore the third research question regarding the learners' attitudes toward the use of music in teaching difficult English words, we transcribed the semi-structured interviews and analyzed the transcribed content through color coding. To reiterate, the interviewees were selected through embedded sampling. Thus, five students with high scores (the high group) and five students with low scores (the low group) on the post-tests were chosen to take part in the interview.

Due to the limited number of interview questions and also the somewhat brief answers provided by the interviewees, the qualitative component has been considered to function as a follow-up module in this quantitatively-driven mixed methods research. The restricted interview scope did not lead to rich data, thus thematic analysis could not be an appropriate choice for the analysis of the transcribed responses. Therefore, a few main themes that were quite conspicuous at first glance, were color coded in a process of rigorous

reading of the content. Overall, the content analysis of the interviews revealed that almost all the students in both groups found the method interesting. Some excerpts from the answers are presented below. (S stands for Student, H stands for the high group, L stands for the low group):

S2 (H): I liked the method and the fun atmosphere it made in the classroom.

S3 (H): It was exciting compared to the other boring vocabulary teaching classes.

S4 (H): It was very cool! I really enjoyed imagining words with music.

S1 (L): It was only fun in terms of class atmosphere. But sometimes could be confusing.

S3 (L): I liked this exciting method!

S5 (H): I think using music for teaching words can be interesting and we had a lot of fun and excitement in class.

As the qualitative results show, the students had a positive attitude toward the use of music in teaching vocabulary. One of the students in the high group also pointed out that the use of music could help them use their imagination when learning the words. However, one of the students in the low group mentioned that the use of music can be confusing. Although almost all of the students in both the high and low groups found the method interesting, some of them remained doubtful about the effectiveness of the method with regards to learning difficult vocabulary items:

S2 (H): I'm not sure about the effect, but I liked the idea.

S3 (H) … Don't know about the effect but I preferred to listen to the themes while I was taking the test.

S4 (H) … I could recall some of the themes' forms for specific words during the final test.

S1 (L) … I could not really remember most of the words meanings, and connect them to what I had in mind about the musical themes. I needed to listen to the music and take the test at the same time.

S2 (L) I don't know but I didn't like the fact that you didn't play the themes in the posttest. It sure affected better than normal teaching style.

S3 (L) … Why didn't you play the music while taking the test? It didn't affect my learning that much … If you played the music for the final test, I could get a better mark.

S4 (L) I liked to listen to the musical themes when I was doing the test. Maybe that's why I didn't get a good score. The method might have affected positively …

S5 (L) I think this method doesn't work. It didn't affect my learning.

As can be seen, most of the students, particularly the ones in the low group, were rather doubtful about the effectiveness of the method. Several of the students noted that they had expected to listen to the music while taking the post-test. Two of the students in the low group were confident that the use of music had no effect on their learning of the difficult words. A number of students in the low group stated that their low scores could be a result of the absence of musical input during the post-test.

4. Discussion

The quantitative findings of the present study revealed that the use of music as an input mode significantly affected the intermediate learners' learning of the meaning of difficult English words. Generally, this result is somewhat in line with prior research findings with respect to the positive effect of music (de Groot, 2016; Kang & Williamson, 2013) or other input modes (Bao, 2019) on learning L2 vocabulary. More specifically, the result is convergent with the findings of studies in which music was used as a background tool to help the learners learn L2 words (Felix, 1993; Ferreri, et al., 2015; Francoise & Schön, 2010; Smith, 1985). Similar positive effects on vocabulary learning have also been observed in studies that utilized songs as musical input (Coyle & Gómez; 2014; Pavia et al., 2019; Rose, 2016). The results of the present study also showed that the use of musical input had a positive effect on the retention of difficult L2 words. This finding coincides with the results from Džanić and Pejić (2016), Milton (2008), and Shekarian et al. (2016).

The significant effect of music as an input mode on the learning of difficult word meanings can be further interpreted in light of the strong version of multimodality. Grapin (2019) argues that by placing emphasis on the use of different modes, particularly non-linguistic modes, the strong version of multimodality can positively influence the teaching and learning activities. In the context of the present study, we observed that music as an input mode

could compensate for the limitations of the use of linguistic mode per se in the teaching of difficult lexical items, thus creating an affordance for the teacher and learners (Grapin, 2019). The contribution of the present study, however, can be connected to one of the components of the general framework proposed by Grapin, that is, the values of the modes. From a strong version perspective, we need further research to shed light on the extent to which music can be used as an "essential semiotic tool" (Grapin, 2019, p. 34) for the teaching and learning of L2 vocabulary as well as on the functions of other components of the framework such as the role of the users of the modes and how the modes are used (p. 36).

Although the quantitative results showed rather large positive effects of music on learning and retention of the meaning of difficult words, qualitative findings did not fully confirm this result. It can be inferred from the qualitative findings obtained from the semi-structured interviews that the musical input was not considered by the learners to be so effective with regards to their learning experience. In spite of the fact that almost all of the learners' found the method interesting and exciting, they were uncertain about the effect of the method on their learning and retention of the difficult words. In light of the qualitative findings, one may think of the fact that use of music as an input mode might break the students' concentration and lead to confusion. This issue has also been considered in previous research (Avila et al., 2012). In addition to the divergence between the quantitative and qualitative results, we should take into account the limitations of the present exploratory study including the small sample size, time limitation, and constraints pertaining to music production and sound quality.

5. Conclusion and implications

The quantitative results showed that the use of musical input had positive effects on the high intermediate EFL learners' learning and retention of the meaning of difficult English words. On the other hand, the qualitative evidence stands in contrast to the quantitative results by pointing to the concern that the learners were not certain about positive effects of the method considering their learning experience. However, they reported positive attitudes with regards to the fact that the method was interesting and exciting. Overall, it seems that the issue still requires further research, particularly considering concerns such as sample size, individual differences, learners' learning styles and preferences, the use of musical input in multimodal studies exploring other language skills and components, and the use of cognitive and metacognitive strategies when it comes to the application of such multimodal input.

The findings of the present study together with the insights from previous research point to some implications for teachers and textbook writers. L2 teachers can make use of music as an input mode to help the learners reinforce learning of vocabulary in case the words are abstract and difficult to teach or learn. Textbook writers can consider the possibility of using music not just as a background tool or supplementary technique but as a mode of representation for the purpose of developing multimodal vocabulary tasks. Needless to say, active collaboration between musicians and language educators in the era of multidisciplinary education can lead to fruitful and novel contributions.

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Appendix 1. The list of 40 difficult vocabulary items

Abstruse	Accost	Ambivalent	Barmecide	Catastrophic
Catharsis	Dearth	Deleterious	Diabolical	Discrepancy
Eccentric	Ephemeral	Farcical	Filibuster	Flummoxed
Foible	Galvanic	Harangue	Heterodox	Inchoate
Instauration	Jejune	Jeopardize	Labile	Metamorphic
Motley	Mundane	Obdurate	Obfuscate	Oscillate
Pandemic	Recapitulate	Scrum	Supererogatory	Tautological
Telekinesis	Ubiquitous	Unanimous	Unanimous	Vicissitude