



MONTCLAIR STATE
UNIVERSITY

Montclair State University
**Montclair State University Digital
Commons**

Theses, Dissertations and Culminating Projects

1-2007

The Use of Music to Stimulate Joint Attention as a Developmental Step in the Language Acquisition of Children with Autism : A Descriptive Case Study

Cynthia D. Longley

Follow this and additional works at: <https://digitalcommons.montclair.edu/etd>



Part of the [Music Therapy Commons](#)



HARRY A. SPRAGUE LIBRARY
MONTCLAIR
STATE UNIVERSITY

MONTCLAIR STATE UNIVERSITY

The Use of Music to Stimulate Joint Attention as a Developmental Step in the Language

Acquisition of Children with Autism:

A Descriptive Case Study

by

Cynthia D. Longley

A Master's Thesis Submitted to the Faculty of

Montclair State University

In Partial Fulfillment of the Requirements

For the Degree of

Master of Arts,

Concentration in Music Therapy

January 2007

School College of the Arts

Thesis Committee:

Department John J. Cali School
of Music

Thesis Sponsor Karen D. Goodman

Certified by:

Dean Dr. Ronald L. Shurps

Committee Member Amy Clarkson

12/15/06
(date)

Committee Member Margaret Treason

Department Chair Robert Aldridge

Abstract

This descriptive case study details music therapy with one five-year-old boy named Yitzchak who presented with autistic spectrum disorder. A literature review of aspects of a developmental skill, joint attention, is presented as a basis for the work. It defines joint attention and communication, as well as music's effect on these skills within a developmental, individual-difference, relationship-based philosophy. An investigation was conducted to test music's efficacy as a stimulus to increase joint attention behaviors and therefore increase language output. The results show positive trends of increases in eye contact and musical/communicative behaviors in a short-term therapy sequence of sessions as well as a decrease in fleeing/avoidance behaviors. Considerations for future study are presented.

Running Head: THE USE OF MUSIC TO STIMULATE JOINT ATTENTION

The Use of Music to Stimulate Joint Attention as a Developmental
Step in the Language Acquisition of Children with Autism:

A Descriptive Case Study
Cynthia D. Longley, MT-BC
Montclair State University
January 2007

Acknowledgements:

The author would like to acknowledge and thank several of my supervisors and professors that I have worked with over these years, who gave me guidance, support and great models of therapy: Karen Goodman, MS, RMT; Amy Clarkson, MMT, MT-BC; Margaret Freedson-Gonzalez, EdD; Judi Rubin-Bosco, MA, CMT; and Joke Bradt, Ph.D., MT-BC. Thank you to Cindy Lu Edgerton, MM, MT-BC, who sent me the Checklist and gave me permission to use it for this study. Also, thank you to the staff at the Demonstration Program/Children's Center: Kathy DiPaola, Mary Peters, Jessica DeHart, MS, CCC, SLP; Tracy Williams-Healy, COTA; and Antoinette Spiotta, Co-Director; what a warm, wonderful, talented group of people! I could not have gotten through the study without all of you! And warmest thanks to the family and to Yitzchak, for giving me this opportunity to learn and grow as a music therapist.

Table of Contents

<u>Section</u>	<u>Page</u>
Introduction	5
Theories of Child Development, Joint Attention and Language Acquisition	6
Theories of Music Therapy	11
Method	17
Case Study: Yitzchak	24
Discussion	49
Conclusion and Considerations for Future Study	53
References	55
Appendix I: Checklist of Communicative Responses/Acts Score Sheet	58

List of Figures

Figure 1: Recorded joint attention behaviors by session	40
Figure 2: Joint attention behaviors, musical and non-musical	47
Figure 3: Trends in joint attention behaviors	48
Figure 4: Trends in fleeing behavior	49

The Use of Music to Stimulate Joint Attention as a Developmental Step in the Language Acquisition of Children with Autism

In the past decade, rates of children diagnosed on the autistic spectrum have risen dramatically. A recent newspaper article from New Jersey's *Star Ledger* stated that in 1994, there were 850 children with autistic disorders in the state compared to 5,738 in 2005. Children are being diagnosed at a rate of 1 in 333 in New Jersey (Scott, 2005). Nationally, autismspeaks.org reports the statistic as 1 in 166 (2006). Now categorized under the umbrella of Pervasive Developmental Disorder (PDD), autism is classified on a spectrum of severity. At one end are mild impairments such as those found in Asperger's syndrome: children are verbal, can be engaged and successful in school, but often have difficulties in social skills, transitions and other interactions. At the other end of the spectrum are severe impairments: children can be non-verbal, cognitively impaired, can be difficult to engage, and are not successful in school. Other categories of the disorder include Rett's syndrome, PDD-NOS and Child Disintegrative Disorder.

In autism, there are certain common deficits in functioning. Characteristic features of the disorder include three main areas: (a) a language delay or impairment, (b) impairment in or lack of social skills, and (c) stereotypic behaviors or mannerisms. Much of the current literature has explored the connection between the developmental skill, joint attention (also referred to in connection with the terms interaction, attunement, or engagement), and autistic children's language development (Baron-Cohen, Baldwin, & Crowson, 1997; Greenspan & Wieder, 1998, 1999; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1990; Rollins, Wambacq, Dowell, Mathews & Reese, 1998). It is this joint attention between a person and an object that children with autism are often lacking,

and there is now much evidence, as referenced above, that autistic children's ability to engage in joint attention is related to their language development. In fact, ability to engage in joint attention may be an integral first step in the process of the acquisition of language for these children.

Theories of Child Development, Joint Attention and Language Acquisition

Dr. Stanley Greenspan and Serena Wieder (1998) present a developmental approach to children with autism and other special needs. They delineate six milestones that are prerequisite to language development and other pre-academic skills, based on a child's social-emotional functioning. When assessing a child, the Functional-Emotional Assessment System (p. 92-97) evaluates which skills have been mastered and the level at which a child is functioning overall. Without these foundational skills, children will be impaired in later functioning including language development.

The first milestone is biological: *the ability to calm oneself and take interest in the world*. If a child cannot calm him/herself, their nervous system remains in a constant fight-or-flight response and no other functioning is possible (Berger, 2002). This nervous system response is the basis of the sensory integration movement; Greenspan uses a child's sensory profile as a basis for diagnosis and treatment. At the Demonstration Program at Montclair State University's Children's Center, Greenspan's Developmental, Individual-Difference, Relationship-based (D.I.R) model is used in a transdisciplinary approach. Children on the spectrum are given a "sensory diet" (Wilbarger, 1991, as quoted on Occupational Therapy Innovations, 2006) of brushing, swinging and other sensory experiences to help them regulate their sensory input, in the context of a one-to-one relationship with a teacher, teaching assistant, or therapist. A technique called the

Wilbarger Deep Pressure and Proprioceptive Technique (DPPT) is used. Administered under the supervision of a Certified Occupational Therapy Assistant (COTA), the children are given deep pressure brushing with a soft, surgical brush; and joint compressions. This technique is used to coordinate the mind-brain-body processes: to self-organize and regulate by stimulating the tactile and proprioceptive senses.

Swinging is used to activate the vestibular system. Often viewed as a perseverative behavior that is self-stimulating, swinging can activate the body's sense of position in space. By swinging in a variety of ways (e.g. linear or orbital), the inner ear is stimulated and new vestibular feedbacks are created in the brain (Berger, 2002). This allows vestibular information to be processed more quickly, efficiently and successfully. Other sensory experiences and modifications are based on the child's individual needs. Once a child can remain in a calm, regulated state, they can observe the "sights sounds and sensations of the world" (Greenspan and Wieder, 1998, p. 3) and then begin to interact with objects and people in their world.

The second milestone is the ability to engage in relationships with people, or *intimacy*, which can be observed in typically developing infants as early as three months. Children recognize and "fall in love" (p.3) with their parents and caregivers, and begin to use eye gaze, some vocalizations such as cooing and interactions through facial cues. Stern (1985) calls this *affective attunement*, and in children with autism, this is inconsistent or impaired.

The third milestone is *two-way communication*, which is a significant step in children's social and language development. In another publication, Greenspan states that during this stage, children begin to use gestures or "presymbolic gestural

communication” (1999, p.148). These gestures are often used to respond to or to initiate interactions with another person (e.g. reaching out in response to outstretched arms, or raising arms to be picked up) (1998). Mundy, Sigman, & Kasari (1990) show that it is this gestural joint attention that is lacking in children with autism. In typically developing children, joint attention is established by the age of 24 months (Loveland & Landry, 1986). The Mundy et al. study showed that deficits in gestural joint attention were found to be a significant predictor of impaired language development over time. This deficit is consistent with autistic children’s narrow intentional communication skills (Rollins et al., 1998).

Rollins et al. (1998) go further to suggest a sequence of development of joint attention skills. Like Greenspan’s stages, they are based on a child’s interaction with the world around them. First, the child (infant) begins to understand other people as intentional agents; they will then participate in social routines or games (e.g., peek-a-boo). Lastly, they are able to engage in joint attention, or as Greenspan terms “closing many circles of communication”, his fourth milestone of *complex communication*.

Greenspan’s fifth and sixth milestones are *emotional ideas* and *emotional thinking*, respectively, and they include pretend play schemas and expressive language utterances. “Joint attention is also theoretically related to both pretend play and theory of mind, two social-cognitive abilities that develop later and are also specifically impaired in individuals with autism” (Jones & Carr, 2004, p.16). Theory of mind is an area that could be researched in the future in connection with facial cues and eye gaze.

Gestures and joint attention. In looking at why joint attention is important in communication development, we must consider what gestures are and how gestures

indicate intentional communication. "Gestures are actions produced with the intent to communicate and are typically expressed using the fingers, hands, and arms but can also include facial features and body motions" (Iverson & Thal, 1998 as quoted in Crais, Day Douglas, & Cox Campbell, 2004, p. 679). Gestures can be looked at for their form and their function.

There are different forms of gestures: representational, i.e. conventional gestures such as waving *hello* or *goodbye* that imply some semantic content; and deictic, i.e. pointing, showing, reaching, giving and refusing, that are either to regulate behavior or draw attention (Bruner, 1981). Deictic gestures are further broken down into *contact* and *distal* gestures. Contact gestures involve direct contact with a child and a caregiver or object and usually emerge first. Distal gestures are performed with distance between the child and the caregiver or object. As children transition from contact to distal gestures, they are learning to acquire symbolic meanings; children who do not use distal gestures could be presenting a deficit in symbol acquisition (McLean, McLean, Brady, & Etter, 1991). This can also explain why children with autism have more success when adults communicate at a close distance; however this could also be related to sensory stimulation or auditory processing.

Gestures serve two primary functions of communication: requesting and initiating (Berko Gleason, 2001, Jones & Carr, 2004). Requesting serves an imperative function, (i.e. to obtain an object or assistance). Initiating joint attention serves a declarative, or indicating, function (i.e. to show an object to someone else). Bruner (1981) defines the communicative function of gestures in three broad categories: behavior regulation (e.g.

requesting or protesting), joint attention (e.g. commenting or pointing) and social interaction (e.g. representational gestures or social games).

The developmental connections between joint attention and social and language development require that the child display both the forms and the function of joint attention (Jones & Carr, 2004). Jones and Carr call joint attention a “pivotal skill in early intervention” (p.16). Pivotal skills are skills that, once they are mastered, can affect other areas of functioning and cause improvements in later skill acquisition (Koegel, Koegel, Harrower, & Carter, 1999). If gestural joint attention is remediated in children with autism, it seems logical that their subsequent learning will be improved.

The role of eye gaze. Dawson, Meltzoff, Osterling, Rinaldi and Brown (1998) found that autistic children do not orient to social stimuli (e.g., facial expressions, speech, gestures). Joint attention is based on orienting and shifting attention between stimuli; children must be able to direct their gaze between stimuli. When engaged in joint attention, the child will alternate their eye gaze between a person and an object. This type of interaction may be crucial in the development of communication skills (Arnold, Semple, Beale & Fletcher-Flynn, 2000).

As compared to normal children, autistic children have marked difficulty with eye contact, or eye gaze, although the norm is far less than previously thought (Arnold et al., 2000). This deficit in eye gaze is attributed to deficits in the acquisition of language, particularly in the way autistic children learn new words. Baron-Cohen et al. (1997) observed that typically developing children will use what they call the Speaker’s Direction of Gaze (SDG) strategy, where a child will orient their gaze to what the speaker is looking at to determine the name of the object. But children with autism will only use

the Listener's Direction of Gaze (LDG) strategy, will not orient to what the speaker is referring to, and assume that the word is referring to what they are focused on. This results in mistakes in word acquisition and mapping. "A child who is unable to follow another person's gaze and/or point, and who is unable to direct another person's attention to interesting objects and events (impaired forms of joint attention) is a child who is likely to have a great deal of difficulty following and understanding social interactions and associating language labels with objects." (Jones & Carr, 2004, p.16).

So the question is: how do we engage an autistic child in joint attention to promote language development? An effective method would seem to involve finding the correct stimulus, engaging joint attention using gestural communication and then building on a developmental sequence. Music has long been noted as a successful therapy with special-needs children and, in particular, with autistic children (Alvin, 1978; Davis, 1990; Grant, 1989; Monti, 1985; Nordoff & Robbins, 1977; Thaut, 1984). Music therapy can work at each of these levels to ultimately aid autistic children with their acquisition of language.

Theories of Music Therapy

Music as a stimulus. In a pilot study, Thaut (1987) found that children with autism were engaged more than normal children with an auditory (musical) stimulus versus a visual stimulus. However, they showed an even preference for visual stimulus when compared to auditory. All of the autistic children showed strong response to the music, some rocking or jumping, and one humming for long after the music was over. The music evoked the kind of responsiveness that can be used to engage joint attention.

In a related study using sign language paired with music, Buday (1995) found that using both a visual and auditory stimulus resulted in larger amount of speech imitation in autistic children. Sign language is, by definition, gestural communication, the developmental skill that autistic children lack. This method of simultaneous communication, the pairing of sign language with speech, has been found successful in previous studies using the speech therapy technique of Melodic Intonation Therapy (Miller & Toca, 1979). The added auditory stimulus of the music may be the key to these successes.

A stimulus may be looked at as an antecedent to a desired behavior, in this case joint attention. Braithwaite and Sigfoos (1998) examined developmentally delayed children's responsiveness to musical antecedents on their communication behaviors versus purely social-verbal antecedents. They measured children's communication responses (i.e., gestures, manual signs, vocalizations or spoken words). Three opportunities were presented, greeting, naming, and requesting; in two conditions, a social stimulus condition and a musical stimulus condition. Results showed that music can evoke communication responsiveness in some children with developmental disabilities and impairments in communication skills.

Music in sensory integration. Music is a powerful tool for sensory modulation (Occupational Therapy Innovations, 2006). Berger (2002) names six basic elements of music that can be used as tools to modulate sensory regulation. They are: rhythm, melody, harmony, dynamics, timbre and form. Each has its own elements, e.g. rhythm has: pulse, pattern, repetition and tempo; some elements will be more appropriate for individual children and individual situations.

Rhythm is one element that can effectively change the body's sensory regulation (Berger 2002). A phenomenon called entrainment has been observed, where the body's rhythms align with an external pulse. By modulating elements such as tempo in musical exchanges, a child will learn to modulate his body's rhythms.

Other elements such as dynamics can modulate the energy level of music to induce different emotional responses. Changes in dynamics can "instigate attention states, mood changes, excitement...and more" (Berger, 2002, p.126). Using and manipulating these elements in the music can meet and modulate a child's sensory regulation.

Music to engage social communication. Music therapy has the ability to engage children in interactive relationships (Toolan & Coleman, 1994). Music has been shown to foster social relationships and peer interactions through music improvised to children's play (Gunsberg, 1988). Symbolic play is often viewed as a precursor to developing interactive relationships. Winnicott (1971) believed that children will first learn to manipulate objects before they can make any relation to the world around them. In interactions, toys and musical instruments can become 'transitional objects' to spark joint attention between a child and another person.

In a 1993 study, Muller and Warwick hypothesized that using music therapy with autistic children and their parents (i.e., their mothers) would increase communicative responses that would generalize to other settings. They tested the interactive behaviors of imitation and turn taking which could lead to better interactions between mother and child. While the results showed that the interactive behaviors increased in the music therapy setting, they did not show generalization to other settings. This is consistent with autistic children's overall difficulty with generalization. However, it did show more

realistic interactions between mother and child, appropriate to the child's developmental level.

Perhaps the most relevant research done on this subject was by Wimpory and Nash (1999). They describe a technique called Musical Interaction Therapy in which an autistic child is engaged by a parent or primary caregiver, while a music therapist provides a musical support for the interactions. Joint attention is achieved between the dyad through 'lap play, play routines and songs (which) provide scaffolding for communication' (p. 19). This approach was based on an earlier case study (Wimpory, Chadwick & Nash, 1995) that described using the technique with a 3-year-old girl with autism. Musical Interaction Therapy is used to increase social interaction as seen by social initiations and eye contact through play and song play. This technique also structures timing necessary for the social timing used in communication. 'Singing (can) form a basis for proper intonation and timing when the child learns to speak' (Wimpory & Nash, 1999, p. 19).

The Wimpory and Nash study is most like the type of music therapy used at the Demonstration Program. The music therapist is scaffolding musical, social and communicative events that take place between the child and the assistant, and the child and the therapist. The assistant functions in two roles: one, to shadow, support and give needed input for the child to interact in the music with the music therapist; and two, to interact directly with the child.

Music to promote language development. Music therapy has been used in many different ways to aid the development of expressive language in autistic children.

Hoskins (1988) determined that music was 'an excellent tool in helping children develop

speech'. She compares music with speech and notes that Miller (1982, as quoted in Hoskins) believed the same. 'Music incorporates many of the behaviors and skills needed for speech, and can facilitate development...' of these skills (p. 74). In a case study, Sutton (1993) describes a 5 year old boy who discovers the relationship between musical rules and the rules of spoken language to overcome his inability to process the syntactic rules of language.

Certain stages of speech development can be looked at in a musical context (Loewy, 1995). If a music therapist can meet the child in these pre-verbal sounds, she can increase their vocalizations through this interaction in the music. The Musical Stages of Speech model consists of: Stage I - Crying or Comfort Sounds; Stage II - Babbling, Lalling and Inflected Vocal Play; and Stage III - Single and Double Word Utterances. In music therapy with autistic children, the children's sounds are often mirrored by the therapist. As the children begin to associate intentions with their sounds, they begin to use them intentionally. Intentionality is the first step in achieving joint attention (Rollins, et al., 1988), particularly when used with gestures (Crais, et al, 2004).

Musical joint attention behaviors in relation to communication development.

What musical behavior can be observed, then, to show that a child is engaged in joint attention? We have already outlined the nonmusical behaviors of gestures and eye contact, but what can we interpret musically? In a 1994 study by Edgerton, musical and nonmusical communicative behaviors of autistic children were examined using a checklist constructed by the author called the Checklist of Communication Responses/Acts Score Sheet (CRASS – Appendix I). It described instrumental (as well as verbal or vocal) *communicative responses* of matching, imitating and call-and-response.

It also defined *communicative acts* of creating or initiating these interactions. The tool used a hierarchy of musical engagement skills related to processing and expressive skills. Sections included are tempo, rhythm, structure/form and pitch under the musical portion; and speech production, communicative-interactive, and communicative intent skills in the non-musical portion.

Rainey Perry (2003) looked at relating improvisational music therapy to communication development in children with multiple and severe disabilities. She describes musical interaction as a part of general communication development rather than a separate skill, due to the fact that it can be described in communicative acts such as turn-taking and intentionality. She says that musical interactions provide positive communication experiences to influence others and to participate in a back-and-forth, turn-taking "conversation". Turn-taking is a part of call-and-response.

Form is particularly important for communication *and* for joint attention. Berger (2002) says, "Musical form becomes a problem-solving, task-organization and completion event" (p.127). Form requires the child to wait "in anticipation of closure" (p.127). A child will learn to anticipate the phrase endings of a song, and reflect this in his/her playing. Stopping and starting the music at phrase endings allows the form to be processed and provides opportunities for musical exchanges.

Summary Question

The literature has made many references to joint attention influencing language acquisition. This study, then, is proposed to test music's ability to stimulate joint attention in a child with autism as a developmental step to his language acquisition. Will music be an effective stimulus to engage joint attention? The literature has shown that children

must master joint attention before gaining language. If this is the case, then will language develop as a result of increasing joint attention? A case study is presented as an initial investigation into these questions.

Method

A descriptive case study was used to determine if music therapy was able to provide an effective stimulus for musical and non-musical joint attention behaviors in one child with autism, in a short-term course of therapy.

Setting and Subject

The study was conducted at the new Children's Center at Montclair State University. It is an inclusion setting combining the Child Care Center, Jeffrey Dworkin Early Intervention Program and the Demonstration Program that had previously been housed in separate locations on campus. The Demonstration Program provides services for children on the autistic spectrum and other sensory related disorders. The children are preschool aged (3-5 years) with a primary diagnosis of an Autistic Spectrum Disorder. They are paired one-to-one with an adult assistant throughout the day. Each child/assistant keeps a schedule book of Picture Exchange Communication System (PECS) which contains representational pictures of daily routines, activities, needs, wants, etc. The system allows the assistant to transition the child through daily activities and express needs and wants; using the visual strength of the child, representation/symbolization and accessing gestural joint attention.

The children are interspersed into four preschool classrooms totaling 16 children each. In addition to the four preschool classrooms, there are four infant and four toddler rooms housed in the center. Many of the university students come through the program to

observe, work and to do clinical work. In addition to the therapies, the children have group and individual sessions with an interactive storyteller.

Music therapy is held in what is called the "Developmental Classroom" in the North Wing of the school. This space is adjoining one of the preschool classrooms, via a bathroom, office, and kitchen area (three separate connective spaces), and is used for small group activities. There is a studio upright piano on one wall which was pulled out for the sessions. The space was set up to contain the child in a circle of chairs and tables around the piano, referred to as "the music space".

The child was chosen for this case study based on his lack of joint attention, his potential for language and his positive response to music. The child was seen in individual sessions which were videotaped for data collection. Sessions were held in the middle of the room, with the child in a chair facing the therapist who usually sat on the piano bench or other small chair. The therapist mainly played guitar to maintain a face-to-face experience and as a transitional object. The session format was based on activities that alternated between moving and sitting, following the child's lead and interests. The therapist utilized high affect with the child to encourage as much engagement/joint attention as possible.

Procedure

The child was brought into the music room by his assistant, and directed to sit in his chair. A tambourine or other small instrument was available to play. A schedule of the session, made of PECS, was placed in view and at the beginning of the sessions was either showed to the child or sung to him. Sessions each began with the same greeting and the child was expected to sit in his chair for the greeting. The song incorporated

movement, (e.g. clap and stomp), instrument play on a drum or handheld instrument such as the tambourine ('tam'), and vocal play on simple syllables (i.e. /ba/, /la/, /doo/).

The sessions ran in an improvisational format with basic, predictable progressions based on pre-existing or pre-composed songs; almost like jazz form of *head-solos* (in this case improvisation) *-head*. Emphasis was placed on regulatory and relational activities (i.e. movement activities, playing in different ways – fast, slow, loud, soft and stopping; and musical and vocal play with the therapist – matching beat, imitation, and call and response). The therapist was looking for any musical or vocal behavior that is indicative of joint attention as listed in the CRASS.

The end of the session was marked by a two chord lullaby to transition and calm the child. The sounds 'ooh' and 'aah' were used, and the child was encouraged to make sounds with the therapist. This merged into a goodbye song in which the child was expected to give some form of a goodbye on a given cue (i.e. a wave, a verbal approximation, etc.)

Design

For this descriptive case study, data was collected and scored after review of videotapes of each session. Sessions were recorded for five weeks, with a total of 12 sessions. Sessions were approximately 15-20 minutes long on average. The video camera was placed on a shelf in one corner of the room, pointing down on the music space.

Independent and Dependant Variables

During the session, interactions were scored according to the dependant variable of joint attention, observed as frequency of eye contact and frequency of musical or non-musical interaction/communication with the therapist or the assistant. The musical and

non-musical/communicative interactions were further observed and scored according to the CRASS. The independent variables were the types of music used to stimulate joint attention: structured, predictable progressions; open ended phrases with space for the child to respond or imitate; regulatory playing as described above; and call and response.

Measures

After each session, a transcript of the session was written during review of the videotape. Each videotape was further reviewed and scored according to frequency of eye contact; in addition, measures of musical interchange were measured using the CRASS. Duration of eye contact was not measured due to the findings by Arnold et al. (2000) that when engaged in joint attention with a person and an object, a child will engage in less eye contact than previously believed. For this study, joint attention was achieved when the child alternated gaze between therapist and instrument. Finally, after all of the tallies were taken, a tally of fleeing/avoidance behaviors was taken to track progress in sensory tolerance of the session.

Description of the CRASS

The CRASS was sent to me by its author, Cindy Lu Edgerton. The checklist is divided into musical and non-musical behaviors and has a descriptive key to scoring behaviors. There are four sections under musical behaviors: tempo, rhythm, structure/form and pitch. Under the non-musical, there are three sections: speech production skills, communicative-interactive skills and communicative intent skills.

The sections are then delineated into a hierarchy of behaviors. These levels parallel many developmental communication behaviors. One example is the section on rhythm, described below. The first category, multiples of the beat, can be compared to

duplicative and reduplicative syllables. The second, two different rhythms, is like putting sounds together into words. The third category, imitating a rhythmic motif, is like chunk phrases of speech. The fourth, imitating a rhythmic phrase, is like putting three or four words together. And the last, imitating an entire melodic rhythm, is like speaking in sentences. Even the youngest musicians learn that a phrase is a musical sentence. The non-musical portion was not hierarchically based.

Some of the categories were not expected to be scored, as the child chosen for this study was not at the developmental level to perform the higher level skills. For example, at the time of the study, the child was speaking in rote chunks of speech and one to three word utterances. He also did not imitate, initiate or develop any rhythmic/melodic phrases or entire melodic rhythms; he only imitated rhythmic motifs, akin to his rote chunked speech. The section, categories and subcategories in the CRASS are as follows:

Under tempo, the first category is: matches a steady tempo for three responses. This is further broken down into the subcategories of: a) beating within a single tempo range, b) beating a basic beat: fast, moderate or slow; and c) beating for twelve continuous beats. The second category is: makes an *accelerando*. This is broken down into the subcategories of: a) vocalizes or beats an *accelerando*, b) increases own, c) matches accurately or approximately, and d) matches accurately. The last category is: makes a *ritardando* and it is broken down into the same subcategories as *accelerando*.

Under rhythm, the categories are: first, vocalizes or beats multiples of the basic beat (at least four therapist beats); second, beats two different synchronized rhythms; third, imitates a rhythmic pattern or melodic motif (one measure or less), which is then broken down into (a) simultaneously, (b) subsequent to therapist, (c) creates, and (d)

repeats own. The next categories are: fourth, imitates a rhythmic or melodic phrase (greater than one measure); and fifth, imitates entire melodic rhythm (two or more phrases). These are both broken down into the same subcategories as the third category.

Under structure/form, the categories are: first, responds to a phrase, (a) end of phrase and (b) phrase or measure beginning – specific and not the first. Second is: produces one at appropriate time. The third is: (a) responds to rhythmic give and take, (b) initiates the give and take, and (c) develops the give and take.

Under pitch, the categories are first: (a) vocalizes (singing quality), (b) vocalizes in the key of the improvisation, and (c) matches the therapist's pitch. The second is: varies pitch, (a) ascends in pitch and (b) descends in pitch. Third is: (a) vocalizes a melodic motif, (b) matches melodic contour approximately or accurately, (c) matches pitches approximately or accurately. The fourth is: vocalizes a melodic phrase, with the same subcategories as the third; in addition to these is (d) spontaneously creates a new melodic phrase. The fifth is: vocalizes an entire song, with the same subcategories as the fourth with the exception of (d) spontaneously creates new song.

In the non-musical section, the first category is: speech production skills. This is broken down into the following categories: first, produces a sound, vocalization or word. Second, is a song vocalization or word; (a) produces word of song being sung, (b) produces motif of song being sung, and (c) phrase of song being sung. The third is: spontaneously produces an appropriate vocalization or word; (a) spontaneously produces appropriate two-word combination, and (b) spontaneously produces appropriate greater than two word combination.

Under communicative-interactive skills the categories are: first, plays instrument; second, plays two instruments; third, uses both hands simultaneously in beating; fourth, vocalizes and beats simultaneously; fifth, tolerates entire 10 minutes; and sixth, participates with therapist for entire 10 minutes. The last category, communicative intent skills is broken down as follows: first, expresses an emotional reaction; second, indicates any want or need; and third, indicates wanting a music activity or song.

The checklist has two columns for scoring. The left side is for scoring responses to the music and the right is for scoring acts such as initiating musical elements and exchanges. An "Overall Level of Musical Communicativeness" scale is given at the end of the checklist, to be completed at the end of each session. A "Behavior Change Survey" is included to be given to people close to the child.

Use of the CRASS

The CRASS was chosen as a quantifiable tool for looking at musical behaviors indicative of joint attention. Due to the 2004 federal guidelines of the Individuals with Disabilities Education Act (IDEA), data about children's progress towards their goals needs to be "measurable" (U.S. Department of Education, 2006). While the music experience is not well explained in numbers and behaviors, music therapists need to find a way to make our medium fit into these guidelines if it is to be considered a valid related service. Also, this tool was designed to look at musical joint attention behaviors and contained many of the communicative responses this author was looking for, i.e. matching, imitating and call and response.

While viewing the videotapes, behaviors were checked off as they were observed during the session. Some of the categories were not used, specifically: tolerates entire 10

minutes and participates for entire 10 minutes. The sessions were designed to be 15-20 minutes long, and his tolerance was marked by the child's fleeing/avoidance behavior and scored separately. Also, the "Overall Level..." scale was not used, as it was a subjective evaluation of the session. This was shown in the data analysis of the sessions.

When the child matched or responded to the therapist's music, the behaviors were checked in the responses column. When he initiated music or musical exchanges, the responses were scored in the acts column. Multiples were scored as such. When the child produced a word or a rhythmic motif, or played a certain instrument, this was written next to the behavior for data analysis.

One area that was unclear was to how to score the behaviors. Under the section of structure/form, the behavior of producing one word at the appropriate time was also reflected under the speech production section, with the behavior of producing one word of the song being sung. After consulting with the other music therapist, the decision was made to score the behavior in both areas, as they both served different functions. Also, the category of produces sound/vocalization/word was used to score words spoken outside the context of the song. Any words or phrases that were prompted or scripted were not scored, as they were not considered genuine communication initiated by the child.

Case Study: Yitzchak

Social History and Background

Yitzchak, a five-year-old boy with autism, was born of a typical pregnancy without any complications. He was the third son of four in an English speaking, Orthodox Jewish family. He had no noted developmental delays until his parents and preschool

teacher became concerned about his speech development; he was subsequently diagnosed with autism and an articulation disorder. He was also found to have lead in his hair strands by a nutritionist, although the amount detected was not considered by the special education teacher and therapy staff to be a significant factor in his disability.

Yitzchak had the ability to speak; he scripted often from his favorite movies and TV shows and would be very animated and engaged when he did. He could make his needs known with basic words, and often used basic words to request or protest. In many sessions, he would say, "Don't want that song," or "want that snack." He would repeat the final word or words of a phrase spoken to him and also use some rote chunks of speech to communicate. One of his main chunks at the time of the study was, "Please help me, yes". He would use this in many situations. Yitzchak did not usually exceed three or four words in his chunk phrases, and spoke one to three word utterances otherwise.

When Yitzchak came to the Children's Center, he was recommended to me for individual music therapy because of his positive response to music. He had sessions three times a week from October to the December break. During this time, his assistant was not present, and many of the sessions were spent chasing him both physically and musically. After reviewing the work with the music therapist (who was my supervisor), we came to the conclusion that the sessions were too free in structure, PECS had not been used, and the improvisational format was too overwhelming for a child who had difficulty with novel activities and songs. His sensory regulation was also a factor; at this time, the therapy staff did not have a set protocol for keeping Yitzchak calm and regulated, and he would typically flee any situation that was overwhelming to his sensory system.

After the December break, I left the Center due to scheduling constraints. I returned again for the express purpose of conducting the study. I was informed by the music therapist and special education teacher that Yitzchak had still not mastered his joint attention goals and that they considered him a good candidate for this study. His family was supportive and pleased for him to have more individual music opportunities. While I have never met his family, his mother and I communicated through his "Tell Me Book", a notebook that the special education teacher, assistant and/or therapists wrote in each day to communicate with the families at home.

At the time of the study, Yitzchak was in an inclusive music group run by the music therapist. He required his assistant to be with him in the session, and participated inconsistently. Some days he would flee, while other days he was able to tolerate the group. In general, he would only participate in the familiar activities. If he played an instrument such as the xylophone or bells, he would play fast and be unconnected to the music and children around him.

Sessions, Narrative

I began the study with a pre-session to test the effectiveness of the activities I had planned and to reacquaint Yitzchak with me. The video camera did not turn on, however and I was unable to record any behaviors past what I recalled immediately after the session. The session did go smoothly, and I determined that the plan would work for both of us. I observed that Yitzchak was much more on-task than he had been when I had previously worked with him, and that he was able to tolerate the entire session without fleeing. The presence of his assistant helped Yitzchak to stay regulated and on-task. During the session he had nice moments of eye contact and matching the beat.

The sessions were designed to begin with regulatory activities, move to musical/instrumental activities with opportunities for non-verbal communication, and end with a vocal activity/song. The sign language gesture for “all done” was often used to end activities. The basic session format was as follows:

1. Hello song: I sang and played guitar. He was given the tam and mallet, but sometimes requested a different instrument.
2. Movement Song: sung *a cappella* with body motions to regulate his sensory system. Several different songs were attempted.
3. Bells: a musical call and response, played from the piano, using the song, “Can You Play the Bells?” from Ritholtz & Robbins (1999) *Themes for Therapy, Volume 1*.
4. Instrument play: he was given several instruments to play freely with the music. I played the piano and used the song, “Let’s Make Some Music”, also from *Themes for Therapy, Volume 1* (Ritholtz & Robbins, 1999).
5. “Mr. Sun” (Raffi, 1984): a favorite song of his that was guaranteed to hold his attention and was used to encourage him to sing by filling in words. Also emphasized in this song was starting and stopping, usually at phrase endings for sensory regulation and for musical form.
6. Transition/Goodbye: a calm, lullaby-like, holding pattern of two chords by Joanne Lowey and Judi Rubin-Bosco. I played guitar and sang on the syllables, ‘ooh’ and ‘aah.’

The instruments in the room were consistent throughout the sessions: tambourine (“tam”), soft rubber mallets, child’s djembe and xylophone, two resonator bells (G4 &

D5), a multi-headed drum, egg shakers and sticks. They were stored on top of the piano and offered for a specific song or given on request.

Puzzles: Sessions 1-3. In the first group of sessions, Yitzchak had difficulty transitioning to music. He was doing a puzzle each time I came to tell them I was ready. Puzzles were very grounding and organizing to him, and he could sit and do puzzles over and over. If his puzzle play was not allowed to become obsessive, then it was an organizing activity for him and one that he could often transition away from. He would whine, flee, lay down on the floor or a mat; he would verbalize his desire for the puzzles saying, "I want puzzles." In the first recorded session, he escaped from the music space and found a pile of them across the room. He then had to be brought back into the room after he chased his assistant as she put them away in another room.

Yitzchak's music time was held during the class's snack time. He would come to music after the children's free play time before their snack; although as part of his morning routine, he was usually coming from the gym where he was brushed or had OT/PT. Since Yitzchak had difficulty transitioning into the test session, I wanted to give him more transition time before the first session. I saw him in the gym as I passed by to set up for the first session and, in an attempt to ease the transition said, "Music soon!" in a very cheery tone of voice. His assistant was very consistent with telling him the schedule, using PECS, and said, "gym first, then music," a strategy from Yitzchak's learning plan. He still had a difficult transition, though, as he did not tolerate novelty well.

In the first three sessions, I attempted to use a hello song from Nordoff & Robbins, *The Second Book of Children's Play Songs*, "Roll Call" (1968, p.10). It is a call

and response song where the therapist sings “Where is my friend, [*child’s name*]” and the child is supposed to respond, “Here I am!” on the musical and verbal cue. During the early sessions the previous year, he had begun to play a hiding/peek-a-boo game with me when he would flee. I would sing a little song, *I’m Hiding*, and he would come back at the end for the, ‘Boo!’ part, usually smiling and with eye contact. At this point last year, I had made some parallels to the Tony Wigram case study on structure vs. freedom (Wigram, 1991), when Helen, the child in the study, began playing interactive games with him. This became a turning point in their relationship and also in her development. She began to use instruments and beaters functionally and with purpose, and her musical interactions improved.

I felt that this hello song was in the same vein as the hiding song from last year and thought that it would get Yitzchak’s attention in the same way; I was wrong. There was not enough music surrounding the opening to be compelling to him. It also immediately placed language demands on him. This was ineffective since I was trying to stimulate Yitzchak’s language through joint attention. Unfortunately, there was nothing to gain the joint attention before the language demand was placed.

So, beginning in the first session, I immediately transitioned into a hello song that I learned in my internship. My supervisor there had used the song so that no language demands would be placed immediately. The child would only have to be sung to and to listen. After the first verse (or A section), the B section asked for some participation if the child did not begin to play along of his or her own volition. I used some kind of instrument play in each session with Yitzchak. To encourage him to play, I would sing, “C’mon and play, play, play that tambourine...” or whatever instrument I had given him

to play at that time. I would also sing on a syllable such as, 'ba', 'doo' or 'la' to encourage vocal play. I would also sing other songs verses on syllables to continue the musical play.

In the first session, I gave Yitzchak the lollipop drum with mallet and a djembe for the hello song; I played guitar. At first, he tapped both as if her were trying them out, without regard to the music I was playing. He then stood up and began to tap the mallet on the guitar neck on the beat, then alternated between the lollipop drum that he was holding and the guitar. As he beat, he made an *accelerando*; then when I got to the end of the song, after going back to the final A section, he decelerated with me. This was the best joint attention that he showed in the first session. I kept each activity short and the whole session lasted 15 minutes. One overall feature of his playing was rapid, obsessive beating in groups of beats. He also seemed unable to beat bilaterally when given two resonator bells with mallets. In the first three sessions he only used his dominant (left) hand.

One of the goals of the opening songs was to regulate Yitzchak's sensory system so that he would be able to focus on the music and musical interactions. The strategy was to encourage him to imitate body movements such as clapping, stomping and wiggling his fingers, etc.; this would stimulate his proprioceptive response and hopefully ground his body to be able to play. He resisted this from the beginning, often times yelling, "Don't want that song!" Since his motor skills were not something that I was focusing on for this study, I did not try to expand or modify this activity. I decided that I would discontinue this activity song and focus on others that met his needs. After the third

session, I tried to use the movements in the hello song; and after he still did not perform the movements in the fifth session, I did not ask for movements again at all.

Another strategy for using music to regulate the sensory system, and especially to encourage joint attention, was changing the music: from loud to soft, fast to slow, stopping and starting. We began to vary the way that we played the music in the second session hello song. First, Yitzchak changed his tempo to a slower, more emphatic beat, which I matched with the guitar strums. He then continued to alternate his attention between the music and me, playing the tam and xylophone. In the first three sessions, he had consistent joint attention in the hello song and it became a good transition song into the sessions from the puzzles. In the later sessions, he was more engaged and communicative for the latter half of the session.

By the third session, Yitzchak became consistent in the ability to use two hands to play the resonator bells with mallets. At the beginning he could not use both hands and would rely solely on his dominant hand. By the third session, he began to play simultaneously with both hands to get the sound of both bells. He played them multiple times when he would respond on the cue, at first seeming like he was trying to get a good, solid tone from them. He would miss a bell on some beats and they would not sound (always a problem with these bells). As he got better at playing them, though, he continued to play them in the same way. So, in the fourth session, I began to play the bell cues with my right hand on the piano; the open fifth of G4 and D5. I played four times as he had been doing and he responded by playing seven times, developing the response. I then played again and he imitated me. In Greenspan's philosophy, he calls this, "closing circles of communication." Yitzchak became very interactive with this activity and it

became one that we used successfully throughout the sessions, closing many circles in each session.

Expanding: Sessions 4-7. Suddenly, in the fourth session, Yitzchak realized that the other children were eating snack while he went to music. He had a very difficult transition and in the following sessions would repeatedly say, "Want that snack," or "Want that lunch." Also impacting his fourth session was the fact that he and I had both been absent the week before due to illness. He threw instruments and mallets at me when they were offered to him, and only when I gave him the djembe did we make any progress. After he knocked it over and began playing on the side, I followed his lead and sang, "Play it on the side of the drum." He finally looked at me and smiled while playing and we were able to have a loose connection in the music.

Throughout this session, he showed very little eye contact. His musical/communicative behaviors were reduced from the previous session, but still were more than they had been in the first sessions (see Figure 1). I questioned whether I should be pushing him through the whole schedule for the routine of it, when he was not engaging in joint attention or showing any desire to be there. The problem in my mind was that Yitzchak's attention was so fleeting in general, that one of my goals was to try to expand these fleeting moments.

In the fifth session, Yitzchak's assistant was absent and another assistant was with him. I thought this was going to throw him off, but it was the beginning of several great sessions for him. In this session, he began to sing single words or syllables in spaces. We had sung "Mr. Sun" since our sessions last year; and he would always fill in "Sun" when I'd leave the space. But, in the transition to goodbye, he sang on the syllable 'ah' two

times and then sang, "- bye" on pitch. He did not sustain the sound through the syllable, but released his air all at once. This was the most vocalizing that he had done in any of the sessions to date, besides complaining and protesting, scripting or echoing.

The next two sessions were the most engaged sessions of the entire case study. Yitzchak finally felt comfortable with the activities and the routine and did not protest at all. For the sixth session, he had eaten his snack beforehand and came in with a smile for me. It was the easiest and most comfortable transition he had made.

During this session, I felt that we had some real communicative moments. He played all of the regulatory aspects in the hello song and was with me for almost all of it. At one point, he had been tapping softly so I sang for him to, "...play soft...". He then said, "loud," in a soft voice, so I began to sing loudly. He smiled at me and played a few responses in the loud dynamic. At another point, I asked him if he was all done with the bells. He stood up to gather them in his arms with the mallets, looked at me and said his rote phrase, "Please help me;" then looked down and back up at me to say, "Yes." Although this was a rote phrase for him, he used it functionally and with purpose, while looking at me. He also alternated his attention and eye contact between me and the bells showing his joint attention.

Another activity that helped Yitzchak to understand the cause and effect of communication was in the song, "Mr. Sun". He whispered the words, "Oh mis-sr sun" at the beginning and I began the song. At other points I would stop and wait for his words to begin again. In the sixth session, he exclaimed, "Sun!" to begin one phrase and was so pleased and excited that it made me start again that he looked at me, the drum, then backwards to his assistant and back to me to share the fun while beating fast. Also, in this

song I often stopped at the end of a phrase to see if he would stop with me and to mark the form of the music. In this session, he looked up at me to see if I would stop at the ends of phrases even if I didn't stop there.

Finally in the song, he said, "All done." I pushed him for one more verse and he played and filled in words. As I went to cycle back to the start in a slow tempo to see if he would be able to fill in more words, he finally protested, "No I don't want Mr. Sun! No more Mr. Sun," looking at me. This was the most words I had ever heard Yitzchak put together in such a purposefully communicative way. So, I sang and ended the song on, "please shine down on me" and then on the final V-I, I sang, "all done!" He sang "me" one last time before it ended and then "done" with me. Then in the goodbye song, he sang, "Ah," with me two out of three times, alternating the pitch and sustaining the air flow through; and then sang "goodbye" twice while looking at me.

Because I was so pleased with Yitzchak's communication in the session, I showed the videotape to my supervisor for feedback. He had really learned the songs and seemed comfortable with me and the session format. She recommended that I try to expand the activities to include fingerplay and a stick song. The fingerplay would hopefully stimulate him to do movements in the session, giving them relevance to the words in a playful format. There was one fingerplay in his music group that he would enjoy and imitate and was used by his assistant to calm and engage him. The stick song would build on Yitzchak's enjoyment of playing sticks; he had been playing with the mallets in many sessions, imitating motions from stick songs that he knew from music group or with his teacher. So, I pulled out two songs that I have done with children at different times in the past.

In the seventh session, I introduced the new songs. First was the movement song. However, Yitzchak protested through the entire song, so I only sang it one time and then moved on. This was similar to his reaction to the movement song in the first few sessions. It was novel for him and I knew it would be hard for him to assimilate on the first try. In the stick song, Yitzchak began by trying to hit my sticks as I tapped and even knocked one out of my hand. I kept redirecting him and singing, and he was able to follow some of the motions, with some delay in when he would actually perform them.

One other recommendation that my supervisor made was to use a much more simple bass line in the instrument play song. The bass line to "Let's Make Some Music" is a dotted quarter-eighth-quarter-quarter rhythm in 4/4, like a tango rhythm. I had noticed that this activity had not gotten his attention as well as some others. I had previously modified it from a free-play activity to a more structured one in which I would hand him a different instrument for each verse. But she felt he would be more successful with a straight quarter bass. In the seventh session I began to do implement this strategy and in later sessions would only occasionally throw in the original rhythm.

Although this session felt like it had been less cohesive, with Yitzchak protesting the new songs and having some distractions, he actually displayed the most communicative behaviors of any of the sessions. He watched the new songs and maintained joint attention, even during his protests, and played in all of the songs he was familiar with. But from this session on, he began to decline in the quantity of his joint attention behaviors in the songs and activities. After expanding on the activities and skills he was acquiring in the session, he began to do fewer and fewer communicative behaviors for the next few sessions. One modification we did make, however, was that

Yitzchak would eat snack before the sessions. This proved to be a positive change for him, and he no longer protested coming to the sessions.

One other behavior that I noticed, and was pointed out to me after the seventh session, was that Yitzchak would turn his head away or swing it back and forth during the music. It was prevalent throughout his day and was enough of a concern to have his eyesight checked by a specialist. The specialist came to the conclusion that his looking away was not a function of a lack of visual acuity, but one of a behavior consistent with autistic spectrum disorder. It was apparent that he was using his peripheral vision, a very typical behavior for children with autism. But, in the context of his sensory regulation, this was a behavior that was indicative of his processing. Also, the waving back and forth creates variation in the sound which was probably self-stimulatory in nature, as well as stimulating the vestibular system. Berger (2002) speaks about children shutting down one sense to focus on another. In this case, he seemed to be shutting down his visual sense to concentrate on or stimulate his hearing.

Disregulation: Sessions 8-10. In the eighth session, the speech therapist joined us to observe Yitzchak's communication in the music. She had recently been assigned to work with him and, having been involved in my sessions in the past, she was interested in how my methods were stimulating his language. She was impressed and excited with what he was doing in the session; although I found that he fled the session again and was a little less engagable than he had been in the previous two sessions. One rhythmic call and response during the bell song was particularly successful. He played after each musical cue for the first time through the song; 5 times, 8 times, 6 times, 7 times + non-

successful hits. Each time was different and he played in response to the cues, waiting and looking at me.

In the ninth and tenth sessions, both Yitzchak and I fell apart. In the ninth, I had found out about the death of a friend, and was fighting tears the whole day. He seemed to show some empathy for me in this session, hugging me and then climbing on my back at the end and hugging me from behind. But his joint attention was not as consistent as it had been. His assistant later informed me that he had not been swung that day, which was part of his usual sensory protocol. Any change in this was bound to change his responses in the session, especially considering that he was usually in the gym before the session.

In the tenth session, however, not only had he been swung, but the OT purposely tried to disregulate him by spinning him orbitally on the swing. This was done as part of a vestibular activating protocol meant to regulate children's response to vestibular information. It was not successful and it was discontinued thereafter. He fled at the beginning of the session, and took longer than usual to engage in joint attention once he did come to sit down and play. I tried to play a song that his family sings together on Friday nights, but he did not respond. I was able to go through most of the songs, but they were all abbreviated because he kept losing attention. I would typically have offered a cabasa to have the student roll it on their arms and legs to calm themselves, a similar action to their therapeutic brushing. But, the school did not have one; however, he did roll the sticks together on his legs as he sat.

All of Yitzchak's behaviors that had been pervasive in the beginning sessions were exaggeratedly so in this session. He whined for puzzles, his snack (calling it his lunch); waved his head back and forth and scripted without any engagement to me or to

the music. At one point, he hung over the piano bench, which seemed to be an attempt to regulate himself. He fled again in the middle of the session and protested saying, "Don't want that song!" It took two minutes to get him to come back to finish the session. He also had difficulty putting words together to request the mallet. He was able to have some communicative moments in his musical exchanges, but overall the session left me frustrated and worried that his behaviors would decline in the last two sessions.

Onward and upward: Sessions 11-12. I was feeling anxious going into the last two sessions. I had talked with the special education teacher about Yitzchak's progress since I had seen him the previous year before starting the study sessions; she informed me that he had good and bad days. I had seen great progress in the sessions and my supervisor noted his greater tolerance and connectedness in the music group. I wanted the study to demonstrate this.

In the eleventh session, he began by requesting the sticks for the hello song; he stood up, looked at me and said, "Sticks!" We played the hello song and then went into the stick song. He began to protest and then suddenly threw the stick at me. This was the last problem we had, though. He finally joined me in the motions of the song after I sat down closer to him on a cube chair and began to incorporate the motions he was doing from his other stick song. After I used his idea, he followed the rest of the song motions to the end.

In the middle of the session, Yitzchak began trying to climb up on my back as I sat on the piano bench. Both his assistant and I tried to redirect him back to his chair, but it became a game for him. He giggled and looked at me as he snuck from side to side trying to climb up, while I tried to avoid this and to keep playing the piano. It was a

playful moment and just like the Wigram study, showed that our relationship had become as familiar to him as the songs he learned.

When we got to “Mr. Sun”, I offered Yitzchak the tambourine, but he requested the guitar. I sat in front of him with the guitar between us and strummed it and sang the song. I took his hand and strummed the strings. He smiled and pulled away from the sensory stimulus. He then began to strum over the strings with an open hand on the beat, but produced no sound. I strummed again with his fingers and again he smiled.

I continued to play verses and he filled in words when the spaces were provided, but then at the end of the third line he whispered, “Play with you,” looking at me. Then he took my hand and strummed with it as I sang. I got to the end, stopped and asked him, “More?” He began to strum with my hand again and at one point took my thumb and caught just the top two strings with it. It was a beautiful interaction and after the song ended, he climbed into his assistant’s lap for a hug. He also sang with me for the goodbyes. I told him in simple terms that tomorrow was our last session and that music would be all done.

The last session was bittersweet. I was happy to be finishing my study, but I knew that I would miss working with Yitzchak. I would also be leaving the school again, and I held my colleagues there in very high regard. The session was typical of most of the good sessions that we had, but a few interactions were of note.

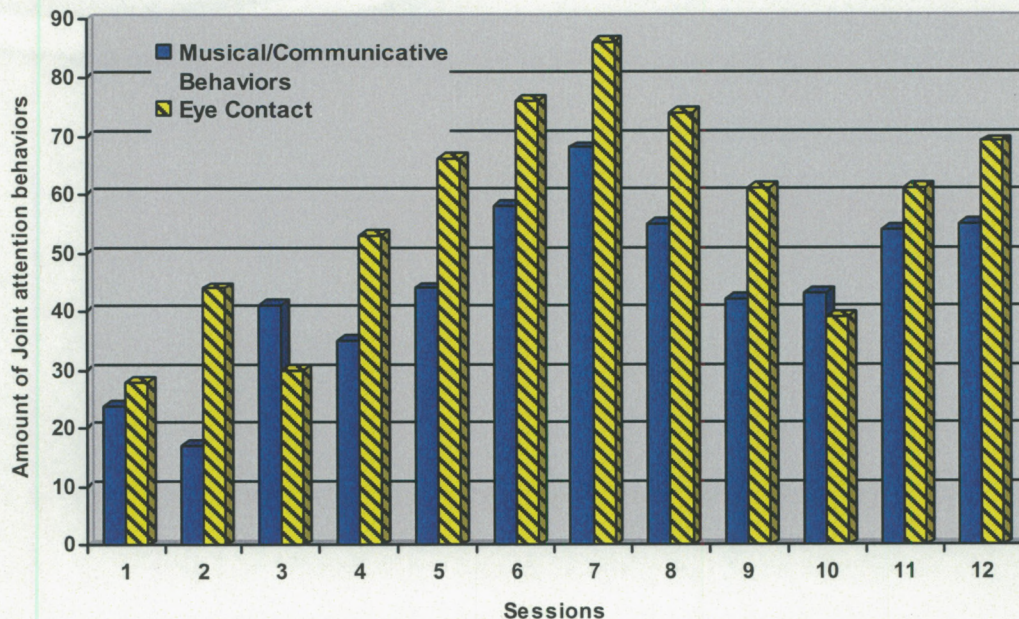
In the instrumental song, he began to imitate my rhythmic motif of quarter-eighth-eighth-quarter on the drum, both simultaneously with and subsequently to me. He also had a melodic give and take with me in “Mr. Sun”. I would often sing, “Oh...” and then wait to see if he would fill in the words. This time, he sang, “Mis-...” and waited, looking

at me. I sang back, “-ter...” and he gleefully exclaimed, “Sun!” We sang the song together, him filling in most of the spaces I provided. This alternating exchange reminded me of when young children will alternate the alphabet with an adult before they can say it all themselves. It was another indicator of how far he had come in the past five weeks.

When I said the final goodbyes, Yitzchak come over to me and leaned his cheek in for a kiss. He had never done that to me before, although he had hugged me. It was a sweet gesture; I’ll never know if he really understood that it was our last session, but I have a feeling that he may have.

Sessions, Data

Looking at the data, Figure 1 shows the total number of recorded behaviors in each session, measuring musical/communicative behaviors and eye contact. 83% of the time he had more eye contact than musical/communicative behaviors, 10 out of 12 sessions.



(Figure 1) Recorded joint attention behaviors by session

A detailed description of each session's scored behaviors, followed by a chart of the behaviors in each section (Figure 2), is presented below.

Session 1: Tempo: matches basic beat (moderate), matches 12 continuous beats, responds/increases own tempo, matches accurately or approximately, responds/decreases own tempo, matches accurately or approximately. Rhythm: imitates rhythmic motif subsequent to therapist. Structure/form: Responds to end of the phrase, produces one word at appropriate time ("me", "good-bye"). Pitch: ascends in pitch, descends in pitch. Speech Production: produces sound/vocalization/word ("go"), produces word of song being sung ("me", "good-bye"). Communicative-interactive skills: plays instrument (lollipop drum, djembe, piano, guitar, bells, tam), plays two instruments. Communicative intent skills: expresses an emotional reaction, indicates any want/need.

Session 2: Tempo: matches basic beat (moderate - 2x), matches 12 continuous beats, responds/decreases own, matches accurately or approximately. Rhythm: none. Structure/form: responds to end of phrase (3x). Pitch: none. Speech production: produces sound/vocalization/word ("yeah"). Communicative-interactive: plays instrument (xylophone, tam), plays two instruments. Communicative intent: expresses emotional reaction, indicates want/need ("want xylophone", "want mallet"), indicates wanting activity/song ("no want", responded "yes" to activity)

Session 3: Tempo: matches basic beat (fast, moderate, slow); matches 12 continuous beats, responds/increases own (3x), matches accurately (2x), responds/decreases own, matches accurately. Rhythm: imitates rhythmic motif subsequent to therapist (2x). Structure/form: responds to end of phrase (3x), produces one word at appropriate time ("sun", "done"), responds to rhythmic give and take, develops

rhythmic give and take (2x). Pitch: vocalizes, matches therapist's pitch, ascends in pitch, descends in pitch. Speech production: produces sound/vocalization/word ("sun"), produces word of song being sung ("sun", "done"). Communicative-interactive: plays instrument (djembe, bells, tam, lollipop drum, piano), plays two instruments, uses two hands simultaneously in beating, vocalizes and beats simultaneously (scripting). Communicative intent: expresses emotional reaction, indicates any need/want ("no want more", "don't want that drum", "go outside", "all done")

Session 4: Tempo: matches approximately beats in a single tempo range, matches basic beat (moderate – 2x), responds/increases own, responds/decreases own. Rhythm: imitates rhythmic motif subsequent to therapist, repeats own rhythmic motif. Structure/form: produces one word at appropriate time ("sun", "me", "bye"-2x), initiates rhythmic give and take, develops rhythmic give and take. Pitch: matches therapist's pitch (3x), ascends in pitch. Speech production: produces word/vocalization/sound ("sorry"), produces word of song being sung ("sun", "me", "bye"-2x). Communicative-interactive: plays instrument (bells, xylophone, eggs, tam), plays two instruments, uses both hands simultaneously in beating, vocalizes and beats simultaneously (scripting). Communicative intent: expresses emotional reaction, indicates any want/need ("don't want", "all done"- 2x), indicates wanting an activity/song.

Session 5: Tempo: matches approximately beats in a single tempo range, initiates beating in a single tempo range, beats basic beat (fast – 2x), matches basic beat (moderate – 2x), beats basic beat (slow), matches 12 continuous beats, beats 12 continuous beats, beats an *accelerando*. Rhythm: none. Structure/form: produces one word at appropriate time ("sun", "bye"), responds to rhythmic give and take (3x). Pitch: responds in key of

improvisation ('ah'-3x), matches therapist's pitch (2x), ascends in pitch (3x). Speech production: produces sound/vocalization/word ("ah"-3x, "bye"), produces word of song being sung ("bells", "sun", "bye"). Communicative-interactive: plays instrument (tam, bells, piano), plays two instruments (tam and djembe alternating), uses both hands simultaneously in beating, vocalizes and beats simultaneously (scripting).

Communicative intent: expresses an emotional reaction (2x), indicates any want/need ("don't want"-3x, "more"), indicates wanting an activity/song ("don't want that song", "play piano")

Session 6: Tempo: beats within a single tempo range (2x), matches basic beat (fast-2x, moderate, slow), matches 12 continuous beats, beats an *accelerando*, matches accurately, matches *ritardando* accurately or approximately. Rhythm: beats multiples of basic beat. Structure/form: responds to end of phrase (6x), produces one word at appropriate time ("sun"-3x, "me", "goodbye"), responds to rhythmic give and take (3x). Pitch: matches therapist's pitch, descends in pitch ("ah"-2x). Speech production: produces sound/vocalization/word ("sun", "loud", "bells", "ah", "slow", "goodbye"), produces word of song being sung ("sun"-3x, "me", "goodbye"), produces motif of song being sung ("oh mis-ser sun"). Communicative-interactive: plays instrument (xylophone, bells, djembe, tam, piano, guitar), plays two instruments (tam and djembe), uses both hands simultaneously in beating. Communicative intent: indicates any want/need ("please help me, yes", "need it", "all done"-3x), indicates wanting an activity/song ("don't want Mr. Sun. No more Mr. Sun!", "don't want that song")

Session 7: Tempo: match approximately within a single tempo range (2x), beats within a single tempo range (2x), matches basic beat (fast-5x, moderate, slow), matches

12 continuous beats, beats an *accelerando* (3x), responds/increases own, responds accurately or approximately, responds/decreases own. Rhythm: beats multiples of basic beat (2x). Structure/form: responds to end of phrase (7x, stopped own 1x), produces one word at appropriate time (“sun”-4x, “me”-2x, “you”), responds to rhythmic give and take (4x), develops rhythmic give and take (2x). Pitch: vocalizes, matches therapist’s pitch, ascends in pitch (2x). Speech production: produces sound/vocalization/word (“yes”, “xylophone”), produces word of song being sung (“sun”-4x, “me”-2x, “you”, “goodbye”). Communicative-interactive: plays instrument (tam, bells, sticks, xylophone, djembe, eggs), plays two instruments (bells and piano), uses two hands simultaneously in beating. Communicative intent: expresses emotional reaction (2x), indicates any want/need (“want Ima”, “want bells”, “want mallet”), indicates wanting an activity/song (“no want that song”).

Session 8: Tempo: beats within a single tempo range (4x), beats the basic beat (fast-2x, moderate-2x), beats 12 consecutive beats (2x), beats an *accelerando* (2x), responds/decreases own (2x). Rhythm: beats multiples of basic beat (2x), imitates rhythmic motif. Structure/form: responds to end of phrase (5x), responds to phrase/measure beginning, produces one word at appropriate time (“sun”-2x, “tree”, “you”), responds to rhythmic give and take (3x), initiates rhythmic give and take, develops rhythmic give and take. Pitch: vocalizes, matches therapist’s pitch. Speech production: produces sound/vocalization/word (“sticks”, “drum”, “goodbye”), produces one word at appropriate time (“sun”-2x, “tree”, “you”, “me”), spontaneously produces word of song being sung (“sun, sun”). Communicative-interactive: plays instrument (multi-drum, bells, piano, tam, sticks), plays two instruments (multi-drum and djembe),

uses both hands simultaneously in beating. Communicative intent: expresses emotional reaction, indicates any want/need (“want stick”), indicates wanting an activity/song (want that drum”)

Session 9: Tempo: beats within a single tempo range, beats basic beat (moderate-2x, slow-3x), beats an *accelerando* (2x), beats a *ritardando*. Rhythm: beats multiples of basic beat. Structure/form: responds to end of phrase (2x), produces one word at appropriate time (“tree”, “sun”-2x, “me”-2x). Pitch: vocalizes, matches therapist’s pitch, ascends in pitch, descends in pitch, matches (melodic) pitches approximately or accurately. Speech production: produces sound/vocalization/word (bells, bumpy, ah-2x), produces word of song being sung (“tree”, “sun”-2x, “me”-2x). Communicative-interactive: plays instrument (bells, djembe, piano), plays two instruments (bells and djembe), uses both hands simultaneously in beating. Communicative intent: expresses emotional reaction, indicates any need/want (“want bells”, “no want bells”, “want piano”, “no want that”), indicates wanting an activity/song (“no want Mr. Sun”)

Session 10: Tempo: matches basic beat (fast, moderate-3x) beats basic beat (moderate), beats an *accelerando* (2x). Rhythm: beats multiples of basic beat (2x). Structure/form: responds to end of phrase, produces one word at appropriate time (“sun”, “me”), responds to rhythmic give and take (3x), develops rhythmic give and take. Pitch: matches therapist’s pitch (3x), ascends in pitch, descends in pitch (2x). Speech production: produces sound/vocalization/word (“goodbye”), produces word of song being sung (“sun”, “me”). Communicative-interactive: plays instrument (sticks, xylophone, tam, djembe, bells, tam), plays two instruments (djembe and xylophone), uses both hands

simultaneously in beating. Communicative intent: expresses emotional reaction, indicates any want/need (“want piano”).

Session 11: Tempo: matches approximately beats within a single tempo range, beats basic beat (fast, moderate, slow), matches basic beat (moderate), makes an *accelerando*, responds/increases own, matches *ritardando* accurately or approximately. Rhythm: beats multiples of basic beat, imitates rhythmic motif subsequent to therapist (2x). Structure/form: responds to end of phrase, produces one word at appropriate time (“you”, “sun”-5x, “me”-2x, “tree”, “time”, “goodbye”), responds to rhythmic give and take, develops rhythmic give and take (2x), responds to melodic give and take. Pitch: matches therapist’s pitch, descends in pitch. Speech production: produces sound/vocalization/word (“sticks”), produces word of song being sung (“you”, “sun”-5x, “me”-2x, “tree”, “time”, “goodbye”), produces motif of song being sung (“play with you”). Communicative-interactive: plays instrument (sticks, tam, piano, xylophone, guitar, bells), uses both hands simultaneously in beating. Communicative intent: indicates any want/need (“want that sticks”, “don’t want that tam”, “drum”, “want guitar”)

Session 12: Tempo: beats in a single tempo range, matches basic beat (fast-3x, moderate-2x), beats an *accelerando* (2x), matches accurately, responds/decreases own. Rhythm: imitates rhythmic motif simultaneously, imitates rhythmic motif subsequent to therapist. Structure/form: responds to end of phrase (3x), produces one word at appropriate time (“sun”-2x, “you”, “me”, “tree”, “time”), responds to rhythmic give and take (6x), responds to melodic give and take. Pitch: vocalizes, matches therapist’s pitch, ascends in pitch, descends in pitch (2x). Speech production: produces sound/vocalization/word (“go”, “bells”, “Mila”, “mis-ser”, “no”), produces word of song

being sung (“sun”-2x, “you”, “me”, “tree”, “time”), produces motif of song being sung (“play with you”). Communicative-interactive: plays instrument (sticks, xylophone, djembe, eggs, multi-drum), uses both hands simultaneously in beating. Communicative intent: expresses emotional reaction (2x), indicates any need/want (“don’t want drum”), indicates wanting an activity/song (“don’t want that song”).

Joint Attention Behaviors

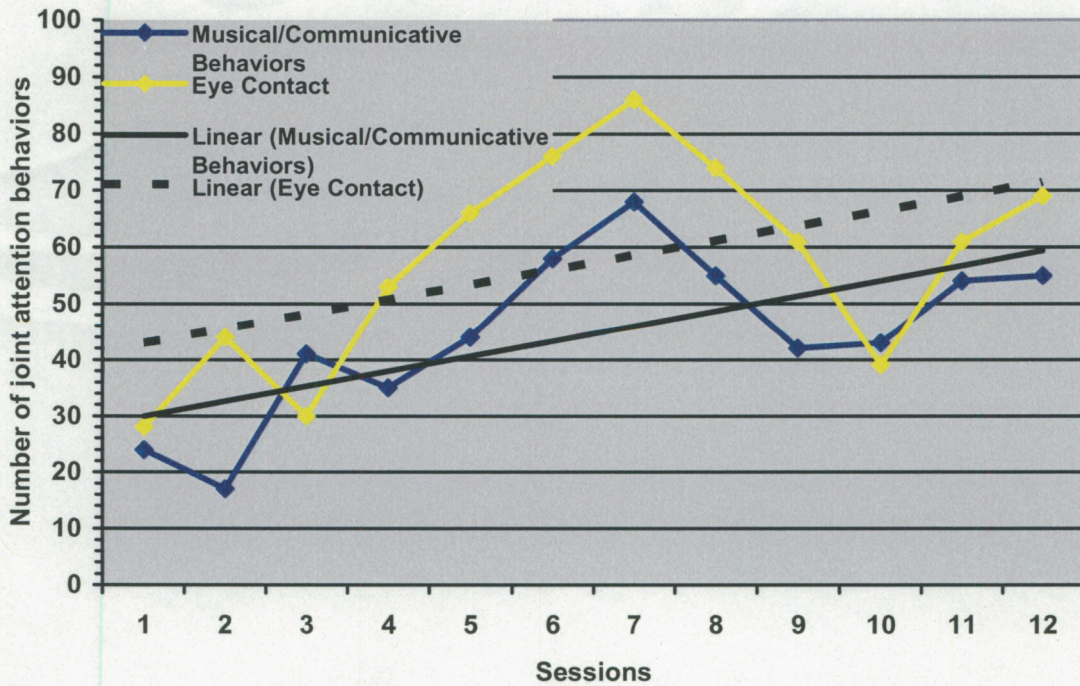
Musical Behaviors	Session 1	2	3	4	5	6	7	8	9	10	11	12
Matching Tempo	6	5	11	5	10	11	18	14	9	7	8	10
Imitating Rhythm	1	0	2	2	0	1	2	3	1	2	3	2
Responds to structure/ form	3	3	8	6	5	14	21	16	7	7	14	16
Vocalizes/ Matches Pitch	2	0	4	4	8	3	4	3	5	6	2	5
Non-Musical Behaviors	Session 1	2	3	4	5	6	7	8	9	10	11	12
Speech Production Skills	3	1	3	5	7	15	9	9	9	3	13	12
Communicative-Interactive Skills	7	3	8	7	6	8	8	7	5	8	7	6
Communicative Intent Skills	2	5	5	5	8	7	6	3	6	2	5	4

(Figure 2) Joint Attention Behaviors, Musical and Non-Musical

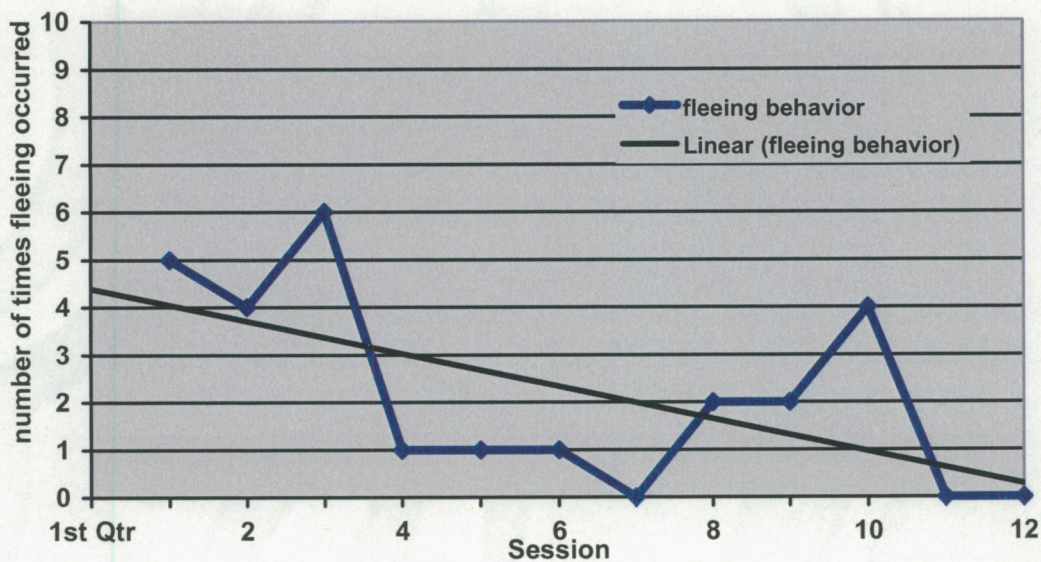
In Figure 2, the joint attention behaviors were broken down into the sections in which they were scored on the CRASS. Figure 2 highlights strengths in Yitzchak’s ability to match tempo, respond to structure/form, and in his speech production skills. His musical behaviors increased more than his non-musical behaviors, where his weakness in

communicative skills was displayed. His skills were always in direct proportion to his overall functioning in the session.

The results of all of the numbers show a consistent upward trend in both eye contact and musical behaviors, as shown in figure 3, despite rise and fall in session outcomes. As those musical behaviors increased, his fleeing/avoidance behavior in the session decreased. He was able to maintain engagement for longer periods of time; staying longer in the music space and playing more in the musical interactions. Figure 4 shows the downward trend of fleeing/avoidance behaviors.



(Figure 3) Trends in joint attention behaviors



(Figure 4) Trends in fleeing behavior

Discussion

Yitzchak began music sessions with me as a child who would flee any situation that was overwhelming to his sensory system. Fleeing was defined as any spontaneous exit from the music space. He needed his assistant present to keep him contained in the music space and regulated in the sessions. Some songs and activities I attempted never crossed the threshold of familiarity for him and had to be discontinued. But, many of the original songs became the soil from which musical interaction and joint attention were eventually grown.

Yitzchak's engagement in joint attention was directly related to his sensory regulation, and the days when he was less regulated he had decreased amounts of musical behaviors and eye contact. The session after he had been swung orbitally and was disregulated, he had reduced joint attention which is evidenced in the eye contact score

for that session. While he consistently had more eye contact than musical/communicative behaviors (83%), this session was one of the two sessions that the opposite was true.

His joint attention in the familiar versus the unfamiliar was also consistent. Yitzchak, like most children with autism, had trouble with transition and novelty. In the beginning, all of the sessions showed fewer joint attention behaviors than in the later sessions, once the songs and activities were more familiar and the routines assimilated. I knew I was inviting a challenge by adding new songs in the middle of the study, breaking the routine and predictability of the session. Some songs were kept as a part of the session, and others were dropped from the schedule. Because of Yitzchak's difficulty with novelty, it was important to attempt the songs several times. Although I doubted whether I should push certain activities if he was protesting them, it was impossible for him to feel comfortable with a song on the first time hearing it.

One aspect of Greenspan's theories that I have mentioned is to follow the child's interests and expand on them. When Yitzchak was stuck in the stick motions from songs he was familiar with from other settings, I incorporated a stick song and then incorporated his idea into the song. He was then able and willing to imitate other novel motions. While the symbolic representation of ideas in the stick motions was most likely outside of his experience and level of functioning, he attended to what I was doing and imitated the motions.

Although Yitzchak had words (i.e. the ability to speak), it was often questionable whether Yitzchak's words had purpose or not. Often he would say something that was appropriate and in context, but that would not seem to have any meaning to him. For example, when he said, "Loud;" I would have expected a child to say the word loudly,

and then bang the drum. Yitzchak didn't do this; he almost whispered the word and then only played a little bit with me. But, he did look at me and smile. It seemed that he had words in his head, but lacked the form and function to use them in context.

Many of Yitzchak's words and phrases were rote chunks that were echolalic; I have always believed that one way children with autism learn language is by echolalia. If they are in an interactive, functional environment such as in a Greenspan school and are provided scaffolds for their rote chunked phrases; they will often learn to use them in a purposefully communicative way. Once they know when and how to use the chunks, they will expand their use of words. I have experienced this with several children on the spectrum in my nine years of working with this population. The key again is joint attention. The children have to have an interest and engagement with the world and the people in it to be interested in language and communication.

Yitzchak's language output did not dramatically improve over the course of the sessions. However, he did request instruments more as he became more engaged in joint attention. Some of his verbal interactions showed more purposeful and frequent use. His longest utterance was seen in the eleventh session when he protested, "No, I don't want Mr. Sun! No more Mr. Sun!" He also filled in more words to songs as shown in Figure 2, Speech-Production Skills. This demonstration of form and timing showed his improvement in those aspects of language use.

One consistent quality of Yitzchak's verbal output was that he stated his needs. He consistently protested saying, "Don't want that song"; or he requested, "Want the bells," or "Want that snack!" He seemed to be asserting his autonomy, a developmental skill associated with two to three year old children. Many children with autism display

splintered skills - skills at different developmental levels. The purpose of a developmental program is to remediate the undeveloped skills that are causing the discrepancies.

As the sessions moved towards their end, Yitzchak sang and vocalized more and more with me during "Mr. Sun" and the transition/goodbye song. His ability to sustain a vocalization improved and could alternate pitch on a single breath. Looking back at the session transcripts, I noticed that most of his words or phrases were exclaimed, protested, or whispered. Even the first time he "sang" the syllable 'ah' with me, it was a very short burst of air. I had not realized that he had difficulty regulating his air flow while speaking, and it seemed like singing would be a positive intervention to continue in the future.

Finally, Yitzchak's fleeing behaviors were also an indication of his lack of joint attention to a song or activity. In the first set of sessions, the number of joint attention behaviors was fewer, as he maintained less attention in each activity and fled the music space with greater frequency. The therapy staff at the school all agreed that one key to helping Yitzchak to progress in his development was to lengthen or expand his periods of engagement. As the sessions progressed, he did expand his attention in the sessions; he fled less, he played more interactively and vocalized more and more in the sessions. He also became more aware of his own need to end an activity and would say, "All done," more and more rather than fleeing. Most of the time I would end a song or activity at his request, but at times I would challenge him to expand the activity and go just a little longer.

A Behavior Change Survey, which is part of the CRASS given to the assistant, speech therapist, special education teacher and music therapist found that Yitzchak's communicative, social/emotional and musical behaviors were not well generalized into his regular routine of activities outside of music. Most found his behaviors the "same" or "slightly more", with the greatest changes displayed in his attraction to sound and his quantity of musical behaviors. But in music group, the music therapist has noted greater tolerance of the activities, less fleeing, and greater awareness of his music in the context of the group's. It was not expected that there would be generalization in the short-term format of this study. However, there is great promise for continued expansion of his engagement and joint attention in this type of individual, structured format.

Conclusion and Considerations for Future Study

Music therapy proved to be an effective stimulus to increase the joint attention behaviors in one child with autism over a short-term period. The behavior of fleeing was decreased over the same period. In addition, the quality of his responses grew as we had more interactive play in the activities. He began to communicate musically using aspects of verbal communication: listening, turn-taking, timing and initiating. If given the opportunity for a longer-term period of therapy, the small expansion of joint attention that occurred for Yitzchak would almost certainly grow. Only with that growth could language develop further. Generalization could also only occur with a longer-term period of therapy.

Future studies would consider not only the length of time, but would also consider working with more than one child. An ideal situation would be a weekly music group with each child having an individual session during the week. This would allow each

child's individual needs to be addressed one-on-one, while group skills would expand on their generalization in the music. Joint attention is a developmental skill that is also a pivotal skill in children's development. Music as an intervention for this skill should be researched further.

Finally, the CRASS provided me with a checklist of musical and communicative behaviors that gave me a way to measure Yitzchak's progress. With the current requirements in education under the IDEA emphasizing measurable results, the checklist allowed me to look at a numerical picture of what we were playing in the music. Music is so abstract; one cannot put the feeling and emotions, or experience of it into numbers on paper. But how it is played, and how many times it is played are just two ways music therapists can meet the current federal requirements while holding true to the art of music.

References

- Alvin, J. (1978). *Music Therapy for the Autistic Child*. Oxford: Oxford University Press.
- Arnold, A., Semple, R.J., Beale, I., & Fletcher-Flynn, C. (2000). Eye contact in children's social interactions: what is normal behavior? *Journal of Intellectual & Developmental Disability*, 25(3), 207-216.
- Autism Speaks (2006). *What Is Autism: An Overview*. Retrieved on January 10, 2007 from www.autismspeaks.org
- Baron-Cohen, S., Baldwin, D.A., & Crowson, M. (1997). Do children with autism use the speaker's direction of gaze strategy to crack the code of language? *Child Development*, 68, 48-57.
- Berko Gleason, J. (2001). *The Development of Language (6th ed.)* Allyn & Bacon.
- Berger, D. (2002). *Music Therapy, Sensory Integration and the Autistic Child*. London: Jessica Kingsley Publishers.
- Braithwaite, M. & Sigfoos, J. (1998). Effects of social versus musical antecedents on communication responsiveness in five children with developmental disabilities. *Journal of Music Therapy*, 25(2), 88-104.
- Bruner, J. (1981). The social context of language acquisition. *Language and Communication*, 23, 645-673.
- Buday E. (1995). The effects of signed and spoken words taught with music on sign and speech imitation by children with autism. *Journal of Music Therapy* 32(3), 189-202.
- Crais, E., Day Douglas, D., & Cox Campbell (2004). The intersection of the development of gestures and intentionality. *Journal of Speech, Language, and Hearing Research*, 47, 678-694.
- Davis, R.K. (1990). A model for the integration of music therapy within preschool classrooms for children with physical disabilities or language delays. *Music Therapy Perspectives*, 8, 82-84.
- Dawson, G., Meltzoff, A.N., Osterling, J., Rinaldi, J. & Brown, E. (1998). Children with autism fail to orient to naturally occurring social stimuli. *Journal of Autism & Developmental Disorders*, 28(6), 479-485.
- Edgerton, C. (1994). The effect of improvisational music therapy on the communicative behaviors of autistic children. *Journal of Music Therapy*, 31(1), 31-62.
- Grant, R. (1989). Music therapy guidelines for developmentally disabled children. *Music Therapy Perspectives*, 6, 18-22.
- Greenspan, S. & Wieder, S. (1998). *The child with special needs: intellectual and emotional growth*. Reading, MA: Addison Wesley Longman.
- Greenspan, S. & Wieder, S. (1999). A functional developmental approach to autism spectrum disorders. *The Journal of the Association for Persons with Severe Handicaps*, 24(3), 147-161.
- Gunsberg, A. (1988). Improvised musical play: a strategy for fostering social play between developmentally delayed and nondelayed preschool children. *Journal of Music Therapy*, 25(4), 178-181.
- Hoskins, C. (1988). Use of music to increase verbal response and improve expressive language abilities of preschool language delayed children. *Journal of Music Therapy*, 25(2), 73-84.

- Jones, E. & Carr, E. (2004). Joint attention in children with autism: theory and intervention. *Focus On Autism and Other Developmental Disabilities* 19(1), 13–26.
- Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response intervention: I. Overview of approach. *Journal of the Association of Persons with Severe Handicaps*, 24, 174–185.
- Loewy, J. (1995). The musical stages of speech: a developmental model of pre-verbal sound making. *Music Therapy*, 13(1), 47-73.
- Loveland, K.A. & Landry, S.H. (1986). Joint attention and language in autism and developmental language delay. *Journal of Autism & Developmental Disorders*, 16(3), 335-349.
- McLean, J., McLean, L., Brady, N., & Etter, R. (1991). Communication profiles of two types of gesture using nonverbal persons with severe to profound mental retardation. *Journal of Speech and Hearing Research*, 34, 294-308.
- Miller, S.B. & Toca, J.M. (1979). Adapted melodic intonation therapy: a case study of an experimental language program for an autistic child. *Journal of Clinical Psychiatry*, 40(4), 201-203.
- Miller, S.G. (1982). *Music Therapy for handicapped children: Speech Impaired*. Washington, D.C.: National Association for Music Therapy, Inc.
- Monti, R. (1985). Music therapy in a therapeutic nursery. *Music Therapy*, 5(1), 22-27.
- Muller, P. & Warwick, A. (1993). Autistic children and music therapy: the effects of maternal involvement in therapy. In M.H. Heal & T. Wigram, (Eds). *Music therapy in health and education*, 214-234. New York & London: Jessica Kingsley Publishers.
- Mundy, P., Sigman, M., & Kasari, C. (1990). A longitudinal study of joint attention and language development in autistic children. *Journal of Autism and Developmental Disorders*, 20(1), 115-128.
- Mundy, P., & Gomes, A. (1998). Individual differences in joint attention skill development in the second year. *Infant Behavior and Development*, 21, 469– 482.
- Nordoff, P. & Robbins, C. (1968). *The Second Book of Children's Play-songs*. Bryn Mawr, PA: Theodore Presser, Inc.
- Nordoff, P. & Robbins, C. (1977). *Creative music therapy*. New York: John Day Company.
- Occupational Therapy Innovations (n.d). *Therapeutic brushing techniques; the Wilbarger Deep Pressure and Proprioceptive Technique (DPPT) and Oral Tactile Technique (OTT)*. Retrieved on December 27, 2006 from <http://www.ot-innovations.com/content/view/55/46/>
- Raffi (1984). *Singable Songs*. Ontario, Canada: Chappell
- Rainey Perry, M. (2003). Relating improvisational music therapy with severely and multiply disabled children to communication development. *Journal of Music Therapy* XL(3), 227-246.
- Ritzholz, M. & Robbins, C. (Eds.) (1999). *Themes for Therapy from the Nordoff-Robbins Music Therapy Center at New York University: New Songs and Instrumental Pieces*. New York: Carl Fischer.

- Rollins, P.R., Wambacq, I., Dowell, D., Mathews, L. & Reese, P.B. (1998). An intervention technique for children with autistic spectrum disorder: joint attention routines. *Journal of Communication Disorders*, 31(2), 181-192, quiz 192-193.
- Scott, J. (2005, 12 April). More businesses fulfill the need for fun. *The Star Ledger*, pp. A15, A20.
- Sutton, J. (1993). The guitar doesn't know this song: an investigation of parallel development in speech/language and music therapy. In M.H. Heal & T. Wigram, (Eds). *Music therapy in health and education*, 264-272. New York & London: Jessica Kingsley Publishers.
- Thaut, M. (1984). A music therapy treatment model for autistic children. *Music Therapy Perspectives*, 1(4), 7-13.
- Thaut, M. (1987). Visual versus auditory (musical) stimulus preferences in autistic children: a pilot study. *Journal of Autism & Developmental Disorders*, 17, 425-432.
- Toolan, P.G., & Coleman, S.Y. (1994). Music therapy, a description of process: engagement and avoidance in five people with learning disabilities. *Journal of Intellectual Disabilities Research*. 38(4), 433-444.
- U.S. Department of Education (2006). *IDEA Regulations: Individual Education Program*. Retrieved on January 12, 2007 from <http://idea.ed.gov/explore/view/p/%2Croot%2Cdynamic%2CTopicalBrief%2C10%2C>
- Wigram, T. (1991). Music therapy for a girl with Rett's Syndrome: balancing structure and freedom. In Bruscia, K. (Ed.), *Case studies in music therapy* (pp. 39-53). New Hampshire: Barcelona Publishers.
- Wilbarger, P. & Wilbarger, J. (1991). *Sensory Defensiveness in Children Aged 2-12: An Intervention Guide for Parents and Other Caretakers*, Avanti Educational Programs: Santa Barbara, CA.
- Wimpory, D.C. & Nash, S. (1999). Musical interaction therapy – therapeutic play for children with autism. *Child Language Teaching & Therapy*, 15(1), 17-28.
- Wimpory, D.C., Chadwick, P. & Nash, S. (1995). Brief report: musical interaction therapy for children with autism: and evaluative case study with two-year follow-up. *Journal of Autism & Developmental Disorders*, 25(5), 541-552.
- Winnicott, D.W. (1971). *Playing and Reality*. New York: Tavistock.

Appendix I

Checklist of Communicative Responses/Acts Score Sheet

Edgerton 1994

CHECKLIST OF COMMUNICATIVE RESPONSES/ACTS SCORE SHEET

I	V - RESPONSES	I. MUSICAL	ACTS - I
		A. <u>TEMPO</u>	
		1. Steady tempo (3 responses)	
_____	Match Approx	a. Voc/Beats w/in a single tempo range _____	
		b. Basic Beat	
_____	Matches	(1) Fast (>149 bpm) Voc/Beats _____	
_____	Matches	(2) Mod. (95-149 bpm) Voc/Beats _____	
_____	Matches	(3) Slow (<95 bpm) Voc/Beats _____	
_____	Matches	c. 12 continuous beats Voc/Beats _____	
		2. Accelerando	a. Voc/Beats _____
_____	Responds	b. Increases own	
_____	Matches	c. Accurately or approximately	
_____	Matches	d. Accurately	
		3. Ritardando	a. Voc/Beats _____
_____	Responds	b. Decreases own	
_____	Matches	c. Accurately or approximately	
_____	Matches	d. Accurately	
		B. <u>RHYTHM</u>	
_____	Corres	1. Voc/Beats multiples of basic beat (4 ther beats) ^{+x}	
		2. 2 diff synchronized rhythms Beats _____	
		3. Rhythmic pattern/mel motif (1 measure or less)	
_____	Imitates	a. Simultaneously	
_____	Imitates	b. Subsequent to therapist (after)	
		c. Creates _____	
		d. Repeats own _____	
		4. Rhythmic/melodic phrase (greater than 1 measure)	
_____	Imitates	a. Simultaneously	
_____	Imitates	b. Subsequent to therapist (after)	
		c. Creates _____	
		d. Repeats own _____	
		5. Entire melodic rhythm (2 or more phrases)	
_____	Imitates	a. Simultaneously	
_____	Imitates	b. Subsequent to therapist (after)	
		c. Creates _____	
		C. <u>STRUCTURE/FORM</u>	
_____	Responds	1. Phrase a. End of phrase	
_____	Responds	b. Phrase or measure beginning-specific & not 1st	
_____	Produces	2. One word at appropriate time	
_____	a. Resp	3. Rhythmic give & take (th-ch-th-ch)	
		b. Initiates (ch-th-ch) _____	
		c. Develops (~ch 2nd reponse diff) _____	
_____	a. Resp	4. Melodic give & take (th-ch-th-ch)	
		b. Initiates (ch-th-ch) _____	
		c. Develops (~ch 2nd response diff) _____	

D. PITCH

- _____ a. Voc 1. Vocalizes (singing quality)
- _____ Responds b. In key of improvisation
- _____ Matches c. Therapist's pitch

- _____ 2. Varies pitch
- _____ a. Ascends in pitch _____
- _____ b. Descends in pitch _____

- _____ 3. Melodic motif a. Voc/Sings _____
- _____ Matches b. Melodic contour-approx or accurately _____
- _____ Matches c. Pitches-approx or accurately _____

- _____ 4. Melodic phrase a. Voc/Sings _____
- _____ Matches b. Melodic contour-approx or accurately _____
- _____ Matches c. Pitches-approx or accurately _____
- _____ d. Spontaneously creates new melodic phrase _____

- _____ 5. Entire song a. Voc/Sings _____
- _____ Matches b. Melodic contour-approx or accurately _____
- _____ Matches c. Pitches-approx or accurately _____
- _____ d. Spontaneously creates new song _____

II. NON-MUSICAL

A. SPEECH PRODUCTION SKILLS

- _____ 1. Produces sound/vocalization/word

- _____ 2. Song vocalization/word
- _____ Produces a. Word of song being sung
- _____ Produces b. Motif of song being sung
- _____ Produces c. Phrase of song being sung

- _____ 3. Appropriate vocalization/word
- _____ Spon prod a. Appropriate 2-word combination
- _____ Spon produces b. Appropriate >2-word combination
- _____ Spon produces

B. COMMUNICATIVE-INTERACTIVE SKILLS

- _____ 1. Plays instrument
- _____ 2. Plays 2 instruments
- _____ 3. Uses both hands simultaneously in beating
- _____ 4. Vocalizes and beats simultaneously
- _____ 5. Tolerates entire 10 minutes
- _____ 6. Participates w/ther in entire 10 minutes

C. COMMUNICATIVE INTENT SKILLS

- _____ 1. Expresses emotional reaction
- _____ 2. Indicates any need/want
- _____ 3. Indicates wanting a music activity/song

_____ - TOTAL Communicative Responses/Acts

Overall Level of Musical Communicativeness

Quantity-----	(low level)	1	2	3	4	5	6	7	(high level)
Creativeness--	(low level)	1	2	3	4	5	6	7	(high level)

APPENDIX C

Communicative Responses/Acts Definitions

Beats - This term refers to the playing of the drum, cymbal, or piano with mallets or with hands, and/or making a percussive sound using body parts or mallets.

Vocalizes - To produce musical tones or tones with musical inflections by means of the voice

I - Instrumental - Any response in which the child beats (as defined above)

V - Vocal - Any response in which the child vocalizes (as defined above)

I. METICAL:

A. TEMPO

1. Steady tempo

a. Vocalizes/beats within a single tempo range-a minimum of 3 responses in the same tempo range. Tempo ranges are defined in section I.A.1.b.(1-3)

Matches Approx-vocalizes/beats a minimum of 3 consecutive responses in the same approximate tempo of the therapist

b. Basic beat-an equal number of beats per minute for 3 consecutive beats/vocalizations

(1) Fast-Vocalizes/beats a basic beat in a fast tempo range or greater than 149 beats per minute

Matches-vocalizes/beats the same fast basic beat as the therapist

(2) Moderate-Vocalizes/beats a basic beat in a moderate tempo range or from 95 to 149 beats per minute

Matches-vocalizes/beats the same moderate basic beat as the therapist

(3) Slow-Vocalizes/beats a basic beat in a slow tempo range or less than 95 beats per minute

Matches-vocalizes/beats the same slow basic beat as the therapist

c. Vocalizes/beats 12 continuous beats-vocalizes/beats 12 continuous basic beats

Matches 12 continuous beats-vocalizes/beats 12 continuous basic beats which match that of the therapist-therapist must initiate tempo

2. Accelerando (a minimum of 10 beats per minute change)

a. Vocalizes/beats an accelerando-increases own tempo

Responds/Increases own-while continuously beating/vocalizing, increases own tempo when therapist increases hers

118

c. Matches/accurately or Approximately-follows the therapist's accelerando accurately or by playing close entire accelerando-all child's beats must speed up

d. Matches/accurately-follows the therapist's entire accelerando accurately

3. Ritardando (a minimum of 10 beats per minute change)

a. Vocalizes/beats a ritardando-decreases own tempo

Responds/Decreases own-while continuously beating/vocalizing, decreases own tempo when therapist decreases hers

b. Matches/accurately or Approximately-follows the therapist's ritardando accurately or by playing close approximations-almost with therapist's beats during the entire ritardando-all child's beats must slow down

d. Matches/accurately-follows the therapist's entire ritardando accurately

B. RHYTHM (Rhythmic Pattern-the grouping of 2 or more

beats/vocalizations/words played/vocalized/sung in succession which differs from but is referenced to the basic beat. The length of a rhythmic pattern will be no longer than 1 measure. Phrase-any short figure or passage complete in itself and unbroken in continuity. The length of a phrase will be greater than 1 measure. Motif-a part or portion of a phrase. Melodic phrase/motif-a phrase/motif taken from the played or sung melody.)

1. Corresponds/vocalizes/beats multiples of basic beat-minimum of 4 of the therapist's beats-therapist must be playing the basic beat

2. Beats 2 different synchronized rhythms-simultaneously uses both hands to beat 2 different rhythms which are both referenced to the same basic beat

3. Rhythmic pattern/melodic motif

a. Imitates simultaneously-accurately vocalizes/beats the rhythmic pattern/melodic motif with the therapist

b. Imitates subsequent to therapist-accurately vocalizes/beats the rhythmic pattern/melodic motif after the therapist finishes playing/vocalizing it-therapist can not be singing or playing it

c. Creates-vocalizes/beats a new, definite rhythmic pattern/melodic motif-must be referenced to a basic beat and be repeatable

d. Repeats own-vocalizes/beats own new rhythmic pattern/melodic motif 2 times

4. Rhythmic/melodic phrase

a. Imitates simultaneously-accurately vocalizes/beats the rhythmic/melodic phrase with the therapist

b. Imitates subsequent to therapist-accurately vocalizes/beats the rhythmic/melodic phrase after the therapist finishes playing/vocalizing it

c. Creates simultaneously-accurately vocalizes/beats the rhythmic/melodic phrase after the therapist finishes playing/vocalizing it

d. Repeats simultaneously-accurately vocalizes/beats the rhythmic/melodic phrase after the therapist finishes playing/vocalizing it

- c. Creates-vocalizes/beats a new, definite rhythmic/melodic phrase-must be referenced to a basic beat and be repeatable
 - d. Repeats own-vocalizes/beats own new rhythmic/melodic phrase 2 times
 - 5. Entire melodic rhythm
 - a. Initiates simultaneously-accurately vocalizes/beats the entire melodic rhythm with the therapist
 - b. Initiates subsequent to therapist-accurately vocalizes/beats the entire melodic rhythm after the therapist finishes playing/vocalizing it-therapist can not be singing or playing it
 - c. Creates-vocalizes/beats a new, definite entire melodic rhythm-must be referenced to a basic beat and be repeatable
- C. STRUCTURE/FORM
- 1. Phrase
 - a. Responds/end of phrase-stops beating/vocalizing at the end of a phrase, beats/vocalizes only on the last beat of the phrase, punctuates the last beat of the phrase using accented beat/vocalization or a different instrument, or holds note at the end of a phrase
 - b. Responds/phrase or measure beginning-specifically places beats to coincide with beginning of measure or phrase, accents first beats of the measure/phrase while beating/vocalizing the basic beat, responds with a differentiated use of two instruments, beats/vocalizes the first beat only, and/or vocalizing/beating song phrases using appropriate rests-2 successive measures/phrases.
 - 2. Produces one word at appropriate time-axis or sings one word of a motif/phrase/song at the correct moment of the motif/phrase/song
 - 3. Rhythmic give-and-take (must follow a meter/beat/tempo and be continuous-child's response must consist of more than one beat/vocalization)
 - a. Responds-Participates in rhythmic give-and-take initiated by the therapist-1 therapist-child-therapist-child cycle
 - b. Initiates-Begins a rhythmic give-and-take-1 child-therapist-child cycle
 - c. Develops-while participating in a rhythmic give-and-take initiated by the therapist or by the child, the child's second response is different from his/her first response (either child-therapist-child or therapist-child-therapist-child cycle)
 - 4. Melodic give-and-take (must follow a meter/beat/tempo and be continuous-child's response must consist of more than one vocalization)
 - a. Responds-Participates in melodic give-and-take initiated by the therapist-1 therapist-child-therapist-child cycle

- b. Initiates-Begins a melodic give-and-take-1 child-therapist-child cycle
 - c. Develops-while participating in a melodic give-and-take initiated by the therapist or by the child, the child's second response is different from his/her first response (either child-therapist-child or therapist-child-therapist-child cycle)
- D. PITCH (Phrase-any short figure or passage complete in itself and unbroken in continuity. Motif-a part or portion of a phrase.)
- 1. Vocalizes
 - a. Vocalizes-produces any sung vocalization/word/sound must be within the key of the therapist's music
 - b. Responds in key of improvisation-a minimum of one note
 - c. Matches therapist's pitch-sings the same pitch the therapist is vocalizing/playing
 - 2. Varies pitch
 - a. Ascends in pitch-produces a minimum of two ascending pitches
 - b. Descends in pitch-produces a minimum of two descending pitches
 - 3. Melodic motif
 - a. Vocalizes/sings a melodic motif
 - b. Matches melodic contour approximately or accurately-sings/vocalizes a melodic motif with or after the therapist, accurately matching the melodic contour or producing close approximations of the melodic contour
 - c. Matches pitches approximately or accurately-therapist, accurately matching the pitches or producing close approximations of the pitches
 - 4. Melodic phrase
 - a. Vocalizes/sings a melodic phrase
 - b. Matches melodic contour approximately or accurately-sings/vocalizes a melodic phrase with or after the therapist, accurately matching the melodic contour or producing close approximations of the melodic contour
 - c. Matches pitches approximately or accurately-therapist, accurately matching the pitches or producing close approximations of the pitches
 - d. Spontaneously creates new melodic phrase-one not known by therapist and observers
 - 5. Entire song (a minimum of 2 phrases)
 - a. Vocalizes/sings an entire song
 - b. Matches melodic contour approximately or accurately-sings/vocalizes an entire song with or after the therapist, accurately matching the melodic contour or producing close approximations of the melodic contour
 - c. Matches pitches approximately or accurately-sings/vocalizes an entire song with or after the therapist, accurately matching the pitches or producing

close approximations of the pitches
 d. Spontaneously creates new song-one not known by therapist and observers

II. NON-MUSICAL:

A. SPEECH PRODUCTION SKILLS

1. Produces sound/vocalization/word-spoken, stated, or sung
2. Song vocalization/word
 - a. Produces word of song being sung-at any time during or immediately after song (within 5 seconds after the song ended)
 - b. Produces motif of song being sung-at any time during or immediately after song (within 5 seconds after the song ended)
 - c. Produces phrase of song being sung-at any time during or immediately after song (within 5 seconds after the song ended)
3. Spontaneously produces appropriate vocalization/word-any vocalization/word appropriate to the ongoing activity
 - a. Spontaneously produces appropriate 2-word combination
 - b. Spontaneously produces appropriate >2-word combination

B. COMMUNICATIVE-INTERACTIVE SKILLS

1. Plays instrument
2. Plays 2 instruments
3. Uses both hands simultaneously in beating
4. Vocalizes and beats simultaneously-must approximate synchronization
5. Tolerates entire 10 minutes-does not demonstrate any of the following behaviors: attempt to leave the room, physically disruptive and/or self-injurious behaviors
6. Participates with therapist in entire 10 minutes-stays in piano/drum/comb area the entire time and actively participates the majority of the time-must tolerate the entire 10 minutes

C. COMMUNICATIVE INTENT SKILLS

1. Expresses emotional reaction to music-e.g., smiling, laughing, clapping, crying, frowning, moving body excitedly, vocalizing excitedly, hugging therapist, vocalizing intensely, throwing arms up in the air (like "hurray!!")
2. Indicates any need/want-through verbalizing, vocalizing, signing, gesturing, or physically prompting
3. Indicates wanting a music activity/song-specific activity/song, element of music, instrument

Overall Level of Communicativeness-rate the child according to both the quantity and creativity of communicative behaviors, both musical and nonmusical, demonstrated during the 10 minute segment

APPENDIX C

BEHAVIOR CHANGE SURVEY

Child's Name _____ Date _____ Your Name _____

Please circle one number for each statement using the following scale:
 much less 1 2 3 4 5 6 7
 somewhat less 2 3 4 5 6 7
 slightly less 3 4 5 6 7
 same 4 5 6 7
 slightly more 5 6 7
 more 6 7
 much more 7

I. COMMUNICATIVE BEHAVIORS

1. Changes in the quantity of gestural communicative behaviors:
 1. Changes in the quantity of nonverbal vocalizations: 1 2 3 4 5 6 7
 2. Changes in the quantity of verbal behaviors: 1 2 3 4 5 6 7
 3. Changes in the quantity of spontaneous communicative behaviors: 1 2 3 4 5 6 7
 4. Changes in the amount of variation in dynamics of verbal/vocal behaviors: 1 2 3 4 5 6 7

II. SOCIAL/EMOTIONAL

1. Changes in the quantity of emotional behaviors such as happiness, confidence, and contentment: 1 2 3 4 5 6 7
2. Changes in the quantity of emotional behaviors such as anxiety, irritability, and sadness: 1 2 3 4 5 6 7
3. Changes in the intensity of emotional behaviors such as happiness, confidence, and contentment: 1 2 3 4 5 6 7
4. Changes in the intensity of emotional behaviors such as anxiety, irritability, and sadness: 1 2 3 4 5 6 7
5. Changes in the quantity of interactive behaviors: 1 2 3 4 5 6 7
6. Changes in comfort in relating to others: 1 2 3 4 5 6 7

III. MUSICAL

1. Changes in attraction to musical sounds: 1 2 3 4 5 6 7
2. Changes in quantity of musical behaviors: 1 2 3 4 5 6 7

IV. Please use the back of this sheet to comment on your responses above or to provide me with any additional information. Once again, THANK YOU VERY MUCH!!!