Music Speaks: The Connection Between Music and Language

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Humans and animals alike have a desire- a need- to communicate; this ability is universal. Ants use their antennae and dogs bark to communicate, while humans use language and music to do so. The purpose of communication has been discussed by countless evolutionary theorists, but we can conclude that it is a social function that connects us to one another. As mentioned prior, language is one of the chief ways that we communicate, but music is also another way. Author Hans Christian Andersen once said, “when words fail, music speaks,” but that raises the question: are language and music related because of their communicative properties?

On the subject of child development, language and music is learned simultaneously. Children are constantly making sounds and attempting to speak in order to express themselves. For children, music is the conduit in which they are involved in the world as well as their learning. While they are being musical, they are trying to learn language. Sometimes, they learn language through music and reciprocally. It is important for us to examine how music and language are related to understand the ways in which children develop their ability to communicate.

For us to understand the ways in which music and language are similar, this paper will serve as a review of literature. Music and language is such a complex and nuanced topic that research from many theoretical frameworks occupy this paper from musicology, child development, language learning, and even neuroscience. We will investigate the theoretical ways in which music and language are communicative, how both are developed in children, whether they affect one another, and what the brain can indicate about them.

**Music, Language, and Communication**

 Studies have been done on how music and language are related, but authors Steven Feld and Aaron Fox (1994) explained the different ways that we can think about music and language and their relation to one another: music as language, language in music, and language about music.

Music as language expressed the idea that musical structures are analogous to syntactic structures in language. For example, a word is comparable to a note, and a phrase is much like a sentence. They do however, offer a criticism to those who ascribe to this idea in that it excludes other musical features such as dynamics and tempo (Feld & Fox, 1994). The idea that music has speech like qualities is explained as language in music, in which qualities of speech, rhythm and pause- also called prosody- are necessary for both. Feld and Fox use lamentation and sprechstimme as a connecting example of language and music. However, they do express a need for clear definitions of musical and language features to compare them properly (1994). Lastly, it is mentioned that comparing music and language of different cultures would help us to understand more about the similarities between music and language as a universal commonality.

After all of this discussion on how music and language are connected, it is important to understand how they fit into our communication. When we discuss communication, we oftentimes think solely of discourse and conversation, but there are so many other ways of communicating. Musicologist, Charles Seeger (1977) explains the different types of communicating such as auditory (what we have been discussing), visual, or tactile, like dance. He asserts that music and language are simply subsets of auditory communication, rather than large entities that we frequently consider. Essentially communication is a hierarchy in which music and language play a smaller role in a much larger function.

 But in thinking of language as a smaller role, it is important to comprehend how prevalent communication is for our species and how far it has evolved. Language is deemed as the most crucial difference between us and animals, but communication is something that is universal between us, animals just have a more primitive way of communicating (Darwin, 1871). Darwin discusses the use of communication in regards to how and why birds make sounds. He contends that birds originally learned to create beautiful sounds in order to attract mates, but he discusses the other uses in which both animals communicate such as a dogs barking to growl at a predator, to yelp with pain, and to bark with excitement (Darwin, 1871). However, Darwin points out that language, like music, is an art in that it must be learned; however, he says that it is an instinctual desire to talk or sing. It is apparent in the sounds we hear from babies and their melodious coo’s (1871).

**Development in Children**

 The desire to use language and music are so prevalent in babies and children that the development of both have been extensively studied. A developmental comparison by McMullen and Saffran illuminated an interesting fact: that the way in which language and music are presented to children are very different, however, young children experience them in the same way- without context. Their connection to music and language is not of comprehension, but of production (McMullen & Saffran, 2004). It is understood that children of different cultures use and develop music and language differently: English monolingual children have a larger differentiation between singing and speech than Cantonese mono and bilingual speakers (Welch, 2006). However, their experience with music and language in pre-birth and after are the same: during the gestational period, babies hear their mothers’ speaking inflection, rhythm, stress, and voice. Once the are born, adults speak and sing to children differently with a lower pitch, repetitive, yet slow with a wide range of pitch variation. This infant directed speech is found across almost all cultures and is easy to recognize in lullabies, especially, due to modification of linguistic and musical aspects by adult (McMullen & Saffran, 2004).

 When children start singing and speaking, it has been found that children tend to create an intermediate vocalization in which they combine the two processes. This vocalization could be a key to understanding the similarities between music and language. Every 4 to 6 months for 42 months, researcher Esther Mang conducted informal interviews with parents as well as interacted with children between the ages of 18- 38 months to understand their use of intermediate vocalizations. After collecting field notes and interviews, a panel of three qualified judges analyzed the data to prevent flaws in the research. It was found that three stages occur in children: the first involves learning to fine tune their voice in which intermediate vocalizations are common, then children start to speak and sing resembling adults, and when they have mastered these skills, they only use intermediate vocalizations to express themselves (Mang, 2000). Childrens’ songs and speech became clearer around the time they turn two years old and this may because the meanings they attribute to language are forming. This can be proved due to the fact that the intermediate vocalizations the children expressed were not communicative (Mang, 2000). Intermediate vocalizations, may then, be a step towards clearer songs and developed language in children.

 If intermediate vocalizations are the combination of music and language, which progresses into speech and song, then this leads to the question of whether music influences language. Studies have shown that music training modifies brain processes, so brain imaging in neuroscience is a way to see how music can influence language and cognition. Researcher Sylvain Moreno examined whether short term or long term musical training affects language processing. He explained that music and language are both auditory processes with four acoustical qualities in common: frequency, spectral characteristics, intensity, and duration. (Moreno, 2009). Twenty non musician children were tested on pitch discrimination of French sentences that were congruous in terms of prosody, weakly congruous, and strongly incongruous: for instance, putting the emphasis on certain words or adding an inflection that made a statement sound like a question. After the initial test, ten of the children were given music training while the other ten learned painting for eight weeks, then were tested again. For the short term training, no difference could be discerned from the two groups of children. However, after a longitudinal study of six months with 32 children, both the behavioral and brain imaging test showed an increase of language processing by the children trained in music. Therefore, it was concluded that with long term training, children could learn to detect difference of language stress and inflection better than children who did painting. After Moreno discussed his findings, he expressed a need for researchers to determine whether language training modifies musical processes in the brain (2009).

**Effects of Language on Music and Music on Language**

 Moreno’s implication for his study brings up an interesting point: does language influence music in any way? Some assert that language and music are different because language expresses definitions and meaning to its elements, whereas music cannot express meaning or specific words like *cat* or *pizza*. However, some researchers have tried to prove that music actually conveys more meaning than previously thought (Koelsch, Kasper, Sammler, Schulze, Gunter, & Friederici, 2004). 122 nonmusicians were tested using a behavioral test and an ERP (brain neuroimaging) test; they were primed with a word, listened to a musical excerpt and were asked whether the excerpt expressed the word they were given. The subjects gave correct answers 80% of the time compared to 92% when given a sentence instead of musical excerpt (Koelsch et al, 2004). The findings proved that music can actually relay some semantic meaning, and this is just one example of language influencing music as well as identification of further similarities.

 As previously mentioned, researchers have been searching for ways in which musical training can influence language perception. It has been noted by several researchers that looking at different cultures with diverse languages may be a key to finding more similarities between language and music. The effects of music training on the L2 speech sound, which consists of nasal consonants and vowels, in foreign speakers has been researched by many (Cooper & Wang, 2012) (Gottfried & Yu, 2008) (Sadakata, Zanden & Sekiyama, 2010). One article focused on Dutch and Japanese speakers as they both heavily utilize L2 speech sounds. Japanese speakers have complex syllable structures and consonant nasal sounds, while Dutch speakers have more variation in their vowels. In said study, 53 native dutch speakers and 38 japanese speakers were tested on their ability to discriminate the speech sounds of the other language. Half of the test subjects were musically trained for more than five years while the other have had less than three years of musical training, focusing more on athletics. Subjects were expected to judge whether two sounds spoken by 4 speakers of the other language (two male, two female) were identical or not. It was found that the Dutch speakers could only detect a small difference of nasal sounds in Japanese, whereas the Japanese speakers had a high performance of discrimination between the Dutch vowels (Sadakata et al, 2010). Another study also found that non-native speakers could identify different vowel sounds regardless of musical training; however, musicians could also identify tone in non-native languages better than non-musicians (Gottfried & Yu, 2008). Research on whether music affects language, such as discrimination of speech sounds or tone identification, is a valuable asset in identifying their similarities.

**Music and The Brain**

 Knowledge acquired from research done on speech sounds and musical training has allowed us to gain an understand of how music also affects the brain processes of language. In order to fully make sense of these processes, it is telling to distinguish the parts of the brain in which music and language reside. Neuroimaging has been an extremely useful tool in discovering the brain and its role in music and language. Using a PET scan, researchers examined which parts of the brain were active when generating both sentences and melodic phrases. The idea behind testing sentence and melodic generation is that both are similar because their phrases have larger meaning than their elements. Five men and five women, around 25 years old who have studied music for over five years, were given two vocal tasks: to generate the second half of a melodic line and to complete the second half of a sentence. While they were completing the tasks, their brains were monitored on a PET scan. After comparing the brain processes of both tasks, it was concluded that there was brain activation in near identical areas, for instance the primary motor cortex, the supplementary motor area, Broca’s area, the primary and secondary auditory cortices, the basal ganglia, and the posterior cerebellum (Brown, Martinez, & Parsons, 2006). Another area that both music and language generation utilized was BA (Brodmann Area) 44 which is a part of Broca’s area. Some researchers suggest the reason why language and music perception are processes of Broca’s area is that it enables the brain to comprehend hierarchical structures, and music and language have their own syntactical structures. Impairments to this area shows that there is difficulty in comprehending hierarchy, but not sequences (Fadiga, Craighero, & D’Ausilioa 2009). Using neuroimaging to identify which parts of the brain house language processing and music perception allows us to understand whether these communicative properties are similar.

 Impairments to the brain in individuals are tragic, but they allow researchers to learn more about the processes and functions of the brain. In one study, researchers sought to investigate the relationship and influence of musical training and language impairment. The children were expected to recognize music violations, such as improper cadences or chord progressions, and grammar violations, sentences that ended on a preposition or words out of order. 28 children about 11 years old- half of whom had musical training- and 24 children around 5 years old- half of whom had language impairment- were expected to discern violations from chords of different keys and timbre and sentences with poor grammar. The study found that music training helps children recognize both the musical processing as well as processing linguistic structures. However, children with language impairment could not identify the musical violations(Jentschke, Koelsch, & Friederici, 2005). Is it possible that children with language impairment might benefit from musical training? The authors declared that using an EEG scan would be more beneficial to the research and further studies could be done based on this. Although children with language impairment could not identify music violations, children who had music training could identify grammar violations which may be due to schooling (the children were 11 years old and probably learned grammar in school) or musical structure helps children to process other structures in language.

 Some impairments in the brain affect music and language and research on them have been extensive and useful in finding similarities of both. Amusia is a disorder that affects music perception and production and aphasia affects the perception or production language. Two women with brain damage, but no aphasia, were given thirty four french sentence pairs with different contour, stress, rhythm, and inflection as well as pitches. The women were expected to distinguish whether the pairs were different or the same. One of the women did very well, while another did quite poorly on the test. The results exposed that linguistic intonation performance was similar to the melodic tone sequence and that music and language are not distinct separate entities (Patel & Peretz, 1997). By comparing the brain processes of music and language and the influence of impairments, it is possible to understand their similarities.

**Summary**

 By examining the literature review on music and language, it is apparent that there are similarities that exist between them. The theoretical framework that music and language are essentially communicative forms the idea that these two human functions are alike. Through research on their development, it is understood that both music and speech are innate in children and they use them simultaneously throughout their maturation. When researchers examine music and language as function in the brain, we see that these two processes are interconnected in many ways and are even found in the same areas. The research presented in this review of literature has pointed out a myriad of ways in which music and language are much the same, taken from a variety of different field such as neuroscience, musicology, psychology, and child development.

**Implications**

 However, for as much research that has been done, there is still much to learn about music and language. As technology progresses, there will be new ways to view the brain and the auditory processes that we otherwise could not see prior. Music in child development is still a fairly new field, so with further research on their musical development, we will be able to understand how it is related to language development. Furthermore, as impairments such as aphasia and amusia will allow researchers to explore the interrelated faculties of music and language in those with brain injury. As mentioned prior, music and language may be different in other cultures, so further research should focus on languages other than English and music from other places around the world. Music and language are universal and we must consider the entirety of the world when studying this commonality among us. The research done on this relationship between music and language enlightens us to a new understanding of how we communicate, listen to music and speech, and think about music and language.

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