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Music Therapy and Communication Disabilities: Singing, Speech, and the Brain

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Music therapy interventions, especially singing, can aid those with communication disorders to attain and develop verbal and non-verbal communication and language skills, as well as functional social skills. Throughout my own interactions with those with communication impairments, I have witnessed many individuals who struggle with typical speech, but are better able to communicate when music is involved. For instance, a young boy with Autism Spectrum Disorders (ASD) who does not typically speak independently or when prompted is able to sing every word to familiar songs on the radio that he enjoys. Such evidence of the positive effect that music can have on one's communication skills has motivated me to further research the field of music therapy, with a concentration in singing. Research and observations reveal the relationships among music, communication, and the brain, and the ways in which related pathways within the brain can modify themselves, in response to therapeutic interventions, to accommodate one's communication disabilities. Unfortunately, there is a limited amount of research within the field of music therapy involving interventions for specific communication disorders, as well as limited findings related to the effectiveness of existing music therapy interventions. However, the field of music therapy has made significant contributions towards helping people with communication disabilities. This paper will discuss existing research and include an overview of the field of music therapy, a discussion of the concept of neuroplasticity, and notes on personal experiences and my observations of a professional music therapist.

## I. Overview of music therapy

Because having difficulties with communication and language skills is such a significant aspect of several disabilities, professionals in special education and related fields work hard to incorporate speech and language interventions into academic instruction. Many of the academic goals within a student's Individualized Education Plan (IEP) reflect the explicit effort to provide as many opportunities as possible for special education students to be exposed to language, including music therapy interventions. Musical activities can provide children with motivating, comfortable, and stimulating opportunities to work on improving their communication and language abilities.

Music therapy can be considered a means of using music to achieve a non-musical goal. Goals addressed in music therapy sessions range from learning how to cut with scissors, to learning to walk at a consistent pace, to being able to respond verbally when asked a question. Interventions used in music therapy sessions are based on clinical experiences as well as qualitative and quantitative research evidence and are designed to address the cognitive, social, emotional, and physical needs of clients. Treatment plans typically involve creating, moving to, listening to, and singing to music. Skills that are improved within music therapy sessions are then transferred and focused towards improving other areas of life. For example, a preschool child who has learned to play a mallet instrument as a means of working on the non-musical goal of improving fine motor skills may then begin to improve upon his or her coloring skills within the setting of the preschool classroom.

There are many types of patients with whom music therapists can work and whose lives they can enhance. For example, music therapists work with those who suffer traumatic brain

injuries during and after birth. Many of these injuries cause impairments to speech and movement. However, even typically developing preschool age children can benefit from music therapy services, which aid them in developing many different early childhood skills, such as motor and speech development. Both children and adults with physical, cognitive, social, emotional, developmental, and learning disabilities benefit greatly from music therapy interventions. Specifically, children and adults with communication disorders, such as Autism Spectrum Disorder (ASD), aphasia, Down syndrome, and cerebral palsy can achieve improvements through music therapy due to its connection to language and communication. The strength and stamina that come from participating in musical activities also make music therapy a valuable intervention for children and adults with medical conditions such as asthma and chronic pain. In addition, music therapy can benefit those suffering from emotional difficulties and stresses, such as depression, anxiety, Post-Traumatic Stress Disorder, problems related to substance abuse, and traumatic experiences. The music therapist whom I interviewed stressed that “music therapy is easily adapted to fit disparate and unique individual needs.”<sup>1</sup>

Due to the large variety of patients whom music therapy supports, there are many settings in which music therapists provide services. Some of these settings include medical and psychiatric hospitals, public and private school systems, senior centers and nursing homes, rehabilitative programs, group homes and mental health care centers, hospice programs, and correctional facilities. It is typical for music therapists to work in several of these environments simultaneously. In fact, the music therapist whom I interviewed works in all of the aforementioned settings, as well as in pediatric palliative care, which specializes in the care of

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<sup>1</sup> Interview with Kari O'Briant, professional music therapist, November 4<sup>th</sup>, 2014. See Appendix A for complete notes on interview.

children with significant medical needs.<sup>2</sup> Some music therapists have their own private practices, in which they treat patients in the therapist's office or the patient's home. In all of these settings, music therapy sessions can take place within a group or in one-to-one sessions.

Although music therapy is a relatively new form of intervention within the medical, educational, and research communities, it has a significant history. Even in the ancient world, the benefits of music therapy were widely discussed. Philosophers such as Aristotle and Plato wrote of music as a healing influence that could affect and improve upon one's health and behavior.<sup>3</sup> Despite such early references to music therapy, the field of modern music therapy did not truly begin until the World War I era, when musicians traveled to veterans' hospitals and facilities all over the United States to play for both physically and emotionally wounded soldiers. These patients responded in significantly positive ways to this musical entertainment.<sup>4</sup> As a result, doctors and nurses who saw these positive outcomes requested that hospitals begin hiring musicians to play on a regular basis for patients. If musicians were to play for therapeutic purposes, they needed to take part in formal training, and so, college curricula for these hospital-employed musicians were developed.

The first music therapy degree program in the world was founded in 1944, by Michigan State University.<sup>5</sup> The Certification Board for Music Therapists (CBMT) was created in 1983, creating recognition for music therapy as a legitimate therapeutic intervention and profession. The first music therapy board examination was administered in 1985, and CBMT has been fully accredited by the National Commission for Certifying Agencies since 1986. To further validate

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<sup>2</sup> Interview with K. O'Briant,

<sup>3</sup> American Music Therapy Association, "Definitions and Quotes about Music Therapy" (online resource, accessed January 28, 2014); available from <http://www.musictherapy.org/about/quotes>; Internet.

<sup>4</sup> *Ibid.*

<sup>5</sup> *Ibid.*

the practice of music therapy, the American Music Therapy Association (AMTA) was founded in 1998. This served to unite the music therapy profession and merged the National Association for Music Therapy (NAMT, formed in 1950) and the American Association for Music Therapy (AAMT, formed in 1971). Currently, AMTA is the largest music therapy association in the world, representing therapists from thirty-one different countries.<sup>6</sup> For membership in AMTA, music therapists are required to hold a bachelor's degree or higher from an approved college or university program. These programs require 1,200 hours of clinical training in psychology, medicine, and music. To become certified, music therapists must successfully complete the board examination administered by the Certification Board of Music Therapists.<sup>7</sup>

The practice of music therapy has been investigated in a number of evidence-based studies. There are many peer-reviewed research journals from around the world dedicated to the field of music therapy. Such journals include the *Journal of Music Therapy*, *Music Therapy Perspectives*, *Australian Journal of Music Therapy*, *Canadian Journal of Music Therapy*, *New Zealand Journal of Music Therapy*, and *Approaches: Music Therapy and Special Music Education*. While there is a considerable amount of research that still needs to be completed involving the specific applications of music therapy interventions, quantitative and qualitative studies affirm the value of music therapy.

## II. Neuroplasticity

One concept that supports and explains the effectiveness of music therapy is the biological process of neuroplasticity. Neuroplasticity is the brain's ability to pave new pathways

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<sup>6</sup> American Music Therapy Association, "History of Music Therapy," (on-line resource, accessed January 28, 2014); available from <http://www.musictherapy.org/about/history>; Internet.

<sup>7</sup> *Ibid.*

around damaged areas of the brain. This means that if a certain area of the brain becomes damaged, the brain can bypass that area and find a different pathway that will allow it to carry out the task that the damaged area of the brain typically completes. This is similar to instances when one is driving and there is construction blocking the path to the destination; one takes a detour and follows a different path that will still bring the driver to the same destination. In the case of brain injury, the brain is able to reorganize its remaining tissue to form new routes, which allow it to continue its functioning.<sup>8</sup> Similarly, neuroplasticity can also be effective for those who are born with communication impairments, such as ASD, Cerebral Palsy, and aphasia. Such substituting pathways and alternative areas of the brain are trained to carry out these compensational functions through the interventions of various types of therapies. These therapies focus on stimulating and exercising these areas and pathways within the brain to help them understand and recognize the different jobs that they now need to complete.

Music therapy is especially useful, because participating in musical exercises activates areas throughout the entire brain. Rhythmic and sequential aspects of music activate the left hemisphere of the brain, while melodic aspects of music activate the right hemisphere of the brain.<sup>9</sup> Typically, musical activities incorporate both melodic and rhythmic tasks, simultaneously involving both hemispheres of the brain. In contrast, language is dominant within the left hemisphere of the brain and this is where the majority of, although not all, language processes occur. Whenever damage to the left hemisphere of the brain occurs, whether it is a result of trauma or a disability, both expressive and receptive language functions may be altered. Music facilitates the process of neuroplasticity by linking aspects of language to the

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<sup>8</sup> Felicity Baker and Edward Roth, "Neuroplasticity and Functional Recovery: Training models and Compensatory Strategies in Music Therapy," *Nordic Journal of Music Therapy* 13 (2004): 24.

<sup>9</sup> *Ibid.*, p. 26.



undamaged right hemisphere of the brain. There is much research that supports the role of neuroplasticity in music therapy.<sup>10</sup>

As early as the 1870s, a connection was observed between the nature of a brain injury and the adaptations made by the brain in response. Hughlings Jackson found that the rate of development of a brain lesion determined the severity of a patient's symptoms; in patients with more slowly developing brain lesions there were fewer symptoms.<sup>11</sup> This is because more slowly developing lesions allow more time for the brain to reorganize its pathways and prepare to compensate for a gradual loss of function.

By engaging both hemispheres of the brain, music therapy can facilitate neuroplasticity and remediate communication difficulties such as stuttering. Like most language functions, stuttering shows more activity in the left hemisphere, while fluent speech is connected to the right hemisphere of the brain. It has been found that those who stutter during speech are able to sing without exhibiting this condition.<sup>12</sup> Stuttering is due to one's difficulty with the perception and implementation of rhythms, and the practice of rhythmic exercises through music can help to overcome stuttering in non-singing communication as well. This is attributed to neuroplasticity, for after several therapeutic sessions involving singing, the brain is evidently able to "rewire" around the area that contributes to stuttering during speech.<sup>13</sup>

Neuroplasticity also seems to explain how music, movement, and speech can be connected through therapy. Movement and music are often part of the therapy for stroke patients

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<sup>10</sup> See for example, Baker and Roth, "Neuroplasticity," 24; and Carolyn Johnson, "When Language is Blocked, Music May Offer Detour," *Boston Globe*, Section A, p. 1 (April 22, 2010); and Nathalie Henrich, "Singing Voice research at the Speech and Cognition Department," *Psychomusicology* 21 (2011): 240.

<sup>11</sup> Edward Podolsky, *Music Therapy* (New York: Philosophical Library, 1954), p. 102.

<sup>12</sup> Amy Clements-Cortes, "Can Music Be Used to Help a Person Who Stutters?," *Canadian Music Educator* 53 (2012): 45.

<sup>13</sup> *Ibid.*

who are regaining their speech abilities. Left-hemisphere strokes impair Broca's Area, a speech center located in the left hemisphere of the brain. Through singing, unimpaired language centers within the right hemisphere of the brain are activated. Commonly, the type of music therapy used for patients who have a loss of language is Melodic Intonation Therapy (MIT). MIT involves repetition of a target word or short phrase, where the patient sings the word using techniques similar to the rhythm, stress, and intonation of natural speech. For example, in MIT, a sung phrase would have a high-to-low pitch pattern, because this exemplifies the typical inflection of a spoken phrase.<sup>14</sup> Such imitations of speech through singing allow for an individual to practice and recognize the proper positioning of the speech apparatus, through the promotion of the active movement of facial muscles and articulators. MIT also aids the improvement of one's vocal range, pitch control, and tone quality of speech.<sup>15</sup> In addition to these activities, the patient along with the music therapist moves to the rhythm and beat of the word or phrase. This is often done by having a patient tap on a drum while simultaneously singing a word or a phrase in a repeated cycle. It is thought that having the left hand tap activates the sensorimotor network within the right hemisphere of the brain, which plays a role in articulation abilities.<sup>16</sup> The music therapist whom I interviewed uses a similar drumming activity with her students. The therapist explains,

“I use a turn-taking drum song that, in addition to playing the drum, includes rhythmic hand clapping and feet stomping (the latter accompanied by a rhythmic vocalization, e.g. “oo oo oo”). Another example is a song that involves clapping, patting knees, and stomping feet. Each verse focuses on one movement, which is slow at first, then after a pause,

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<sup>14</sup> Blythe Lagasse, “Evaluation of Melodic Intonation Therapy for Developmental Apraxia of Speech,” *Journal of Music Therapy* 30 (2012): 49.

<sup>15</sup> Jeanette Tamplin, “A Music Therapy Treatment Protocol for Acquired Dysarthria Rehabilitation,” *Music Therapy Perspectives* 26 (2008): 24.

<sup>16</sup> *Ibid.*, p. 26.

speeds up dramatically and changes from sung words to sung vocal sounds. [The sound] “la” is one I use often, but depending on the group or client, [the sounds used] can be altered to their needs (e.g. “ba” “ha” “ma”).”<sup>17</sup>

MIT is able to engage both the left hemisphere of the brain and the right, undamaged hemisphere of the brain, as it combines movement, language, and music, especially because it incorporates both melodic and rhythmic aspects of music. Within a study where MIT was used as a therapeutic intervention, it was found that patients significantly improved their speech production, fluency, and articulation.<sup>18</sup>

MIT can also be used to develop the communication abilities of those with Developmental Apraxia of Speech (DAS). DAS is a neurological disorder that affects the speech abilities of children. Those with DAS typically produce inconsistent errors in the sound production of speech and disrupted transitions between the syllables of words; they have difficulties with oral motor functions, prosody, phonemic awareness, and literacy. In a study of two boys with DAS, researchers used MIT as a warm-up for speech therapy. During MIT sessions, the music therapist would begin by tapping the rhythm of a word or phrase onto a patient’s hand. Then the patient would listen as the therapist modeled singing the word or phrase while tapping. The therapist would repeat this word or phrase several times, and the patient would then sing along with the therapist. This step would also be repeated several times. The therapist would gradually fade out his or her singing so that the patient would sing alone. Then the therapist would speak the word or phrase using normal speech patterns. The patient would then speak the word with the therapist and then on his or her own. Next, the therapist would ask the patient a question that led to an answer involving the word or phrase they were working on to

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<sup>17</sup> Interview with K. O’Briant

<sup>18</sup> Lagasse, “Evaluation of Melodic Intonation Therapy,” 49.

incorporate the functional use of speech.<sup>19</sup> It was found that when compared with children with DAS who did not take part in MIT warm-ups, children who did take part in MIT warm-ups achieved improved phrase lengths, noun retrieval, and verbal imitation.<sup>20</sup> This may be because remembering a melodic contour or a rhythmic progression is similar to processing sequential linguistic information, such as sentence structure.<sup>21</sup> Although more research needs to be conducted in regards to MIT for it to be considered an evidence-based treatment for children with DAS, this study suggests that the use of singing as an imitation of spoken language, accompanied with rhythmic and movement activities that stimulate both hemispheres of the brain, helps to develop the speech abilities of children with DAS.

As Melodic Intonation Therapy exemplifies, the combination of music and movement acts as a way to stimulate multiple areas of the brain. Studies suggest that the combination of music, movement, and speech activates and strengthens a network of brain regions that overlap with those brain areas thought to be abnormal in children with ASD.<sup>22</sup> A 1994 study indicated that after the intervention of music therapy, children with ASD were able to produce rhythmic patterns and vocal responses to varied pitches and to vocalize in a steady tempo that matched the tempo of others around them.<sup>23</sup>

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<sup>19</sup> *Ibid.*, p.52.

<sup>20</sup> *Ibid.*

<sup>21</sup> Hayoung Lim, "Effect of Developmental Speech and Language Training Through Music: On Speech Production in Children with Autism Spectrum Disorders," *Journal of Music Therapy* 48 (2011) 3.

<sup>22</sup> Johnson, "When language is Blocked," p. 1.

<sup>23</sup> Lim, "Effect of Developmental Speech and Language Training," p. 13.

### III. Music therapy and specific disabilities

With an understanding of how neuroplasticity allows changes within the brain, music therapists have been able to address a number of specific disabilities, including Autism Spectrum Disorder (ASD). Significant criteria for diagnosing ASD include impairments in speech and language abilities as well as difficulties with social communication. The main speech impairments of ASD include repetitive language, uncommon tone of voice, lack of flow of speech, echolalia (repetition of another person's spoken words), incoherent speech, difficulty processing speech directed at oneself, difficulty expressing thoughts and feelings through speech, and uncommon prosody (patterns of stress and intonation). Despite these difficulties, those with ASD show an ability to perceive and produce speech. Music has proven to be a beneficial therapy for children with ASD, not only in verbal and non-verbal communication, but also in fine and gross motor coordination, attention span, social interpersonal skills, concept of self, and verbal and non-verbal communication.<sup>24</sup> In particular, music therapy is significantly effective in increasing the frequency of communication behaviors such as vocalizations, verbalizations, gestures, vocabulary comprehension, echolalia, and communication intention.<sup>25</sup>

As already noted, the combination of music and movement can be beneficial for a child with ASD. In a case study of a six-year-old girl with severe ASD, the music therapist had the child imitate drumming rhythms presented by the therapist. After the child began to show progress in reproducing the music therapist's given rhythms, she was asked to beat her drum while the music therapist sang a "hello song." After several sessions in which the child was allowed to interpret when and how the drum was beaten during the "hello song," the child began to shout the words of the "hello song" to the rhythm of the drumbeat. After a good deal of

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<sup>24</sup> *Ibid.*, p. 21.

<sup>25</sup> *Ibid.*, p. 22.

practice, the child was able to sing the “hello song” without having to simultaneously beat the drum. It was found that this therapeutic intervention resulted in an improvement of vocabulary as well as an increase in the spontaneous use of language.<sup>26</sup> This child’s parents also reported that her behaviors and responsiveness to communication at home improved as well.<sup>27</sup>

Children with ASD typically show a particular interest in patterns, which helps to explain why music therapy can improve their communication abilities. Many experts conclude that the ability to perceive and produce patterns strongly influences the development of language abilities in children with Autism Spectrum Disorders.<sup>28</sup> Both music and speech incorporate patterns of pitch and rhythm. A 1994 study found that children with ASD are able to correctly reproduce rhythmic and pitch patterns and to vocalize in a steady tempo that matches a given tempo when singing.<sup>29</sup> In addition to patterns, both music and speech share a steady flow, either of notes or words. This association can help those with ASD to improve upon the flow of their speech. One study that focused on this involved twenty-two preschool-age children who were considered verbal or pre-verbal and were immediately able to participate in echolalia.<sup>30</sup> Within the study, the participants were asked to sing songs chosen by a music therapist, in which the lyrics included target words and phrases that were typical for preschool-age children. Each line of a song ended in a target word or phrase, and a music therapist reinforced these words and phrases by showing participants pictorial representations of them. At the end of the study, the participants were assessed on their abilities to speak sentences including their target words and

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<sup>26</sup> For descriptions of similar exercises, refer to Appendix B, Notes on observations of Grades 1-4 Public Elementary School, Spring 2014.

<sup>27</sup> Lori Gooding, “The Effect of a Music Therapy Social Skills Training Program on Improving Social Competence in Children and Adolescents with Social Skills Deficits,” *Journal of Music Therapy* 48 (2011): 443.

<sup>28</sup> *Ibid.*, p. 444.

<sup>29</sup> Lim, “Effect of Developmental Speech and Language Training,” p. 16.

<sup>30</sup> *Ibid.*, p. 18.

phrases. It was found that the therapeutic strategy of singing improved the ability of participants to speak with appropriate and steady flow of speech.<sup>31</sup>

Within Applied Behavior Analysis (ABA), a common teaching and data collection method for students with ASD, language is treated as a behavior that can be shaped and reinforced. In one type of ABA, a musical stimulus, such as singing a song, is paired with target verbal behaviors and effective positive reinforcement. It has been found that the fun and stimulating nature of singing acts as a positive reinforcement, increasing the frequency of communication behaviors and social interactions in children with ASD.<sup>32</sup> Verbal prompts can also be embedded within musical stimuli, further encouraging children with ASD to participate in speech and communication activities.<sup>33</sup> For example, a therapist or teacher may sing an instruction or explanation of an academic task, which would provide motivation through music.

Many children with ASD experience sensitivities to various types of stimulation. It has been found that these sensory overloads can be alleviated with the use of strategic music therapy interventions. When a child with ASD experiences a case of sensory overload, it is very difficult for him or her to be productive in working towards meeting goals, including those related to academics, functional skills, and communication. Music accommodates the sensitivities of a child with ASD while also working on important skills and goals. In 1969, the first article in *The British Journal of Music Therapy* to address the use of music therapy with children with ASD advocated the use of music therapy to improve communication skills in these children.<sup>34</sup> This

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<sup>31</sup> *Ibid.*, p. 23.

<sup>32</sup> Hayoung Lim, "The Effects of Music Therapy Incorporated with Applied Behavior Analysis Verbal Behavior Approach for Children with Autism Spectrum Disorders," *Journal of Music Therapy* 48 (2011): 533.

<sup>33</sup> *Ibid.*, p. 536.

<sup>34</sup> Alaine Reschke-Hernandez, "History of Music Therapy Treatment Interventions for Children with Autism," *Journal of Music Therapy* 48 (2011): 171.

study found that an improvisational group therapy approach works well for children with ASD. In this setting, a music therapist provides limited musical guidance and allows students to explore through music and interact with one another at their own pace.<sup>35</sup> This approach allows students to practice aspects of communication, such as participating in conversations and taking turns, as well as to choose his or her own desired amount and type of stimulation. During an improvisational group music therapy session, students take part in rhythmic and vocal imitations of one another, have reciprocal musical conversations, and explore the cause and effect of creating music. Along with conversation and functional language skills, these activities also aid in the development of joint attention, the shared focus of two or more individuals on the same object, task, or idea. Joint attention is one of the aspects of communication that is most difficult for those with ASD. Practicing such communication skills within a self-regulated environment allows for these children to minimize the occurrence of sensory overload while learning how to communicate.

Music therapy can also be used to aid the communication skills of children and adults with ASD who use Alternative and Augmentative Communication (AAC). AAC involves the use of pictures and/or devices (e.g. iPad applications, Dynavox devices, Tobii Gaze Viewers) as a substitute for or in addition to speech. A year-long case study of a three-year-old boy with ASD who participated in individual music therapy sessions illustrates this technique.<sup>36</sup> Within music therapy sessions, the child would use picture symbols as well as gestures to request songs that he or she would like the music therapist to sing. This teaches the child the cause-and-effect relationship between communicating a want or need and having it granted. This also mirrors the

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<sup>35</sup> *Ibid.*, p. 176.

<sup>36</sup> Carolyn Ayson, "The Use of Music Therapy to Support the SCERTS Model Objectives for a Three Year Old Boy with Autism Spectrum Disorder in New Zealand," *The New Zealand Journal of Music Therapy* 9 (2011): 9.



form of a conversation, where one first listens and then responds to another. In addition, when singing a “hello” song with the music therapist, this child was able to press a voice output device to say the word hello at the right times throughout the song.<sup>37</sup> This activity allowed the child to practice skills involving the flow of speech as well as the functional purpose of the word “hello,” for this song was sung at the beginning of each music therapy session. Using AAC devices within music therapy sessions may also reinforce a child’s understanding of using his or her AAC device within everyday environments involving communication.

The music therapist I interviewed described another exercise that was helpful to children with ASD. She explained that she uses fill-in-the-blank activities, similar to those involving AAC devices to say the word “hello” throughout a “hello” song. The therapist sings a song, in which the patient uses his or her opinions and feelings to provide a word where the therapist leaves a blank.<sup>38</sup> This allows for the patient to practice his or her speech abilities and helps him or her learn when it is appropriate to speak.

As in the case of ASD, other communication disabilities can be addressed with specifically designed music therapy interventions. Quadriplegia, the paralysis of all four limbs resulting from illness or injury to the spinal cord, can cause a loss of function of respiratory muscles, decreasing one’s inspiratory and expiratory strength. Such respiratory dysfunction can decrease one’s voice projection abilities and phonation length during speech, and cause a rough and breathy tone quality, abnormal prosody of speech, weakened volume of speech, and reduced stress and articulation of words.<sup>39</sup> Although respiratory muscle training exercises can improve

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<sup>37</sup> *Ibid.*, p. 12.

<sup>38</sup> Interview with K. O’Briant

<sup>39</sup> Jeanette Tamplin, “The Effect of Singing on Respiratory Function, Voice, and Mood, After Quadriplegia: A Randomized Controlled Trial,” *Archives of Physical Medicine and Rehabilitation* 94 (2013): 428.

one's respiratory muscle strength and endurance, patients often consider such exercises to be boring, repetitive, and without immediate reward. If a patient ceases doing these respiratory exercises, his or her respiratory functioning typically declines back to its original state.

Professionals working with those with Quadriplegia have started to consider singing as a therapy that would result in effects similar to those of respiratory muscle training.<sup>40</sup> Singing demands a considerable amount of strength and stamina in the respiratory system and muscles, as it requires strong, fast inhalations and extended, regulated exhalations of the lungs and diaphragm. A study investigated whether group therapeutic singing could improve respiratory and voice functioning in those with Quadriplegia. Two middle-aged individuals participated in this study. Both participants completed assessments before, during, immediately after, and six months after the study, including respiratory function tests, vocal assessments, and questionnaires. Within each group music therapy session, participants selected a song to sing using a karaoke system. Pitch accuracy, timing accuracy, use of loud and soft vowels, and use of speech versus singing were assessed. It was found that slight improvements of respiratory functioning were made by those receiving singing interventions.<sup>41</sup> Researchers felt that if the study were extended to allow participants greater time to regularly participate in singing activities, there might have been a greater improvement. Within a similar study of twenty-four participants that took place over a twelve-week span, it was found that singing interventions provided a positive effect on voice projection and phonation length of those with Quadriplegia.<sup>42</sup>

For those who are in vegetative states (VS) and minimally conscious states (MCS), music therapy has been used as part of both diagnosis and treatment. Manipulating the sounds in a

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<sup>40</sup> *Ibid.*, p. 430.

<sup>41</sup> *Ibid.*

<sup>42</sup> Jeanette Tamplin, "The Effect of Singing Training on Voice Quality for People with Quadriplegia," *National Library of Medicine* 28 (2014): 128.e31.

patient's environment (by having a therapist sing at certain pitches or volumes) can help to provide specific information regarding a patient's sensory abilities.<sup>43</sup> Discovering that a patient is in a higher state of awareness when he or she hears higher pitches may help a professional to find additional ways in which these patients can understand what others are communicating to them and be able to respond. In one instance, a patient was considered to be in a VS, and doctors and therapists were unsure of her level of cognitive ability due to her lack of response to stimuli. However, when a music therapist played music for her she was able to move her head in the direction of the music, create positive facial gestures, and increase her breathing rate. This resulted in changing her diagnosis to MCS.<sup>44</sup> Music therapy practices can enhance social functioning in these patients as well, for responding to (and eventually creating) music incorporates skills such as listening, turn-taking, imitation, repetition, and developing unique ideas.<sup>45</sup> The majority of VS and MCS patients cannot immediately express their feelings and thoughts through speech, but music can provide an alternative outlet in which they are able to do so.

Those with Parkinson's Disease can also benefit from music therapy interventions. Parkinson's Disease is a degenerative neurological disorder that is characterized by many symptoms affecting motor abilities as well as the impairment of speech. More than half of those affected by Parkinson's Disease have at least moderate speech impairments, usually called hypokinetic dysarthria. This refers to reduced pitch inflection, hoarse voice, reduced loudness, and articulation impairments. In a 2004 study, participants with Parkinson's disease were asked

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<sup>43</sup> Wendy Magee, "Music Therapy with Patients in Low Awareness States: Approaches to Assessment and Treatment in Multidisciplinary Care," *Neuropsychological Rehabilitation: An International Journal* 15 (2005): 526.

<sup>44</sup> *Ibid.*, p. 528.

<sup>45</sup> *Ibid.*, p. 531.

to pick out a song that they liked from a selection and then to sing it. Before and after singing this song they were asked to read a paragraph from a book. It was found that the rate and rhythm of speech, initial consonant sounds, final consonant sounds, continuity of speech, and intelligibility were improved when reading after singing a song.<sup>46</sup> In another study of Parkinson's Disease, the Music Therapy Voice Protocol (G-MTVP), a specific procedure for carrying out a choral session, was evaluated. Ten participants received G-MTVP treatment twice a week for six weeks and were tested before, during, and after the treatment for progress results. Within each session the choir followed the same protocol, which included opening conversations, physical warm-ups, breathing exercises, speech exercises, vocal warm-ups, singing exercises, and closing conversations. From pre-test to post-test, the fundamental frequency variability of conversational speech significantly increased. (Fundamental frequency is the lowest frequency produced by the oscillation of the vocal chords, referring to the ability of a patient to vary the inflection of his or her voice for expressive purposes.) Participating in singing clearly helped these patients with Parkinson's disease to maintain and strengthen their speech abilities.<sup>47</sup>

Music therapy interventions can also be useful for those with Dysarthria, a group of motor speech disorders involving disturbances in the control of speech musculatures. (The hypokinetic dysarthria associated with Parkinson's Disease is one type of this disorder.) These speech disorders commonly occur following a traumatic brain injury that damages the nervous system and various areas of the brain, such as the upper or lower motor neuron system, cerebellum, and extrapyramidal system. Common characteristics of Dysarthria include

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<sup>46</sup> Olivia Yinger and Leonard LaPointe, "The Effects of Participation in a Group Music Therapy Voice Protocol (G-MTVP) on the Speech of Individuals with Parkinson's Disease," *Music Therapy Perspectives* 30 (2012): 27.

<sup>47</sup> *Ibid.*, p. 29.

impairments in strength, tone, range, rate, speed, steadiness, volume, prosody, and expressive abilities of speech.<sup>48</sup> In one study, a music therapy treatment protocol for patients with Dysarthria was designed to control and strengthen the muscles and mechanisms used to produce speech.<sup>49</sup> This protocol involved verbal and physical warm-ups and exercises followed by singing activities. Patients first took part in preparation exercises, which were intended to make sure the patient was relaxed and ready for therapy by reduction tension and focusing attention on the respiratory system. Such exercises focused on body awareness and muscular relaxation, such as gently stretching neck, jaw, and tongue muscles. Following this initial warm-up, patients completed oral motor and respiratory exercises, which focused on developing breath control and respiratory capacity and allowed for better control of the expiratory pulmonary pulses, which are necessary for the vocal chords to fold and vibrate correctly.<sup>50</sup> These exercises included alternations between sustained unvoiced and voiced audible exhalations (e.g. “shhh” and “ahhh”), designed to develop increased lung capacity and muscular control, and pulsed exhalations, which were used to improve diaphragmatic breathing, onset of phonations, range of pitch, and pitch variation. After these exercises, patients participated in rhythmic and melodic articulation exercises as a means of improving rate, steadiness, and tone of speech. In the last activity in this protocol, patients chose three familiar songs to sing. Patients were encouraged to incorporate strategies learned from the exercises into their singing. Music therapists accompanied the patients on guitar and offered vocal support when necessary.<sup>51</sup> Such interventions resulted in patients’ increased understanding of how to use and control the muscles

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<sup>48</sup> Tamplin, “A Music Therapy Treatment Protocol,” 24.

<sup>49</sup> *Ibid.*

<sup>50</sup> *Ibid.*, p. 26.

<sup>51</sup> *Ibid.*, p. 27.

and apparatuses necessary for speech, which allowed for improved articulation, speech flow, and tone of speech.<sup>52</sup>

#### IV. Music therapy and non-verbal communication

Music therapy techniques can assist those who are non-verbal in improving upon their communication abilities. Such individuals express their thoughts, opinions, and needs, through gestures, facial expressions, and body language. The music therapist whom I interviewed told of one such client who is non-verbal due to medical reasons and clearly exemplifies the ways in which one can communicate without words. The therapist explained that although “he cannot produce sounds, he does communicate through facial expressions and will laugh and move his mouth.”<sup>53</sup> The music therapist acknowledged the ability of her client’s non-verbal musical abilities by saying, “he does also sing, just not in the traditional sense.”<sup>54</sup> Such non-verbal singing can be used to communicate. A study examined a four-year-old child with communication disabilities, focusing on how the combination of music therapy and speech therapy helped him to use non-verbal communication.<sup>55</sup> The child was diagnosed with Global Developmental Delay, a significant delay in two or more areas of development, such as gross and fine motor skills, speech and language, cognition, personal and social skills, or daily living skills development.<sup>56</sup> He was born at twenty-seven weeks, resulting in the need for a respirator for the first seventeen

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<sup>52</sup> *Ibid.*, p. 29.

<sup>53</sup> Interview with K. O’Briant

<sup>54</sup> Interview with K. O’Briant

<sup>55</sup> Kamile Geist, Jon McCarthy, Amy Rodgers-Smith, and Jessica Porter, “Integrating Music Therapy Services and Speech-Language Therapy Services for Children with Severe Communication Impairments: A Co-Treatment Model,” *Journal of Instructional Psychology* 35 (2008): 311.

<sup>56</sup> *Ibid.*

weeks of his life. Due to complications, he had severe communication deficits. Prior to this study the child participated in speech therapy and had never been exposed to music therapy. The child used gestures and picture symbols to communicate and had no experience speaking. In music therapy sessions he walked towards sound sources and signed the word “more” when the sound stopped. He was also able to choose the picture of the instrument that he wanted to play. When singing a “hello song,” the child was able to press a voice output device to say hello at the proper times. After participating in music therapy, the child was able to appropriately respond to the word “no” and more frequently communicate his wants and needs with gestures.<sup>57</sup> Music supplied productive opportunities for repeated practice in communication activities as well as social engagement.

As previously noted, non-verbal communication can also be enhanced by music therapy interventions for those in vegetative states (VS). A case study was completed on a patient in a VS who had a severe anoxic brain injury following cardiac arrest.<sup>58</sup> This patient was hypersensitive to touch, which made physical interventions difficult. Prior to music therapy interventions, this patient did not follow verbal commands or respond to visual cues and responded inconsistently to auditory cues (including, but not limited to, verbal commands). She was referred to music therapy by speech-language and occupational therapists to assess her behavioral responses to non-verbal stimuli. The music therapist performed music at various eye-level positions around the patient, specifically during the patient’s exhalations. The music therapist used simple chord progressions and kept a steady tempo at the rate of the patient’s exhalations. She hummed a simple melody that slowly turned into singing “hello” and the

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<sup>57</sup> *Ibid.*, p. 313.

<sup>58</sup> Magee, “Music Therapy with Patients in Low Awareness States,” p. 527.

patient's name. She would repeat this phrase four times in a row and use a descending major third on the word "hello." The music therapist also played songs that were familiar and recognizable to the patient. As a result, the patient had observable responses to the musical stimuli; her facial expressions exhibited being upset when she heard a guitar.<sup>59</sup> When music was played, the patient's head moved repeatedly in an upward direction as an attempt to raise her head towards the guitar. Her breathing rate also increased as musical stimuli were initially introduced. When the music therapist played a song on the piano the patient repeatedly lifted her head to look towards it. Songs that were believed to be meaningful to the patient elicited the most response, such as the lifting of her head and showing facial expressions.<sup>60</sup> The use of musical therapeutic interventions helped to discover that the patient could show consistent responses to her environment.<sup>61</sup>

## V. Music Therapy and Functional Communication

It is important for those with disabilities to learn to transfer functional communication skills (i.e. appropriately participating in conversations, answering questions, expressing needs) to everyday situations and to be able to generalize these skills among various environments. Research shows that music can be used to teach non-musical skills, such as those involved with social activities.<sup>62</sup> Many musical activities include social aspects such as cooperation, verbal and non-verbal communication, positive peer interactions, focus of attention, social play, group cohesion, and peer collaboration.<sup>63</sup> The music therapist whom I interviewed explained that her

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<sup>59</sup> *Ibid.*, p. 528.

<sup>60</sup> *Ibid.*, p. 530.

<sup>61</sup> *Ibid.*, p. 534.

<sup>62</sup> Gooding, "The Effect of a Music Therapy Social Skills Training," p. 443.

<sup>63</sup> *Ibid.*, p. 445.



clients addressed communication issues through taking turns, imitating others, making choices, following musical cues, and initiating music.<sup>64</sup> These activities can be used within everyday communication situations. A study of this functional application of skills was conducted on a group of twelve children ranging in age from eleven to sixteen with disabilities in language, perception, and concentration.<sup>65</sup> Each child participated in a fifty-minute group music therapy session once a week for five weeks. Within sessions, music therapists addressed peer relations and self-management skills. The music therapist used interventions such as movement to music, drumming, instrument playing, improvisation, and singing. Following the conclusion of group music therapy sessions, it was found that the number of student-initiated, on-task social behaviors increased, while the need for prompts from teachers and off task social behaviors decreased.<sup>66</sup>

In another case, a twelve-year-old girl who sustained a traumatic brain injury in a car accident was referred to music therapy to see if interventions would reduce agitation, increase relaxation, and increase the frequency of her non-verbal communication and expression.<sup>67</sup> When asked to touch a musical instrument, the patient initially became agitated and was unable to tolerate such stimulation. As music therapy sessions continued, the patient began to enjoy the noises that the therapist created on the instruments and steadily became more used to them. Over the eight weeks of music therapy sessions, the patient's meaningful facial expressions became more frequent. When simple guitar chords were played she hummed and vocalized along with them and had an increase in eye contact with the music therapist. Subsequently, the patient used increased eye contact outside of music therapy sessions, when involved in conversations with her

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<sup>64</sup> Interview with K. O'Briant

<sup>65</sup> Lori Gooding, "The Effect of a Music Therapy Social Skills Training," p. 458.

<sup>66</sup> *Ibid.*, p. 460.

<sup>67</sup> Magee, "Music Therapy with Patients in Low Awareness States," p. 526.

family members.<sup>68</sup> The combination of music therapy interventions with the development of a relationship between therapist and patient helped to improve emotional expression, decrease aggressive behaviors, and enhance social interaction abilities in patients with neurobehavioral disorders.<sup>69</sup>

The functional communication skills of children with ASD can also be improved through music therapy. As in a similar case study cited above, another one focused on target words within songs. The therapist followed this up with questions and conversations involving those words, but going beyond the scope of the song.<sup>70</sup> For example, if the client were working towards saying the names of animals, the music therapist might ask what his or her favorite animal was. It was found that post-test scores in functional communication were slightly higher for those receiving music therapy than for those receiving speech therapy only and much higher than for those who were not receiving any type of therapy.<sup>71</sup>

One of the biggest struggles for those with disabilities is being able to take what they have learned within a therapy or school setting and applying it to real-life situations, such as home, school, and the community. Music therapy can be particularly valuable in such contexts. The music therapist whom I interviewed stated that she works “on multiple levels to address social, emotional, and physical functioning at the same time.”<sup>72</sup> For example, within Melodic Intonation Therapy (MIT), a patient learns not only to say a phrase, but also how to respond to a question where this phrase is elicited. Within call-and-response singing activities, patients learn skills such as joint attention and turn-taking in conversation as well as improve upon their flow

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<sup>68</sup> *Ibid.*, p. 529.

<sup>69</sup> *Ibid.*, p. 533.

<sup>70</sup> Hayoung, “Effect of Developmental Speech and Language Training,” p. 12.

<sup>71</sup> *Ibid.*, p. 15.

<sup>72</sup> Interview with K. O’Briant

of speech. In my own interactions with individuals with communication disorders, I have observed improved social habits following musical interventions.

## VI. Conclusions

Considerable research still needs to be done regarding music therapy, especially concerning the specific results of interventions. The published research includes many descriptions of clinical approaches and treatment practices; however, there is not much outcome-based evidence regarding the results of such interventions.<sup>73</sup> This could be attributed to the relative newness of the field, with conclusive results simply not yet available. Further studies might involve larger client samples, additional applications of music therapy to classroom settings, integrations of music therapy with other therapies (i.e. speech therapy, occupational therapy), and more investigations of how to take advantage of the effects of neuroplasticity. Still, music therapy has contributed significantly to the improved communication abilities of a wide variety of individuals. The creative atmospheres and innovative approaches that music therapy provides, especially through singing, work together to help patients to gain both vital skills and the capacity to use such skills functionally within everyday life.

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<sup>73</sup> Tamplin, "A Music Therapy Treatment Protocol," p. 28.

**Appendix A**  
**Interview with Kari O'Briant, Certified Music Therapist**  
**November 14, 2014**

**1. What types of communication disabilities/disorders do the students you work with have?**

Nonverbal, limited verbal, speech delay, echolalia, production of particular sounds (“r”s, “l”s, etc)

**2. What are the different types of patients that you work with?**

Currently, my caseload includes:

- Integrated preschool (some students with special needs, and peer models)
- PreK-8th grade, students with special needs
  - diagnoses include ASD, Down syndrome, developmental delay, behavioral disorders, PTSD, cerebral palsy
- Pediatric palliative care (children up to the age of twenty-one with significant medical needs, sometimes also with special needs)
  - diagnoses include seizure disorder, cerebral palsy, chromosomal/other genetic disorder, traumatic brain injury
- Adults with developmental disabilities (age sixteen and over)
  - diagnoses include ASD, Down syndrome, developmental delay, OCD, cerebral palsy
- Older adults with early stage dementia

**3. What are the different settings that you practice music therapy in?**

- group
- client's home
- community music school (South Shore Conservatory); individual and group
- assisted living community

**4. Among the activities used in therapy, how important is singing?**

Singing is important - however, its importance compared to other music experiences depends entirely on each individual client. Some individuals who struggle with speech can sing without showing any signs of speech delay.

For example, I have worked with a child with Prader-Willi Syndrome who, when having a verbal conversation, sometimes needs up to ten seconds to respond. In the course of our group music therapy sessions, she begins to sing along with me - at first with some lag, but after a few minutes sings rhythmically in time.

I have another client who has very limited mobility and is nonverbal due to medical reasons. My singing is a big part of his music therapy sessions. He cannot produce sound, though he does communicate through facial expression and will laugh and move his mouth. So he does also sing, just not in the traditional sense.

**5. Do you work with students who use Alternative Augmentative Communication (AAC)? How do you incorporate AAC into music therapy sessions?**

Yes. I have students that use a variety of AAC - Dynavox, iPad, picture board, and sign language.

For picture-dependent communication (Dynavox, iPad, picture board), I work with the teachers to add things that will come up most in music therapy sessions (simple dynamics and tempos, “my turn”, “yes”, “no”, “all done”, names of the instruments I typically bring, regular songs, etc) to give that client equal opportunity with peers to answer questions and make choices.

If a music experience is very open-ended (as songwriting can be, even fill-in-the-blank), I will often provide my own visuals to aid in choice-making.

I tend to incorporate at least a little bit of sign language into my sessions (e.g. “music,” “all done,” “more,” “me”/“my turn”, “clean up” etc.) even if I don’t have a client present who uses it regularly to communicate - signing can provide an extra level of engagement for clients who need more sensory input (visually by watching me, or physically imitating the signs themselves). A few of my clients have created their own versions of signs, usually because of a physical or neurological issue that makes it difficult to use the traditional sign. In those cases, I mentally note and remember their sign as well.

Occasionally, if there is no AAC device and no visual representation of the choice and my client is having difficulty expressing their choice, I will give two choices using my hands as stand-in representations (e.g. right hand “yes”, left hand “no”), and let the client touch one of my hands to communicate the choice.

I also have some clients who do not speak or use AAC. They may primarily communicate likes/dislikes/choices through eye gaze, body/head positioning, affect, etc

**6. What are some of the activities that work best for students with communication disabilities, opposed to physical disabilities, emotional disabilities, etc.?**

Many of the experiences I use work on multiple levels (address social, emotional, and physical functioning at the same time), and it is important to remember that each client is different, so there is no particular thing that will work for everyone.

I may address communication head-on using a songwriting experience: perhaps a simple fill-in-the-blank song (where the client needs only provide one word, like how they are feeling or a color they see in the room), or a more complex song where we brainstorm words relating to a particular topic. Songwriting though can address emotional needs as well.

Communication can also be addressed in other ways, such as through instrument play or movement. Clients take turns; imitate myself or peers; make choices; follow musical cues or initiate musical cues, etc.

**7. What are some of the factors that affect your choice of which music activities you use when working with children with communication disabilities?**

I think about their level of communication. What sounds or words can they produce? Do they have an AAC device? What are their communication goals? I also consider any other needs or goals they may have.

**8. Do you find that the majority of students you work with that have communication disabilities have specific activities that they really enjoy and learn most from or does it depend on the specific child? Could you give an example?**

It definitely depends on the individual.

I have a nonverbal client who is in love with the guitar. He will participate in other experiences, but is most likely to be successful if the guitar is involved in some way.

I have an adult client who has some speech delays and most enjoys to sing popular songs with me while we play piano.

I also have several clients who have speech delays who prefer drumming, and several others who really enjoy songwriting.

**9. Are there specific activities that you will not use for students with communication disabilities?**

I can typically alter experiences to match the level my client needs to participate successfully. If I decide not to use a particular song or experience, it is usually due to other factors than communication itself (for example: attention span, stimulation level, engagement level, emotional state, etc.).

**10. Can you describe any additional activities that encourage speech with rhythm and movement components as well?**

I use a turn-taking drum song that, in addition to playing the drum, includes rhythmic hand clapping and feet stomping (the latter accompanied by a rhythmic vocalization, e.g. “oo oo oo”). Another example is a song that involves clapping, patting knees, and stomping feet. Each verse focuses on one movement, which is slow at first, then after a pause, speeds up dramatically and changes from sung words to sung vocal sounds - “la” is one I use often, but depending on the group or client, can be altered to their needs (“ba” “ha” “ma” are some other examples).

**11. What types of speech improvements do you typically see in students who take part in music therapy? Increased vocabulary comprehension? More conversation skills? More**

**expressive language skills? Initiating speech? Using language socially? Non-verbal communication skills (eye contact, joint attention)?**

All of the above! Increased expressive/receptive communication, clearer enunciation, faster response time, improved prosody are some others I would add.

**12. Have you noticed that music therapy has a particularly positive effect on a particular disability category?**

No; music therapy is easily adapted to fit disparate and unique individual needs.

## Appendix B

### Notes on observation of Grades 1-4 Public Elementary School (substantially separate classroom setting, five 45 minute long sessions, one music therapist)

Spring 2014

#### Observation Notes:

- Music therapist sings a welcome song when she starts each session
  - Each child has an opportunity to sing by themselves during the song
    - Music therapist leaves a gap in the song as an opportunity for students to sing during it
  - Music therapist leaves blank in song where students sing their name
  - Music therapist leaves gap for student to sing anything they want/what they are feeling (this is left open to interpretation and up to the student)
    - “what are you feeling today \_\_\_\_\_”
  - music therapist leaves gap for student to choose who will sing next
    - this teaches turn taking which is a practical application used within conversation making
  - music therapist pauses until student answers
    - gives enough time and does not rush students
    - makes student feel comfortable to use their voice
  - music therapist gives encouragement to students when they are able to fill in the blank
  - one student is non-verbal and uses an i-pad to communicate so when she is filling in blanks in the song she taps the corresponding picture for the word she would like to say and the i-pad verbalizes it for her
  - teaches pragmatics of spoken language of taking turns speaking, not speaking over someone, and of how to have a conversation
- constantly sings phrases that would typically be spoken, to encourage students to use their spoken words
  - fun atmosphere/singing encourages more speech
  - singing gets students more engaged with language
  - ex: used during transition instructions such as “put away your instruments”
- music therapist would sing a song to students where lyrics gave different directions of actions they must complete, such as jump, crawl, and skip
  - music therapist also plays an instrument to the beat of the song, which encourages students to participate in completing the actions
  - music therapist would give students each a turn to choose both the instrument she plays and the action students must complete
  - this encourages students to use their words because speaking will lead them to participate in a fun, musical activity
  - when doing activity, students are taking part in joint attention which is an important aspect of having a conversation
    - joint attention is a difficult concept for children with autism to grasp



- joint attention → when two people share interest in an object or event and there is understanding between the two people that they are both interested in the same object or event
  - joint attention is a social component
- this activity helps with various skills needed to be able to participate in a conversation
  - answering a question asked of a student when they choose an action and an instrument
  - understanding that they need to do this action when the song and music therapist's directions tell them to
  - starting and stopping the action when the song starts and stops
    - the song always ends with the word "stop"
- music therapist would sing a song about going on a picnic, she would have a large pile of flashcards that had pictures of different types of food that you would take on a picnic, when singing the song the music therapist would leave a blank where a student would have to choose the picture of the food they would like to bring and verbalize the name of the food (if applicable)
  - encouraged students to use their language (singing, speech, or sounds depending on student and their language abilities)
  - helps to learn the pragmatics of having a conversation, where when there is a pause it becomes the other person's turn to speak
    - also helps to teach not to speak over others
  - non-verbal students would choose a picture of the food they would like to take on a picnic
  - depending on the student's level of communication,, different responses were expected
    - ex: if the student were mostly non-verbal they may just sound out the beginning sound of the word
    - other students who are more verbal would be expected to say the entire word
  - music therapist also encouraged students to sing along with the entire song
    - several students would sing along with the entire song, hum the melody, or say lines frequently repeated in the song
- music is catchy and fun and something that is easy to get students involved in
  - feels more like a game to them rather than work when they are actually working really hard on an actual skill
  - students do not get frustrated and tired of working as quickly as they do when completing typical schoolwork, which allows for more productivity and learning

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