Literature Review: Using music to learn a second language

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Abstract

This is a literature review on the latest research in finding the possible role of music when used to learn a second language. The neural system transformation as well as the motivation obtained when using music are detailed. The possible future research in each of these areas is also presented. The way songs should be appropriately chosen to support learning is also discussed later.

1 Introduction

As a child we learn to understand or speak our first language by listening to what others say again and again even if initially we don't understand it fully. In kindergarten, we don't learn any language rules and still we get to recite poems and through it we get to learn how various words are spoken and how they are combined to form a sentences. Through the poem itself we get to extract out how words are composed together and the grammar of the language. It is a helpful technique and can be extended to music to learn a second language.

There is a lot of evidence suggesting that musical training affects the neural encoding of speech and networks function required for ordinary speech communication.[1]

Music also motivates us to keep learning a language by introducing us to the culture where the language is spoken. If the genre of music interests us then we may keep hearing it and involuntarily learn the language details like grammar. Studies have shown that using music engages the students more towards learning a new language than the usual classroom methods.[2]

2 Effect of music on Neural system

It has been shown that same brain resources are shared while processing music and language. Making even stronger claim, Brown et al.,(2006)[3] showed that same functional brain areas are used in generating linguistic and melodic phrases which indicates cognitive parallelism between music and language. The paper stated that further work can be done in higher spatial-resolution measurements,

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meta-analyses of functional neuroimaging and electro-physiology studies, parametric processing variables, articulately contrasted designs for studying music and language creativity in fuller structural complexity, and explicit tests for domain specificity. Daltrozzo et al.,(2009)[4] have even showed that there is a shared processing between language and music at the conceptual level.

Research has been done on how musical training affects the structural changes in areas of brains which help in language skills as well. The following three papers are crucial in this regard.

The work by Kraus et al.(2010)[5] tells about how musical skills affects language skills. It states that, music tones the brain for auditory fitness just like physical exercise impacts the body fitness. It states that enhanced functional plasticity reflects experience in playing music and doesn't just reflect the innate differences between musicians and non-musicians. It shows that continued intense musical training brings structural changes in the primary auditory and primary motor areas. It shows that auditory skills of musicians do percolate to other domains, such as language, speech, emotion and auditory processing, so auditory skills enhanced by musical training help in these domains as well. The future work can be in understanding the plastic changes with time that are induced by music training which will allow us to explore the extent and limits of plasticity in the brain.

The work by Besson et al.(2011)[6] takes it to further level by arguing about commonalities between music and language, and that there is transfer in skills obtained by music training to language. It discusses how music and language were earlier favored to have common origin with common primary function to express emotions. It also discusses that musicians of one language can process the harmonic sounds of another language as efficiently as native speakers of that language. Phonological processing of language is positively affected by music skills. It showed various research works whose results are in favor of common processing of acoustic parameters (e.g., frequency and duration) in speech and music. The paper studies the transfer of the training between music and speech and states that the future work can be in finding the upper limit of transfer effects, i.e. influence on phonological, syntactic, semantic or pragmatic processing.

The work by Patel et al.(2011)[1] discusses why it is the case that music training improves language skills. It tells about several research works which have shown that there are many descending neural projections (corticofugal) in the auditory system (exceeding the number of ascending fibers), hence providing a potential pathway for cortical signals to tune subcortical circuits. The subcortical circuits also convey neural signals to cortical regions. Hence, two-way interactions between subcortical and cortical regions is possible, with structural malleability at both levels. This suggests that non-linguistic auditory training enhances neural encoding of speech. It is significant as the quality of brainstem speech encoding has been associated with language skills such as hearing in noise and reading ability. It has been hypothesized that musical training influences the neural encoding of speech via plasticity driven by corticofugal projections, but why only musical training does so is because both music and speech use pitch, timing, and timbre to convey information and years of processing these cues in a fine-grained way in music may enhance their processing in the context of speech. On this idea, the paper builds the OPERA Hypothesis: the neural encoding of speech is driven by adaptive plasticity in speech-processing

networks, and that this plasticity occurs when certain conditions are met. The OPERA hypothesis is used to account for the observed superior subcortical encoding of speech in musically trained individuals. OPERA hypothesis suggests mechanisms by which musical training might improve linguistic reading abilities and it states controlled manipulation of sound features (of an instrument) will be required to effectively enhance neural processing of a particular feature (e.g., amplitude envelope). OPERA makes no assumption that influences between musical and linguistic neural encoding are unidirectional. Hence future work can be in determining whether certain types of linguistic experience with heightened demands in terms of auditory processing (e.g., multilingualism, or learning a tone language) can impact the neural encoding of music. Also, the relative merits of musical vs. linguistic training for speech sound encoding can be resolved by direct comparison in future studies.

All the works mentioned above talk about improving speech skills that too by training on musical instrument. The works don't discuss how listening to music in a new language can have neurological effect such that one get to learn the new language.

Kraus et al.(2014)[7] compares the neural effect of music on students who just listen to music (through music appreciation classes) and those who actively participate in playing instruments (through musical training). They showed that after undergoing a year of musical training, the children showed faster and more robust brainstem responses to speech than children who participated only in music appreciation classes. Instruments playing caused faster neural coding of consonants and more robust encoding of high frequency spectral content. Those who played instruments showed stronger differences for the case when processing demands were stronger but for other cases, the difference wasn't even noticeable. The authors concluded that auditory learning, especially through music, may improve the neural coding of behaviorally salient, yet acoustically complex, components of speech (e.g., consonant transition). Future work can be done with a larger sample size, better sex distribution, and more detailed information about what guided students' progression.

Work done by Ludke et al.(2014)[8] gives experimental evidence that singing can facilitate short-term paired-associate phrase learning in an unfamiliar language (Hungarian). The short phrases learned were paired with native language (English) of the speakers. The result showed that the participants who sang (rhythmic and melodic speaking) after listening the phrases (as song) performed better than those who just spoke (after listening a spoken phrase) or rhythmically spoke (after listening a rhythmically spoken) in four of the five tests. Prior to this, most of the research was done in using music to enhance native language which had made the following conclusions:

1. Listening to songs provide a long-term memory benefit for learning verbal material.[9]

2. Songs using frequently changing melodies serve as a distraction, rather than helping participants memorize the lyrics. Using songs with a repeated, simple pattern can facilitate verbatim text recall in the native language to songs.[10]

3. A musical presentation of linguistic stimuli may help particularly at the encoding stages of memory, and particularly for verbatim language tasks.[11][12]

4. Both rhythm and melody effectively facilitate verbal recall for folk song lyrics, as compared with a spoken version[13]

5. The rate of stimulus presentation, the overall duration of stimuli, and the song's complexity are important considerations that may influence verbal learning and memory through song.[10][14]

6. Pitch information provides an extra musical cue (in addition to, and different from, a prosodic cue), which can support retrieval and recall suggesting that melodic structures may have a stronger encoding distinctiveness than rhythmic structures.[15][16][17]

7. When a syllable change is accompanied by a change of pitch, this has the potential to enhance phonological discrimination.[18]

The results showed that singing can support second language learning, and supporting the hypothesis that the benefits of a sung presentation of verbal material in verbal learning are most evident on verbatim recall tasks. It showed that simple, previously unfamiliar melodies can provide a significant memory benefit for paired-associate foreign language learning, both immediately and after a 20-min delay. The authors state that emphasis on the phonetic aspects of verbal stimuli may be particularly useful when beginning to learn a foreign language, since the semantic meaning of individual words is not always directly available on which to "hang" the utterance. One of the research works[18] it cites makes the interpretation that pairing each syllable with a consistent pitch can lead to quicker word segmentation of a sound stream, hence songs might be particularly helpful during the beginning stages of second language learning. The learning paradigm and tests assessed both participants' L2 (second language) understanding of and verbatim use of the new linguistic material. Learning via singing also showed a direct transfer to speaking skills. Semantic learning also took place in this experiment, since the Hungarian conversation task involved selecting the most appropriate L2 phrase to use in the conversational context, and the Hungarian production task involved matching an English phrase, which would have been understood semantically, with the correct L2 phrase. This indicates the strong likelihood of some semantic understanding. Future work can be done to:

1. identify whether the beneficial effects of singing in this listen-and-repeat, paired-associate foreign language learning paradigm were due to correlated pitch cues, integrated encoding of lyrics and melodies, or other possible factors (such as increased attention)

2. investigate the extent of semantic learning that is possible via a sung presentation

3. explore the potential links between prosody and melody

4. examine the stages of encoding, rehearsal, and retrieval in more detail

5. investigate the benefits of singing in a foreign language for classroom learning and for educational practice at a range of age and skill levels.

Most of the other works I found were looking at the influence of musical training on language learning, which is also suggested by the review article by

Ieva Zeromskaite(2014)[19]. I didn't find any work which looks at the rate of improvement in second language skills just by listening to song as compared to other methods.

In the next section, I present some of the other research which looked at listening to music for motivation to learn second language.

3 Music for motivation

Kao et al.(2014)[20] suggest that when one is constantly fed knowledge, one may loose motivation. Hence, there is a need for self-directed learning. The authors claim that self-regulated learners can build motivation through music. They list two objectives:

1. To have good relationship with the material. The contact between the learner and his or her favorite material works almost the same as living in a nation where target language is spoken

2. To have the material available. The availability of songs help the learner in spending less time searching for material and more time concentrating on the material, enjoying it, and learning from it.

The authors details the language learning strategy (using Hip Hop to learn English by native of Taiwan) for building up inspiration and motivation along with proficiency. The authors suggest that this strategy can be employed with any kind of music that has linguistically meaningful and culturally relevant lyrics. The steps in the strategy include:

Music choosing and simply enjoying the music

Language analyzing the lyrics and creating a personalized textbook based on the lyrics

Culture deepening the understanding of the underlying culture

The authors assert that if the learner can get used to many of the patterns used for paraphrase, he or she can manage most conversations easily and can then unconsciously build up a "learner's grammar," similar to the way children learn to speak their native language. The first author learned English by following this routine. He says that he is far ahead of those who still struggle with uninspiring, rigid learning materials and curricula.

Similarly, Aguirre et al.(2016),[2] studied the effect of music when included in class curriculum. The results showed that students were motivated to participate and became more engaged in classroom activities when songs are used in their English classes. Use of songs had positive effect on students and it was the most preferred strategy for students when learning English. Moreover, listening and singing songs was the most preferred activity. Students were more willing to participate and were paying more attention in classes where music was used, carrying out all their tasks with more energy and enthusiasm. The future research can be in

1. whether a song can serve as a motivator element when learning English for adults as well

2. finding the most preferred audiovisual materials for children

3. investigating the most effective materials for teaching English as a second language

Likewise, Dolean(2015)[21] carried out research where songs were used while teaching foreign language(FL), French, to children of 8^{th}-grade. Their findings indicate that teaching songs during FL classes was perceived as an enjoyable experience by students from classes with both high and low anxiety; however, this teaching method decreased the Foreign language classroom anxiety (FLCA) average of classes of students with high anxiety. The author states formal assessment results (e.g. grades) and anxiety had weak negative correlation. Further research can be a replication study with a larger number of participants which would help generalize their findings.

4 Selecting music for second-language learning

In this section we discuss the state of the art in selecting music for second-language (L2) learning. In all the research done on using songs for L2 learning, guidance of teacher was required for selecting the songs. The parameters used to select the songs are discussed below.

1. The language used in song should be casual and actually usable. The lyrics should neither be too easy nor too hard considering the proficiency level of learners and their musical preferences[22][23][24][24][25][26][27][24]

2. It is better if the song tells a story. Children's songs may be preferred for real beginner. [23][27]

3. Videos may help understand what the song is about, making it easy to relate words with images[27]

4. Selecting the songs based on genres and artists the students prefer in their native language[22]

5. Lyrics should be clear in the song[26]

6. It is better to select the song which the teacher loves or feels comfortable singing[22][23]

7. Keep songs short, simple and appealing to make them easy to learn and remember.[28]

8. The song should have about 50-100 words for beginners and upto 200 words for advanced students to avoid them feeling overwhelmed[22][25]

9. Song should be selected based on the purpose the song will be used for[24]

10. For vocabulary, identify a song that contains several examples of the vocabulary items being taught which is appropriate to the students' proficiency levels[26][22]

11. Songs that have soft music with quite easy words and simple content (e.g. country songs and love songs)[25]

12. For grammar, select a song that contains several examples of the grammatical items being taught[22]

13. For listening comprehension, choose song with good, clear pronunciation of the lyrics and not too many new vocabulary items or grammatical structures[22]

14. For speaking skills, choose a song that has a number of commonly used phrases or structures[22]

15. To teach target culture, choose a song which is popular in the target culture[22]

16. The time of the day is helpful as if the class is in the morning, teacher can use the songs as warm up in order to catch the attention of the students[24]

Debreceny[28] suggests teachers to *create* songs on their own as finding the songs which fulfill the classroom objective can be difficult. It details the following points to be taken into account for the same:

1. List the vocabulary which is classroom objective and accordingly create one or more songs as it is tough to remember too many verses of words to the same melody.

2. For listeners to remember the words more easily, more lines of lyrics should end with same sounds. It helps if there are rhyming words within a line.

3. Beats should occur where there are stronger accents.

4. For young children's voices, D major is preferred key with range of 6 to 8 notes[29]. While for boys with deep voices, the songs must be in a key that is singable by trebles and baritones.

Millington(2011)[30] suggests adapting children's songs according to the requirement. It modified the song "The Wheels on the Bus" to incorporate particular language feature into the song.

Muñoz(2013)[24] states that acquiring a foreign language involves the development of four skills, namely listening, speaking, reading and writing. It expresses that lyrics of the songs are most useful teaching tool as teacher can use it for finding synonyms and antonyms, learning vocabulary, completing lyrics passages while listening to songs, grammatical review, and jumble words.

Nguyen(2010)[25] suggested that pop songs are useful and the way to find songs is to use a lyrics server (e.g. http://www.azlyrics.com/) which contains a lot of titles.

A lot of papers have stated that hip-hop is very useful genre to learn English language. Chesley(2011)[31] also supports the usage of hip-hop music. It found that just by knowing the number of hip-hop artists a participant listened to can be used to predict the participant's knowledge of words and phrases used in hip-hop songs. It therefor suggested that vocabulary can be acquired through exposure to hip-hop music. Byrne(2012)[32] state that although rap has relatively complex lyrics, it is facilitated by pitch range of the hip-hop music which doesn't interfere with pitch range of human voice.

Gordon(2010)[33] in one of its experiments found that songs in which strong syllables occur on strong beats capture listeners' attention and help them understand song lyrics by enhancing beat tracking and linguistic segmentation.

Schotanus(2015)[34] explored the influence of music on perception of lyrics. It can be helpful in selecting the songs. It states that several studies support the hypothesis that linguistic events that coincide with strong beats, get maximum attention and, thus, will be perceived optimally. It states that accompaniment that defines rhythm and harmony, and empowers the melody with a certain sonority, will enhance musical processing and reduces musical foregrounding effects. Hence, the lyrics of a song sung a cappella by a single voice might be more difficult to perceive than that accompanied by a piano or a guitar.

Ludke(2012)[22] states various ways of selecting songs based on the teaching goals. It suggested that songs can be selected from this website: http://www.songsforteaching.com/ which contains songs in different languages classified according to different things that can be learnt from them. It points to the following literature works which detail about how to maximize song memory and hence help in verbal learning:

1. A simple and predictable song structure, e.g. verse [35][36][10]
2. A symmetrical melodic line, e.g. a rise in pitch followed by a fall[10]
3. Songs in which the end leads naturally back to the beginning[36]
4. A rhyme scheme within the lyrics to facilitate recall[10][37]
5. Songs without too much new vocabulary or grammar at once, to avoid confusion and frustration for learners[38]

5 Conclusion

Most of the research on neural system is done on the musicians or those who undergo musical training. This is so because changes are more significant in them as compared to those who just listen to music[7]. The research done on listening to songs to improve language is mostly in sense of creating motivation and enthusiasm. The work done by Ludke et al.(2014)[8] does give possibility that using songs can help in learning language better than just using spoken (or rhythmically spoken) texts. The work done on teaching foreign language through songs required the presence of a teacher who would choose the songs according to different criteria and systematize the process.

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