Adaptive Piano Pedagogy for the Student with Autistic Spectrum Disorder

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ADAPTIVE PIANO PEDAGOGY FOR THE STUDENT WITH AUTISTIC SPECTRUM DISORDER

A THESIS

Submitted in partial fulfillment of the requirements

For the degree of Masters in Music: Concentration in Music Therapy

By

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Abstract

Music therapy is a well known means of creating emotional, academic and social advances in the life of children with autism. However, private instrumental instructions, a form of music therapy for this population, are not easily accessible. Not many piano teachers have the experience, background or understanding needed to teach students with varying degrees of challenges in sensory integration, information processing, aural and visual discrimination, motor problems and low muscle tone.

The literature review in this thesis includes an overview of autistic spectrum disorder, the special learning needs of the child with autism, and general piano pedagogy theories, strategies and techniques, which pave the way for the adaptation of piano pedagogy for learners with ASD.

The author concludes that the music therapist providing adapted piano instruction should emphasize teacher-student bonding, rhythm entrainment, improvisation, and visual and auditory discrimination skills. These areas are explored in greater depth and also demonstrated at various functioning levels through the introduction of three related case studies.
Acknowledgment

First and foremost I wish to dedicate my work to my daughter Tali Zeevi Trager who succumbed to the dreadful disease of leukemia in July of 2007 after a fierce and courageous battle that lasted nearly five years, and to the many hours of beautiful music making we shared throughout her too short a life of 34 years. She is and will forever live in my soul with every beautiful sound I hear and every stirring sight I see.

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Introduction

Many children with autism are deprived of after-school enriching activities like sports, drama, creative writing and crafts, to name a few, due to challenges with motor skills, social contacts and language. The exposure to individual piano lessons with a music therapist who is a specialist in adaptive piano pedagogy can present an opportunity for a child on the spectrum to progress developmentally.

This thesis includes an overview of autistic spectrum disorder, the special learning needs of the child with autism, and general piano pedagogy theories, strategies and techniques. The literature review paves the way for the adaptation of piano pedagogy for learners with ASD.

The author concludes with guidelines for the adaptive piano teacher/therapist on how to construct a lesson building on different domains as follows: teacher-student bonding, rhythm entrainment, improvisation, and developing visual and auditory discrimination skills. The above mentioned areas are explored in greater depth and demonstrated at various functioning levels through the introduction of three related case studies.
It is critical to understand background information related to autism in order to evaluate the challenges a child on the spectrum faces in the course of music therapy and adaptive piano pedagogy. The diagnosis of autism is one that is prevalent and poses a multitude of challenges.

Diagnosis DSM-IV

Most authorities (DSM-IV; Davis, Gfeller & Thaut, 1999) agree that autism is a result of dysfunction in the central nervous system, and can be defined at three different independent levels: 1. a neurological disorder related to brain development, 2. a psychological disorder impacting the cognitive, emotional and behavioral development, 3. a relationship disorder where normal socialization fails.

It is considered a spectrum disorder, but due to different combinations of symptoms, cannot be defined simply from mild to severe. In DSM-IV classification system, ASD is associated as one of several pervasive developmental disorders (PDD) characterized by impairments in social interaction, imaginative activity, and verbal and non-verbal communication skills. Manifestation of symptoms occurs within the first three
years of life, and will stay with two thirds of diagnosed children for the rest of their lives, requiring permanent care.

The three main areas to meet diagnostic criteria up to 30 months of age are social interaction, communication, and restricted repertoire of activities. A child with potential ASD shows impairments in at least six of the following: nonverbal behavior such as body language, affect and gestures, peer relationship, exhibiting spontaneity, emotional sharing or empathy for someone else's distress, expressive and/or receptive language, and imaginary play among others (DSM-IV, 1999). Many children with autism are afraid of any changes in their routine, and will resist it violently at times. In addition to the above, a child may exhibit stereotypic repetitive and/or mechanical pattern of behavior.

Associated features with the autism disorder include hyperactivity, short attention span, aggressiveness, temper tantrums and self injurious activities. Challenges with sensory integration, the process in which the brain organizes many bits of input into cohesive information it can understand and apply, may cause in a child an over sensitivity to sound, light, odors, and certain foods (DSM-IV, 1999).

Keeping in mind that the most fundamental concern of human existence is safety and survival, and that threats puts its mechanism into a fight or flight mode, can explain many of the behaviors children with autism exhibit. The brain of a child on the spectrum seems to receive the stimuli response without the ability to modulate it, which results in confusion and fear of the unknown. The tactile defensiveness, auditory and visual discomforts, and the avoidant behavior observed in many children with autism, can be
explained as resulting from the confusion and inability to integrate sensory stimuli (Berger, 2003).

Diagnosis of children younger than two years old seems to be limited for two main factors: 1. there is little information about normal infants’ social behavior as compared to that of infants with potential ASD, 2. the existing diagnostic system (DSM-IV) is based on later age behaviors. It is the opinion of Crane & Winsler (2008) that appropriate diagnostic criteria for ASD in infants and toddlers be developed and disseminated to pediatricians, paraprofessionals and resource organizations. Infants and toddlers that are diagnosed with ASD later in life lack many typical peer behaviors such as vocalizing at 2 months of age, exhibiting social babbling at 6 months, or pointing and requesting objects at 12 months. Retrospective video analysis and parental reports would usually highlight a constellation of infant behaviors that are atypical such as impairment in attention, lack of eye contact, no response to one’s name being called, and no effective responses like smiling back at caregiver. All of the above show measurable difficulties in communication and socialization, as outlined in DSM-IV. Therefore criteria for diagnosis of ASD can be relevant for potential developmental growth in infants and toddlers if clear definitions are developed.

A new diagnostic classification, by the name of Multi System Developmental Disorder (MSDD), considered to give more flexibility for early diagnosis of ASD is evolving as an addition to the DSM-IV category of Pervasive Developmental Disorder, PDD, and (Kabot, 2003). MSDD includes four characteristics: 1. Significant impairment to engage emotionally and socially, 2. significant impairment to form or maintain
communication, 3. significant dysfunction in auditory processing, 4. significant
dysfunction in processing other sensations and motor planning (Kabot, 2003).

The most recent prevalence of autism in the US, according to the Brick Township,
N.J.investigation, cites 4 cases per 1000 children in 2001, which is a dramatic increase
over the past 20 to 30 years (Bertrand et al, 2001).

Crane & Winslet (2008) advocate for more intense effort for developmental
surveillance and referrals. Their writing integrates information from research about
detection of ASD, pediatric practices, and legislative policy in order to find
interdisciplinary way to enable earlier detection of children with ASD and appropriate
interventions.

Etiology

No one single finding has yet been found to explain the causality of autism,
which makes it very difficult to diagnose. The general agreement is that all spectrum
disorders, also labeled as pervasive developmental delay disorders, relate to brain
abnormalities with genetic susceptibility. There are also pre and post natal triggers like
abnormal capacity for serotonin in the brain found in children with autism. Other
investigations report detecting abnormalities in the limbic system, as well as increase in
cerebral white matter, and cortical gray matter, causing deficiencies in language,
memory, sensory and cognitive information processing (Davis, Gfeller & Thaut, 1999).

Any environmental risk factor that can lead to brain damage is a potential non
genetic autism risk factor (Crane & Winsler, 2008). Other risk factors include birth
complications, pregnancy hazards, reproductive problems, viral infection before or after birth, immune system dysfunction, and rubella infection of mother at the first trimester of pregnancy.

Many experts feel that it is not necessarily the number of autism cases that increased, but rather, their detection. Noticing symptoms happens in the later stage of development, when language and behavioral differences become more apparent.

*Early Intervention*

Early intervention is designed to provide treatment and prevent secondary deficits in a child diagnosed with ASD while the brain is still changing, and neural pathways can be influenced. It is crucial in the authors' opinion for families of such children to have access to intervention services for better prospects, and for good results. Policy makers, at every level of government, need to continue refining and funding legislations like IDEA, The Individuals with Disabilities Education Act, a law that ensures implementing services, early intervention, and special education to eligible infants, toddlers, children and youth (Crane & Winsler, 2008).

The music therapist who receives a referral to work with a child on the spectrum needs to know what interventions have been used and what interventions are currently in progress. These will provide information on what may prove useful within the context of music therapy and will guide the therapist as to what is more important for the child, what gains have been made so far, how to structure the lesson/session plan, and which goals and objectives to prioritize. A child who has been involved in an intensive
educational curriculums that capitalize on his/her strengths combined with guided social situations with peers and family (Crane & Winsler, 2008), starts adaptive piano instructions on a whole new level inspite of areas of deficit. He/she is likely to be more accepting to the piano/therapeutic experience and make more gains musically and in other domains.

More and more primary care providers and pediatricians, especially those whose specialty is to detect and treat children developmental difficulties, are aware of the treatment resources that are available. Yet more awareness is needed, together with an availability of well-defined diagnostic criteria for infants and toddlers. More research on how early intervention works neurophysiologically, its benefits on language development, social skills, decision making and behavioral management is needed. The earlier intervention begins the less permanent loss a child may suffer (Kabot, 2003).

Most brain growth occurs in the first five to six years of life, when pathways to cognitive storage centers are developing. Many children with autism need compensatory stimulation, to be trained and learn basic skills. A long wait before intervention may create a whole new set of symptoms developed by the child as poor ways of coping, that need to be unlearned such as: social withdrawal, temper tantrum, frustration, echolalia, and depression, among others (Siegel, 1998).

Evaluating and choosing the appropriate treatment is more overwhelming for parents and professionals dealing with an ASD child, because of the significant differences in symptoms and the immense publicity of what is the most popular on the
media at a certain time. The strong impact of the internet on decision-making can be dangerous when relying on information that is not valid. It is only the professionals who can assess and give parents the right tools to choose a plan for their child. The pros and cons of each treatment need to be carefully evaluated in the light of what will give a child the longest life independence at home and in the community. When choosing an intervention, families need to discuss their options, rely on scientific research, and have access to information about discredited plans. A program should be intense, structured on a one-to-one setting, start as early as possible, involve family and parents, be focused mainly on communication and social skills, and have individualized goals and objectives.

The IDEA act, reauthorized in 1997, made it possible for the parents to take main role in the education of their child with ASD. With the proper information and advocacy training they can be partners with the professionals, act as co-therapists, attend meetings of individual preschool education plan, and become more independent in solving problems relating to their children.

A good intervention program will try to give a child the tools to transfer what has been learned to the home or to the community setting. Natural reinforces are used to increase generalization with this population, as well as training across materials, people and settings. A child needs to be able to shift from the one-on-one framework to a small group and then gradually to a larger one, from intense setting to a more relaxed natural instructional procedures (Kabot, 2003).

*Special Learning Needs of the Child with ASD*
In order to work effectively with a child on the spectrum who is referred to a music therapist/teacher for adaptive piano skills, one has to know the learning difficulties the student/client may present. The three main areas, in which a teacher/therapist can expect difficulties, relating to the place of the child on the continuum, are in social, communicative and behavioral domains (DSM-IV, 1999). This literature search includes information regarding special learning needs and different implications for varied functioning levels of children on the spectrum: how to overcome social deficits, how to facilitate emotions, how to work with language limitation, what strategies to use for strengthening their cognition, and how to manage behavior. All of these considerations are important in understanding the possibilities for adaptive piano pedagogy.

Overcoming Social Deficits

Many children with autism have good rote-memory ability but “personal episodic difficulty” to recall personal events, due to impairments with emotionality. The emotional component attached to an event makes it meaningful and easy to remember. A child with little intentionality or conscious control is faced with three types of difficulties: 1. interacting socially; 2. transferring knowledge from one situation to another 3. relating to a model that can help shape behavior. Since a child with autism who may have weak social signals may be directed to a one-on-one with teacher or computer setting to be more productive. Social learning that enables taking part of social units such as family, friends, school and community, may not come easily for a child with little imitation skills, and hardly any peer acceptance. A teacher/therapist needs to find an alternate route to teach social behavior. Social skills that evolve naturally and inwardly in normally
developing children may need to be taught by imitation to the child on the spectrum. Behavior that may seem bizarre to an outside spectator could be normal conduct for someone with extreme anxiety like the child with autism. A sensitive teacher will recognize the root of the behavior, and rather than focus on the symptoms, allow the child to establish his/her own starting point for learning. The child needs clear prompting and directions on when to look, when to make eye contact and when to pause. (Jordan & Powell, 1995).

Joint attention, the process of sharing someone’s experience by following his/her gazes or gestures can never be assumed by a teacher who is working with this population (Lord & McGee, 2001).

*Facilitating Emotions*

The lack of emotionality in a child with autism is not merely a behavior, but more likely an enduring personality trait, causing lack in self esteem and self-worth. Emotionality cannot be taught by imitation or prompting alone, but rather through the help of demonstrating acceptance of the child the way he/she is, and establishing good rapport and a relaxed atmosphere for learning. A teacher has to understand the anxiety, fear and/or frustration behind the outbursts, tantrums, yelling and crying in some children on the spectrum, that are parallel to that of a few months old normally developing infant, and show other ways of expressing anger. Due to the love of children on the spectrum for sameness and routine, the process of teaching may sometimes seem mechanical and too structured. However, a creative teacher can incorporate small changes, try to modify
prompts, use low voice level and minimize distractions to keep the learning process going.

A good strategy for a teacher to help facilitate emotions in the child with special needs is by emotionally taking him/her back to an earlier stage of an infant-caregiver interaction, in order to relearn what gives him/her pleasure. This can be done by playing or singing infancy song and utterances, and using musical mirroring of the child emotions instrumentally or vocally (Jordan & Powell, 1995).

An interesting study was conducted in Japan (Katagiri, 2009) with school children with autism, to examine the effect of background music and song texts on teaching them emotional understanding. The participants were taught to decode and encode four basic emotions: happiness, sadness, anger and fear, with four conditions: (a) no purposeful teaching of the emotions (b) teaching the selected emotions by verbal instructions (c) teaching by verbal instructions, background music that represents the emotions and singing songs (d) singing especially composed songs about the four emotions. Participants were given pretest and posttest, with eight individual sessions in between. Background music with additional song writing about feelings, helped improve emotional understanding significantly more than the other control conditions that used no music, therefore proved to be an efficient tool in teaching.

Interestingly enough, musical cues that facilitate emotional response are inherited in the tempo, dynamics, timing, meter, articulation, vibrato, timber, tone attack and decay, and rests of every piece of music. Taking into account the special sensitivity and
attention of many children with ASD to music, these can be used as a highly effective means for developing the social emotional skills they need (Katagiri, 2009).

Teaching Communication

Communication occurs when (a) there is something to communicate about; (b) one needs to have means to communicate. (c) there should be a reason to communicate. However, most children with autism send very few social signals to enable communication, may have limited means for communication (deficits in expressive and/or receptive language), and may not need to communicate since most of their needs are instrumental, and are met by making requests, with no awareness to feelings.

Teaching communication skills to children with ASD can be done by gradually exposing them to reading someone’s tone and gestures, show them how not to invade someone’s privacy, how to communicate liking by hugging, and how to gain attention by touching, vocalizing or making eye contact. Since many do not understand emotions, they need to reflect about a story or an event, showing how they felt using gestures (Jordan & Powell, 1995).

The child-centered approach is advocating imitation of the child spontaneous utterances (like echolalia for example), rather than repressing it, as a way to modify behavior and foster communication. The idea is to facilitate the desired behavior by taking the time it takes to evolve, rather than imposing it. by prompts and behavioral conformity.
The P.L.A.Y project is a child-centered, play-based autism therapy that teaches parents, caregivers, and teachers how to connect with the young child to facilitate development. The philosophy behind it is to meet the child in his comfort zone, let him take the lead and recognize his ideas as they become the driving force for development. Since the child with ASD is often busy watching things from a distance, parents and teachers need to pursue more physical ways of interaction with him/her like chasing, capturing, swinging, and the like. When and if the child spins, for example, the parents copy the behavior until a response is made from the child. Evidence suggests that play-based, child-centered therapy can make a profound difference in these children’s lives. A comparison was made by Pullen (2008) between applied behavior analysis, ABA, which is mainly aiming for academic achievement, cognition improvement, and meeting developmental milestones, to the child-centered approach, which is geared more to teach connections with people and a promote sense of self. The success of the latter system was measured by emotional quotient rather than by intelligent quotient, and showed more emotional growth (Pullen, 2008).

Not all programs are equally effective for all children, and not all children benefit to the same degree, but the most important element for the special child is learning in a natural environment, where spontaneous initiated communicative behavior is of greater value than cue-dependant responding (Lord & McGee, 2001).

Working with Language Limitations
Most children on the autism spectrum have language delays and learning difficulties that are proportional to their location on the spectrum, with some who are most severe remaining mute for the rest of their lives. The normally developed child, who communicates with the world around him, reaches a point when language is needed for more growth. The child with ASD, in comparison, may not understand the need for language, but produce fragmented patterns of speech resorting to echolalia, pedantic tones, monotonous utterances and unnatural sounds in pitch and duration instead, to name a few (Jordan & Powell, 1995).

Of the four abilities on which language production depends: phonology, syntax, semantics and pragmatics (the ability to use language for the purpose of communication), the deficits pragmatics shows the most difficulty, and is considered a universal feature of autism (Frith, 2005).

Developing reading skills first, may be more natural for children on the spectrum than talking, because of being spared the need to use abstracts like metaphors, mental state, humor, sarcasm, to name a few. Fewer words are may be better for children on the spectrum, and the one-on-one teaching setting use for learning, may be sparing them from a group situation, and the need to use language socially. There is little understanding of conversational roles, rhetorical questions, double meaning or common sense.

A teacher who is aware of all the above linguistic limitations will naturally choose to reduce ambiguity, avoid figure of speech, talk in a matter of fact, and reduce the use of
synonyms to avoid confusion. The voice quality of some children with ASD can be monotonous, and intonation is sometimes flat. Since some have reduced emotional attitude, they may exhibit little changes in speech intonation. Conversing through visual cues, motions and touch can make up for some language deficits. Music may help a child enunciate the accented syllable of a sung word, emotions can be expressed with body, and anger or pleasure can be role played with teacher (Jordan & Powell, 1995).

**Supporting Cognitive Ability**

Memory processing of individuals with ASD may be different than that of normally developing children because of their experiencing the world in a non-subjective way. Remembering events may have no connection to self, which results in the inability to search one's own memory for problem solving strategies. Unlike other children, who learn through dependence on regularities, the child with ASD, who may lack confidence and/or motivation, needs cues and prompts. He/she may have problems with motor development, insecure body image, and poor sense of location in space. Tip-toe walking, pacing up and down and low muscle tone can benefit from motor education programs that will encourage body awareness (Jordan & Powell, 1995).

The Cognitive Orientation to Occupational Performance (CO-OP), a new treatment approach to treat children with PDD is investigated in a new Canadian study (Phelan, Steinke & Mandich, 2009). The behaviors that are being targeted are motor impairments such as coordination deficits and clumsiness. Development of assessment and intervention plans help improve performance in daily activities. The authors state that
most of the current strategies used with this population are focused on behaviorism alone, or on combination with psychopharmacological approach. Even though behavioral intervention may prove effective in limiting problem behaviors and improving adaptation, they are not successful in the long term results. The CO-OP approach is highly individualized client-centered method, focused on skill acquisition, cognitive strategy development, and generalization to additional activities of daily living. Children are encouraged to use global problem solving with guided discovery in their chosen goals. High functioning autism and Asperger's syndrome diagnosed children are chosen to participate, due to having sufficient language fluency and cognitive ability to interact with the therapists. The tasks chosen are varied: tying shoelaces, keyboarding and throwing ball. Performances at base-line, at each performance and return to base-line were rated on a one to 10 points scale, where 1 is inability to perform the task, and 10 is performing the task well. Each child receives 10 individualized verbally based CO-OP interventions, in which he is taught to use self-talk and problem solving strategies for his/her motor problems. Each child is given bridging techniques to help transfer the knowledge to other situation that may rise. Test scores and parental ratings of performance show the effectiveness of the study, having important implications to occupational therapists who consider the motor difficulties these children face in everyday life (Phelan, Steinke & Mandich, 2009).

A problem presented to a child with autism needs to be within his/her capacity of solving, to avoid the sense of failure. The child needs to be constantly reminded what he knows, to be able to apply further. This can be done by giving range of memorizing
strategies like visualization, classification and rehearsal. A teacher needs to help direct the attention of the child with special needs by highlighting key characters, using colors, using pictures, turning cards over when task is completed.

Teachers need to model the joy of teaching and of learning, while the academic achievement with some of these children comes in secondary place. Making eye-contact, projecting content, teaching by enabling rather than by controlling will foster more confidence in a child and make the learning process a good experience. The ASD child has a tunnel attention (i.e. the ability to focus on one subject only with no shared attention). Thus, a teacher working with this population needs to be focusing and concentration in one area at a time.

Diverting the teaching style to the ASD child’s way of thinking, and the need for predictability and dependability can help establish trust with a student/client vulnerable, anxious. Instead of punishing or scolding for failure, an alternative non-threatening approach should be sought. More learning will be done if teachers will show the positive side of what to do rather than what not to do (Jordan & Powell, 1995).

**Modifying Behavior**

Dependence may be a fact of life for many individuals on the spectrum, who may need lifelong supervision in various degrees. An outside supervision is a way to compensate the individual with the disability for lacking an internal one. Weak executive functioning needs prompts and signals to initiate action, complete tasks, and guide behavior (Frith, 2005).
Behavior problems are likely to happen when autism and learning difficulties are combined, depending on the personality of the individual and his/her location on the spectrum. A child with ASD, typically on the lower side of the spectrum, who is aloof and withdrawn, can display troubled behavior when frustrated, being bullied, or not understanding the social context. Temper tantrums, anxiety attacks, self-destructive behavior, depression and phobias are some of the many troubled behaviors. The fact of being isolated and not able to share feeling with peers for comfort, makes the frustration worse.

Understanding a problematic behavior is the first step to managing it: (a) the child likes to touch and smell because these senses are not as sensitive as sight and sound. (b) Because of having no pretend play skills and being socially isolated, the child resorts to sensory self stimulation like rocking, flicking, picking, or plucking. (c) Distress is triggered by a particular reason which needs to be located by a process of elimination. These behaviors should be looked upon as immature and alternative ways of expressing distress should be taught, but not before familiarizing the child with his environment and making sure his basic needs are fulfilled. It is a priority to teach the child a better way to communicate refusal to do the task rather than insisting on doing it.

A good way for a teacher to handle a stressful situation is to remove the trigger. Removing the child is not effective, because this may be what the child is aiming for. Punishing does not solve the problem behavior, but rather suppresses it until it surfaces again, creating harsh feelings and aggression towards the teacher. A teacher should consider the severity of the student's disability when rewarding him/her for
accomplishments. Most will benefit from primary reinforcers that relate to physical needs and sensations, which is right for maintaining alternative behavior. Higher functioning children may respond to secondary reinforcers like praise, stickers or tokens. The intrinsic reinforcers which are the highest on the hierarchy and raise one’s self esteem from the performance itself, may not be available to children on the spectrum.

For behaviors to be maintained and controlled, the child with autism needs to be free of pain, approached in a non-confrontational way, presented with a structures lesson, know what to do and when, understand the teacher’s instructions, have minimal distractions and sufficient positive reinforcers to keep the learning process going (Jordan & Powell, 1995).

_Savants_

The term of “idiot savant” was first used to label individuals with learning disabilities that have one area of striking skills, in spite of low cognitive functioning. Today the savants include individuals with normal IQ, but with developmental disorders like individuals with high functioning autism.

The savant’s talent of ability is remarkable when compared with their population’s level. Musical savants have been compared to prestigious professional musicians in their ability to transpose, imitate musical styles, accent desired notes out of chord clusters, memorize music, and posses an absolute pitch.

The obsessive interest and high degree of practice exhibited by the savant is a typical autism characteristic, but it fails to explain the phenomena that also exists at an
early age, when there is no training involved. It also appears that the savants practice because they enjoy the activity itself, rather than to improve their performance. Since most savants suffer from ASD, recent advances in theoretical and biological understanding of autism like Firth’s theory of weak central coherence, explain the existence of outstanding talents. Instead of normal mental processing, in which diverse information merge to construct a high level of global meaning, the mind of the individual with autism gives local attention to parts, interfering with a gestalt-like processing to occur (Sigman, 2001, Frith, 2005).

An individual with such talent inhibits coherent and generative thinking and retains elements of domain-specific knowledge instead of enabling integrative processes. The tendency today is to realize and actualize the savant potentials beyond the deficits. These remarkable abilities can serve as conduit towards normalization without losing the unique talent. It is not between training the talent or eliminating the defect, but rather use one to achieve the other. (Pring, 2005).

Music and Autism

Due to developmental deficits, a child with ASD may display learning characteristics that are unique, complex and challenging for the music therapist. Yet, the uniqueness in the learning situation has to do with the duality of challenges and assets displayed in this population at the same time (Darrow & Armstrong, 1999). Showing consistent sensitivity and attentiveness to music by responding better to a sung prompt than to a spoken word, by being motivated to learn non-musical material, and by showing
reduction in stereotypic behavior when music is applied, among others, is common with children on the spectrum (Davis, Gfeller & Thaut, 1999).

Many children with ASD show enhanced abilities that exist alongside communicative and social abnormalities by performing better musically than in many other areas, and at times, on the same level as normally developing peers (Davis, Gfeller & Thaut, 1999). The readiness that these children show in the music domain prepares the grounds for a music therapist to work on further development. The responsiveness to music enables successful teaching of general musical background, leading the way to a more detailed work on the keyboard for enhanced pianistic skills, as well as promoting a wider range of development in other areas. Performance, for example may enhance fine motor control and coordination, while playing and listening improve cognition, concentration and memory (Ockelford, 2000). As documented by empirical search results (Sigman, 2001, Ockelford, 2000, McMullen, 2000 & Pring, 2005) mentioned previously, many children on the spectrum show readiness for rote learning, improvising, and independently finding tunes by pitch discrimination, all of which are a good start for combined music therapy and adaptive piano pedagogy with promising potentiality.

In a recent study, Heaton and his colleagues (2006), tried to answer the question regarding the differences in response to music by setting up an experiment with a group of children with ASD and a control group of mainstreamed children. All children were given a task of four experimental conditions. The stimuli included listening to seven chords sequences followed by a target chord. The task was to point out the sequences with the correct resolution between two samples with correct endings and two with
ambiguous endings. The striking finding from the study was that the participants with autism and their controls performed the same, judging the target tones correct when related to the harmonic texture. Showing no significant difference in patterns of performance from their controls indicates that many individuals with autism have strengths in the musical domain, and therefore may show readiness for adaptive piano instructions.

Another finding that tries to explain the enigma of the different processing of language and music (Heaton, et.al, 2006) describes overlapping neural processing in response to music and language stimuli. However, deficits on the music task that may have been predicted for the autism group proved wrong. The study states that while language abnormalities are characteristic in autism, it is the semantic-pragmatic components, relating to social and communicative disabilities that are more affected, while syntax and grammar are relatively unimpaired. This fact helps explain how individuals with autism can perform well musically but poorly on linguistic tasks that rely on semantic processing (Heaton, et al 2006).

Based on their responsiveness to music, one may conclude that creating sounds through the exploration of a musical instrument, like the piano, in addition to voice and rhythmic instruments, is a possibility for children on the spectrum, and should be encouraged. Participation in music making through adaptive piano pedagogy facilitates self-expression in sound, provides aesthetic experience, and foster broader gains in the development of a child with ASD.
"Give a man a fish, that is dinner for the night. Teach the man how to fish, that is dinner for life"

The piano teacher's main contribution is to give students lasting pianistic and musical guidance by showing dual responsibility: to the student and to the music. Teaching styles, which are only effective when adapted to the individual student, are empowering, motivational, and create a need for exploration and creativity (Berman, 2000). The following literature review describes successful piano teaching strategies used in teaching typically developing children. These universal theories, strategies and techniques that are essential approaches and guidelines in teaching the instrument, will be adapted in the next section for the music therapist in order to offer piano pedagogy techniques for children on the spectrum.

The Importance of Assessing Students Personality Types

The Myers-Briggs Type Indicator (MBTI), an instrument used to assess personality types, has evolved and been perfected through continual test research for over 60 years and has met commonly accepted psychometric standards for reliability and validity (Myers & McCauley, 1985). In a one-to-one setting of the adaptive piano/music therapy session, it can help a therapist make a quick evaluation of the student personality and adapt the teaching style accordingly (Myers & McCauley, 1985). According to MBTI, personality types are divided to four continua, wherein the two ends of each continuum show the direct opposite of each type: the extrovert or the introvert, the
sensing or the intuitive, the thinking or the feeling, the judging or the perceptive. The extravert student likes action, fast results, being around people and communicating with them. This type of student will get impatient with long, slow and tedious works. The introvert likes to concentrate, work on details, take time when learning a new work, and accept discipline and technical regime. The sensing type is realistic, fun loving, well connected, and produces good and precise work. The intuitive student does not like routine and prefers to explore new things. The thinking type is analytical, logical and orderly, does not like vulnerability and resents criticism. The feeling type is very aware of other people’s feelings, enjoys pleasing and needs occasional praise. The judging type is the group leader who makes quick decisions and does not like interruptions. The perceptive ones are less rigid, good with adopting and changing, likes spontaneity and may easily drop a certain project in the middle to start something new. They may postpone working on hard projects, and are slow to start a new one.

A good teaching strategy could be to observe the type of learner a student is, and adapt the teaching style accordingly: e.g. remember how a particular student likes to approach a new work. For example, when presenting music to the more hesitant student, a teacher needs to use demonstration, talk about the form, and go over parts of the music that may present potential pitfalls when being tackled at home (Berr, Shockley & Flowers, 2008).

Teaching Effectiveness and Evaluative Techniques
Evaluating teaching effectiveness in music is a sensitive subject with independent piano teachers, since they, unlike other professionals, are not regularly observed. This evaluation is even more important for the music therapist who is working with a child with special needs since teaching these children presents challenges in understanding the student and his/her limitations, beyond regular piano pedagogy. In a recent article of the *American Music Teacher*, McAllister (2008) suggests a teacher’s self evaluation to avoid the rigidity of teaching and fixation on wrong methods. An informal process of record keeping and video recording of the lesson can reveal unconscious behavioral tendencies, unwanted personal mannerisms, unfriendly gestures or tone of voice, and other kinds of unwelcome behavior a teacher should try to avoid. A teacher needs to plan ahead by providing short term and long term musical and technical goals, as well as summarizing the main ideas that were addressed at the end of each lesson. He/she needs to give specific practice assignments, as well as conduct a journal of each student’s progress. The choice of repertoire should be appropriate in quantity and broad in range of styles and composers. This is even more critical when working with challenges of children with autism who need gradually monitored lesson plan, goals and objectives.

A music therapist who is a well rounded musician, with knowledge in style, theory, analysis, music history and performance abilities, is likely to achieve more with students. A significant amount of performance experience, though praiseworthy, does not make one a good teacher; it takes training to know how to connect to students each on his/her own level and personality. Clear delivery of instructions and good interactive skills like tone of voice, eye contact, facial expressions, body language, ability to explain
concepts, questioning students, and good demonstration ability are imperative for a successful lesson (Bernstein, 1981).

Music therapists should always consider the sometimes too relaxed nature of a one-on-one piano lesson, and do the utmost to maintain the intensity in the following ways: 1. demonstrating the joy in music; 2. pacing the lesson with varied activities and shorter episodes; 3. giving the student an opportunity to shine by playing a well mastered piece; 4. integrating theory and ear training, and at times; 5. creating an activity away from the keyboard. The best way is to teach proactively, by eliciting the right way or answer out of the student, rather than just correcting and adjusting. Inquiry-based teaching, which consists of asking leading questions, in order to retrieve a correct answer from a student, is more effective than dictating. According to McAllister (2008), it is important to introduce something new in every lesson, be prepared for lessons and implement appropriate pacing and sequencing.

Developing Awareness to Sound and Touch

Objective listening is imperative to good sound production. What the student wants to produce (the subjective ear) is not always what really comes out (the objective ear). It is hard to listen objectively to one’s own playing. Only a good sounding piano (not electronic keyboard) will respond to the different nuances of touch and produce the different colors and shadings. There is no one general beautiful sound, but different ones, appropriate to variety of musical style. For the child with special needs, loud sound may be associated with large movements and quite sound with small movements. A music
therapist’s task is to establish the right auditory environment by eliminating sounds that are too harsh, and modeling how to retrieve the sounds that enhance beauty and well being of the student (Ockelford, 2000).

The performer’s goal is to keep going for the duration of a certain phrase or the length of a musical work. There are two basic types of sound productions: the “in” stroke in which the fingers get immersed slowly in the keys, and the “out” stroke which is a quick motion that “pulls” the sound out of the keys. The two strokes hardly ever appear in their pure form, but rather in countless combinations (Berman, 2000). The first style is more common to the Russian romantic school, while the latter to the German.

Along with working on different types of touch, a music therapist needs to work with the student on the use of the full weight of the fingers, hand, forearm, upper arm and the full body when the musical content asks for it. The more body mass involved in sound production, the fuller and bigger the result. The speed with which the fingers strike the keys have to do with volume and articulation. The higher the fingers, the greater energy, and for fuller sound more joint work is needed. “The soul of the pianist is located in their fingertips” (Nathan, Perlman & Berman, 2000). Curved fingers are needed to reach clarity of articulation, but a smooth singing sound will come out of using flatter, relaxed positioned palm (Berman, 2000). All fingers need to be placed on the keys ready to play, including the thumb, which is half lying, and tends to dangle outside the keyboard. Many beginners lift their shoulders instead of the ceiling of their palms, which may create tension.
Control over dynamics is imperative to a cultivated touch. Teaching a student a richer scale of dynamics will result in his capability to retrieve richer sonorities and more eloquent musical speech. The piano, with its large capacity for different colors, can sound like a full orchestra. It will be enriching for a student to try to imitate the different instruments on the different registers (Berman, 2000).

**Teaching Basic Technique**

There is no standardized piano technique that answers all questions, but rather, an individualized approach for each student (Berman, 2000). A teacher’s responsibility is to introduce the connection between the different joints of the hand, the arm, and the support system between all: the fingers are always supported by the bigger joints, the wrist, forearm and upper arm. Two basic foundations to a good technique are based on “the economy principle”, using fingers only when no more moderate sound is called for, and “the extension principle”, collaboration between all parts of the hand and body when bigger sound is required. Different works demand alternating between opened or closed palm position, vertical positioned fingers (for trills and tremolos) and horizontal rotation of the wrist (for playing octaves and chords). The sensitive and observant teacher needs to help loosen up a student with a stiff hand by letting him/her discover the “hinges” between his joints (knuckles, wrist, elbow, shoulders, legs and feet), and teach ways to relax the student for better pain-free playing.

The reasoning behind teaching scales (using contracted position of the hand), and arpeggios (using extended position of the hand), besides being excellent technique
builders, is because they are the building blocks for most 18th and 19th century repertoire. Mastering them makes learning standard musical works easier, more naturally and facilitate better sight reading skills (Berman, 2000). Proficiency with scales and arpeggios, the alphabet of musical language, familiarize a student with the road map of many keys and opens up a whole world of order and profound capacity for tonality beauty. Not many students are happily practicing scales, which may get tedious and boring, yet, it is the task of a teacher to encourage the student to play scales in a musical meaningful way, rather than mechanically and dryly (Tunstall, 2008).

The Basics of Reading Notation

It is a great accomplishment for a student to learn to read musical notation, as it opens up a window to experiencing the world of music more independently and powerfully. A good way to start is on a clef-less staff with snake like note heads going up and down in a row. This technique frees the beginner student or the child with ASD from the confusion and from stimuli overload of having to read notes using a staff with lines and spaces, and gives him/her freedom to explore direction alone. Only when up and down concept becomes easier, can the teacher move to the middle C shared by the two thumbs, spreading the fingers up into G clef and down into F clef, naming these keys. The middle C position of choice for beginners, fosters physical stability (the two arms are close to the body), teaches F and G clefs as extensions of each other, and introduces only one note for each letter name at a time (Berman, 1981).

Learning Improvisation
As children learn conventional musical language, their musical spontaneity, the capacity to make things up and discover sounds by improvising, is lost unless teachers remember to help retrieve it or sustain it. It is important for an open minded teacher to allow for individual musical taste, and be ready to explore different genres of musical preference with the student (Tunstall, 2008).

In the article “Time Out”, McAlister (2007) discusses the importance of helping a student discover his/her inner composer. The art of composing may teach a student about structure and form more than playing a sonata to perfection through long and tedious drilling. Encouraging students to compose their own contemporary music helps create new audiences for the music of our times. Beginners are usually excited to add their own additions to pieces learned at the lesson, partly because self-consciousness has not yet taken over. Teaching improvisation may be less welcome by teen students, who shy away from being “too unique”. McAlister advocates finding the fun ways in music and music instruction. According to her, teachers should strive to help create better well rounded music lovers who will keep enjoying the gift of music for life, rather than pressuring students to add another demanding work to their repertoire. The future of music is in the hand of young people, who are taking instrumental instructions, and who may grow to be the future audiences of concert halls (McAlister, 2007).

Teaching Phrasing and Timing:

Children respond to rhythm way before they learn about its components and structure. Any symmetrical pulse stimulation produces an involuntary response in the
brain, creating a circuit of repeated motion. As in nature, rhythm is the alteration of activity and rest, pulse is the grouping of the beats in each rhythm, and tempo organizes rhythm and pulse at a specific rate of speed. The movements initiated by many children with disabilities in response to music are most of the time free, expressive and characteristic of the piece they listen to. This is a significant auditory frame of work for the music therapist, who works with individuals that may have difficulty processing other sensory inputs like visual or kinesthetic. Rhythm is a good starting point for the music therapist because of being the strongest link between music and movement and facilitating an instant motoric reaction like rocking, swaying, waving and swinging among others. (Ockelford, 2000).

Counting is best taught by using the unit method, where each note is counted “one”, as opposed to the meter method, (where the beats are counted “one-two-three”).

A student reveals his understanding of the musical phrase by inserting breathing points (slight delays) between the parts of the musical work. Phrasing is considered musical punctuation and has the same marks as in literature like: periods, commas, exclamation marks, question marks, and parentheses among others. Allowing a student to sing the melody line is an effective way to demonstrate the phrase’s focal points and the direction of its flow. When teaching syncopation, the teacher needs to be on guard for the common mistake of students displacing the bar line, instead of conveying the real feel of the syncopation: which is weightlessness and suspense of the natural heavy stress in the measure (Berman 2000).
The Value of Memorization

Most teachers consider memorization a vital part of the process of learning a musical work, since it enables higher level of mastery and control. Many students demonstrate particular strength in one or more different kinds of memory including aural, motoric, analytical and visual. The aural memory is the most common type of memory, and possibly the most important when memorizing music (Berman, 2000). A student needs to engage every memorizing technique available to him/her in order to thoroughly memorize a musical work, so that when one technique fails, there is another one to fall back on. The detailed work continues after memorizing, since the work takes on new influences and is being reshaped as the student progresses. One run through at the end of practice is more likely to reinforce memorization rather than repeatedly playing it over and over again. It is only natural for a student to feel insecure when score is removed, yet, commending a musical work to memory is worth the effort. Practicing and memorizing with feelings is preferred to redundant playing as long as the student can still monitor his/her own playing. Playing with metronome is another side of practicing that can get the playing mechanical and dry. Using the metronome is helpful, but not a must, and deviation from it should be decided by the teacher if the musical content suffers (Berman, 2000).

How to Reach Mastery:

As students grow in age and progress in playing level, they can start drawing from their own experience to find technical solutions. However, as the repertoire becomes
more and more complex, the structures enlarge, and new technical and interpretation issues arise (Tunstall, 2008). Very few students will show the capability of aiming at mastery. Those who are dedicated and willing to give up social time, sport activities, and the like, for getting a recital or a competition program prepared, are doing it not for parents or fun, but because they are compelled and attracted to the instrument and the music. In preparing a class of student for an end-of-the-year concert, a therapist should be prepared for the stress level to rise, however, (Tunstall, 2008), the benefits outgrow the pitfalls: a student who performs is offering a gift of beauty to his/her audience, no matter the level of piano competence. Even a young beginner who is able to perform a little song on the piano, evoking some kind of feeling, experiences gratification when delivering a message that touches his/her audience.

In spite of the dangers of memory slips, finger stumbling or blackouts, it is still worth it for a student to discover his/her own capacity to gather courage and move through the fear, and to be triumphant at the end. The setting of a recital can bring a sense of pleasure and potency that is deeper than fear or anxiety. To most students a recital feels like a celebration, adds self esteem, and motivates tackling future works they heard performed by peers (Tunstall, 2008).

The advanced piano student, however, needs help to acquire the emotional skills needed for performance. What was intuitive and spontaneous at an earlier age becomes a reflection of life itself later on. As one matures, there is a need to collect a deeper reservoir of emotions for meaningful music making. The student needs to convincingly assume the emotional landscape of the musical work, as if it was his/her own in order to
engage his listeners. Being able to plunge into the required emotional state takes practice just as finger drills do (Berman, 2000).

Enhancing Motivation

The secret of motivation is empowerment and inspiration. The student should be involved in the choice of his/her songs, and the pace of his/her progress. Students need to have tools for sight-reading, using fake books, or knowing how to improvise 12 bars blues, whether by music, or in the case of ASD students, possibly by rote, so that they can explore on their own. Allowing the student to use his gained skills to play popular music, jazz, hymns, Broadway tunes, holiday music and more, is a great motivator. Demonstrating to students, congratulating them on their own progress, having close relationships, creating intimacy and allowing students to take leading parts in duet playing will keep motivation high. Showing confidence in the student ability, being generous with praise for extra work a student did on his/her own, using modified token economy techniques of displaying stars and/or ribbons for good work, will propel many students for harder work (Berr, Shockly& Flowers, 2003).

Individuals who strive hard at perfecting their pianistic (or any other instrument) skills, whether professionals or amateurs, normal developing students or children with special needs, share the common notion that their music is their extension, as well as a reminder of their potential for perfection. Music echoes loneliness, pain, joy and content inside our deepest human core. no matter on what level of proficiency. By developing the ability to grasp, understand, conceive and reproduce it, one can touch
nobility. If one practices the way music is, he/she can get close to universal order and perfection. The magnetic force that draws people towards music making is also the one that makes them rise to its demands (Bernstein, 1985).

Statement of Purpose: Thesis

Creating and controlling sounds through exploring a musical instrument like the piano is an activity that may be relevant to children with autism who should be given an opportunity to participate in adaptive piano instruction, geared to fit their range of motor skills, coordination, concentration, memory, motivation and the ability to understand what is expected of them. Autism, being a spectrum disorder, presents uneven profiles of development both in the music domain, and in general skills. A realistic theoretical model of piano instruction for this population needs also to take into account the impairments that may constrain development of some pianistic and musical skills.

The literature reviews included in this paper have been useful in my efforts to develop piano pedagogy concepts which are relevant for teaching the child with ASD, concepts which invite the flexibility to adapt to different levels of functioning. In doing so, I share with the reader suggestions based on the characteristics of the child with ASD, his/her special learning needs, as well as specific ways of adapting previously introduced universal piano pedagogy methodology and techniques.

Adaptation of Piano Pedagogy to the Learning Needs of the Child with ASD

Implications for teachers/therapists
The following are original suggestions for adaptations in piano pedagogy based on developmental learning needs of the child with ASD.

**Emotional Bonding**

As previously mentioned in literature review section, many children with ASD cannot recognize a full range of feelings, including their own, nor can they imitate other people's emotions. A music therapist needs to understand the reasons behind the child's behavior, establish a comforting and welcoming lesson environment; mirror students feelings vocally or instrumentally, attract students to the keyboard, or use manipulatives as an introduction to approaching the piano. Playing music that is familiar and lulling will create a relaxed atmosphere for a successful lesson. A comforting caregiver-child setting can help recreate mother-infant bonding between teacher and student and put the child at ease in order to participate in the musical interaction with teacher, whether vocal, instrumental or rhythmical.

**Musical Communication**

Since many students with ASD cannot understand someone else's state of mind, and have little awareness of how others feel or think, teachers need to model feelings with tone and gestures. They need to show what happy or sad music feels like, or how to match different moods to different sounds, tempi and registers on the keyboard. Teaching musical communication may be done by playing imitative games, incorporating animal sounds, letting the child explore the keyboard or on other instruments and reflect back the child's mood, energy and level of dynamics.
Overcoming Language Barriers

Individuals on the spectrum, that may have difficulty understanding mental state, are unlikely to understand language patterns that are removed from their literal meanings using abstracts, metaphors, hints, hidden intentions or double meanings. Using fewer words, more demonstrations, more gestures, and simple language instructions in the lesson, is easier for them to understand. Resorting to visual, kinesthetic and tactile methods will enhance the lesson. The therapist should speak clearly with no ambiguities, make progress incrementally, use numerous repetitions, and if needed, help relate instructions with body, movement and rhythms (e.g. swaying, nodding, and clapping) in addition to spoken language. It is a good tactics for therapist to refrain from too many musical repetitions and modulations, but rather, introduce new musical material, with children who use echolalia for example, since this caters to the characteristic need to perseverate, and will encourage the child to persist with the unwanted behavior. For students with limited expressive language, playing the instrument can become an alternative channel of talking. Articulation of fingers, hands and arms, take the place of regular speech mechanism using mouth, tongue, vocal chords and respiration.

Adapting to Cognitive Functioning

Keeping in mind the dependency and the lack of confidence and motivation of many children on the spectrum a therapist needs to remember their dependence on regularity and repetition. Too many changes in presenting new material may increase sensory overload and can stop the learning process. A therapist needs to present one
subject at a time, practice on hand at a time, and keep reviewing and reinforcing previously taught material, and show love enthusiasm and love for the music being taught. As mentioned in the literature review, poor proprioceptive sense of location in space and the clumsiness resulting from it may cause frustration, insecurity and a low body image. The therapist’s task is to provide another outlet for frustration created in the lesson by diverting the child to other activities like marching, running, hitting drum or other instruments, rearranging lesson order, moving away from the keyboard, changing the activity, using off key finger drills, or play rhythmical games, to name a few.

*Attending to Difficult Behaviors*

A therapist needs to find the trigger of the student’s frustration at the adaptive piano lesson through an elimination process. Understanding and removing exposure to sensory overload, bright colors, harsh lights, background noise and other obstacles that create distractions to the flow, will improve the lesson’s quality. Using primary and secondary reinforcers for good achievement will motivate a student to work harder, and catering to the need for sameness by using a consistent lesson plan will reduce anxiety.

The world of music through adaptive piano lessons opens up new opportunities to the child with ASD who struggles day in and day out with the hardships of his/her disability. The constant occupation with daily difficulties some children may have such as: the need to unscramble sensory signals, the need for routine and sameness, the isolation and the difficulty to keep up with others, and the social loneliness, cause fear and anxiety. Music has its own vocabulary, structure and repetitive rules that can give
that same child the gift of reading its language through sound. Exposure to music from the performance side, as well as from the healing side, can give him/her a strong link the world of regular people.

The child with autism who learns to play the piano, at whatever level his disability allows, may go through transformation that can forever change his/her life. Some of those changes are: creating a venue for expression, providing sense of accomplishment, fostering higher self esteem, enabling success in other areas, giving a stage to be an entertainer rather than be entertained, giving an aesthetic gift to the world around the him/her, and learn something about his/her own uniqueness.

Adaptive Strategies Related to Piano Pedagogy Theories and Techniques

The following are original suggestions for adaptations in piano pedagogy which depart from general piano pedagogy theories and techniques literature review. This segment follows the format of the previous one, touching on each of the disciplines as adopted and transformed to the needs of a student with special needs.

Teacher-student relationship

As in a therapy situation, the first and most important thing in the adaptive piano lesson for the student with special needs is to establish unconditional acceptance from the teacher. The child will not be able to make educational progress on the instrument without the teacher generating a feeling of good rapport and well-being. This is the crossroad between piano instructions for this population and music therapy (Ockelford,
For the child to feel encouraged, trusted and cared for, every achievement, no matter how small, should be praised and rewarded. Every lesson, especially at the beginning stage, a step forward has been accomplished, may it be in improvising, coordinating hands, counting, reading notations, discriminating rhythms, etc. The intimacy of the piano lesson is created through recognizing and point out to a student every little progress (Tunstall, 2008). Piano instructions for children on the spectrum, unlike those given to normally developing children, may not result in excellent mastery of the instrument to fit performance due to the cluster of abilities in motor, cognitive and auditory skills that these children may be lacking. A teacher needs to develop realistic expectation from students with ASD, carefully weigh the teaching approach each child needs, and keep adjusting new ways as the learning process goes on. Adaptive teaching strategies, many repetitions, and a lot of patience on the teacher's part, may achieve a decent level of performance, satisfaction, reward, and sometimes a life changing experience (Etoile, 1996).

Assessing the kind of learner each student is, helps a therapist to establish a teaching approach. Following are suggestions for the therapist on how to approach different student's learning styles. Suggestions for the visual learner: stay in line of vision, make consistent eye contact, use pictures to explain new material (notes, rest keyboard, clefs, etc.) mark the score if needed, use visualization. Suggestions for the aural learner: incorporate rote pieces, improvise, compose, model before introducing the notes, sing the melodic lines, record the student and play back. Suggestions for the tactile learner (suitable to students with short attention span): touch the student to demonstrate
hand and arm position, use off bench activities, assign physical motions to imitate musical concepts like: loud- soft, fast –slow, high-low, or even to harmony chords like I (sitting, meaning: home)) and V (standing, meaning: direction). When bonding between student and therapist is established, a child is likely to try his/her hardest in order to please. The therapist should be attentive to the pacing of lessons, to build on the student’s strengths, individualize teaching approaches, and to make a child believe in his/her own potential.

Teaching rhythms and counting

Rhythmic accuracy required for successful piano performance is often difficult for students with neuromuscular disabilities and/or cognitive dysfunctions. Research has shown that a more steady execution and developing psychomotor awareness can be achieved by using movement activities. Prominent music educators such as Jacques Dalcroze, Edward Seguin, Carl Orff and Edwin Gordon assert that rhythmic readiness starts with the ability to feel the patterns kinesthetically and tactiley. Physical limitations of potential piano students with autism make many teachers hesitant to expose students to injuries, however, there are many safe activities that can be used, starting from the large muscles of the arms and legs to sitting activities such as swinging arms, clapping and tapping, and then further down to developing finger dexterity. Body movement activities include marching, swaying, clapping, patting, tossing, shaking, or any other activity that is modified to the student’s age, maturity, disability limitations, ability to focus, experience with a musical instrument, and neuromuscular control.
It is important for the teacher to remember not to use more than one set of large muscles at a time, because it may be difficult for children on the spectrum to focus on few activities at once, or on more than one part of their bodies at a time. Body sounds are the most natural thing to introduce rhythms with, together with using manipulatives, like colorful instruments with unique shapes and sounds, to keep the lessons interesting and varied. Keeping in mind the responsiveness of children with ASD to sung prompts, a therapist can apply chanted lyrics of familiar poems and songs for teaching rhythm patterns. Different body parts can be assigned to different notes values (e.g. quarter notes will be clapped, half notes will be stamped). Involving parents in the activity is helpful for fostering relaxed atmosphere and keeping the child at ease. If not causing a distraction, encouraging parents or other significant caretakers to take part in the lesson has double benefits: not only are they experts on their child’s behavior, the lesson can give them another way of relating to their child, and more work can be supervised at home (Shore, S, 2002).

Body movements, marching and stamping are good techniques for teaching counting based on the unit method (quarter notes), rather than on the meter method, (time signature) in which each quarter note is a marching step or “one” or a syllable like “Ta”. The child will arrive at meter counting naturally later on, and will be able to discriminate duple or triple time. This is done by “filling” the longer note value (e.g. whole note) in one hand with the shorter value notes (e.g. quarters) with the other (Crouch, 2006).

The value of improvised music
In many ways, the piano teacher and the music therapist are starting in a similar way when meeting the client-student for the first time. In both scenarios, the main goal is trying to evoke response through music, whether vocal or rhythmic. The child who moves about the studio, can sing, hum, manipulate an instrument, clap, smile or retreat. Whatever the response, the student is already making music but not yet being aware of it. When he or she finds the point of contact with the stimulating musical input, the process of therapy and/or learning can begin. In the therapy setting the child expends his/her repertoire to various tempi, different rhythmic patterns, and different melodic lines in a give-and-take process with the therapist (Nordoff, 1965). In the piano studio, a therapist starts to implement the very beginning pedagogical concepts and activities, to familiarize the special student with the keyboard, exposing him/her to the preliminaries of playing the instrument: melody, harmony, rhythm and technique. It is essential to keep the musical spontaneity going, through playing sounds and tunes the student likes and recognizes. As mentioned in the literature review, many normally developing children who are taking piano lessons lose their capacity to invent their own music on the keyboard as they become self conscious when learning notation. When teaching a child with special needs, however, the therapist needs to keep encouraging the expression of musical invention on the keyboard, alongside reading notation, because of the beautiful vehicle for creativity and communication it such a student (Tunstall, 2008).

Many techniques from music therapy can be applied, but at times, rather than using vocal response, the student should be directed to responds on the keyboard. A rhythmic “fill-in” is done when a therapist stops the song inviting the student to fill in the missing part by
clapping, singing, playing it on the keyboard or using a manipulative. For example, if the therapist sings and plays “When you’re happy and you know it press the C”, the student can play C, C, C, in the correct rhythm. Other variations can include “fill it in” with right hand, with left hand, play up high, play down low, etc. This is a good tool for teaching keyboard orientation, rhythmic patterns, dynamics and ensemble playing and sharing with someone else.

Audiation, the Art of Inner Listening

Audiation takes place when one hears and comprehends music silently, through one’s own ears, when the sound is no longer physically present. When a performer has no clear aural image of the music, the sound he/she produces will not be communicative and convincing (Johnson & Koga, 2007).

The idea of allowing children to internalize the music they hear in their minds and bodies before gradually transferring them to learning sheet music and notation was behind the initiation of an interesting project for young piano beginners in the year 2000, at the Royal Conservatory of Hague. The study called Project for Introductory Piano Education (PIPO) involved children of young age as 5 and 6, and engaged them in a training program of general musical ability combined with piano lessons once a week. The lessons included singing, rhythmical and expressive movement and piano improvisations. The approach was non-competitive, allowing children to move by their own pace, in a relaxed and friendly atmosphere. The central idea of the project is that piano training should stem from general musical ability, and not just from concentrating
on the quickest development of pianistic and theoretical skills. A very central idea in regular piano teaching is to acquire notation skills and piano technique as soon as possible, in order to be able to learn increasingly difficult pieces. This approach restricts the musical development of the child to interpretation of notes symbols alone, without developing their inner hearing. Working with normally developing children calls for much attention to their imagination and improvisational skills, but even more so with the special learner. According to this method, playing from scores hampers the development of the aural senses since the notations symbols translated by the student into finger movement do not exist in his mind as sounding tones. When figuring out the melody on the keyboard a student has to imagine the melodic curve, the rhythms and the harmony. Playing from notes right from the very beginning of training can be harmful to the fluency of the music because of the limited overview of the keyboard, the eyes glued to the score, and, as a result, mechanical and lifeless playing. For training audiation skills in the lesson, the teacher of the disabled child has a substantial body of music to draw from like familiar children and folk vocal songs that are well established in the child’s mind and ear (Koopman, 2002).

Basic technique development

Technical studies need be approached carefully when working with ASD students. Small muscle control is developing in all children until the age of nine or ten, and the work of strengthening fingers for adequate response on the keys, is a slow process. The ASD student may have a particular low muscle tone, and the fingers will be hard to be built up in an arch shape on the keys. Any contact of the hand with the keys,
however, is most important at the beginning, and the teacher may spontaneously “throw” the child’s hand on the keyboard, in whatever shape is natural for the student: opened, fisted, or stretched, and have him/her feel the touch and hear the sounds coming out. High and low concepts can be applied with imagery taken from nature or the animal world. Imagery is a good tool when teaching keyboard orientation, grouping the black and white keys, finding all Cs, Ds, etc. The teacher can help shape the hand in a more curved line using imagery like “apple house”, bear paw”, “igloo”, “cluster” etc. Finger independence starts with wiggling them by numbers, playing “hide and seek”, “where is thumbkin”, and different combinations of the hands with different finger numbers. In my experience, it is easier to start playing on the black keys as a point of physical elevation and therefore easier for children exhibiting low muscle tone to depress the pitches. It is very gratifying for a beginner to play the three black keys in a mirror shape, moving outwardly or inwardly from midline with both hands using fingers 2, 3 and 4, since it gives an instant harmonizing to whichever little tune the student will improvise, making it sound richer and challenging. It is harder for the brain to process the next technical stage of playing parallel notes with two hands, using different finger numbers. As mentioned in the literature review, it is hard for the child with ASD to process two different kinds of messages at once: same keys, same direction, but different fingers. This takes motor coordination and kinesthetic memory to execute, and it will have to be drilled much longer than with normally developing students.

When hands are ready to go on white keys, only mirror oriented five fingers position movement is suggested, and when this is mastered, left hand can go down to the
lower C and be grounded in a 5th interval (this author uses the term bridge, because of the hand similarity to a bridge shape, encouraging erect fingers 1 and 5) position to give one repeated harmony (e.g. organ point) while the right hand plays a simple melody. It is easier to be anchored with one hand in the keys, and focus on the one that is moving. For developing hand independence, every such exercise needs to be reversed. Small 5 fingers drills can be improvised, or method book can be used at a slower pace and with more repetitions. Transposing the 5 fingers drills into other keys should only be done after the student shows complete confidence of the C position. Scales should be introduced at a much later stage of piano instruction, divided in two tetra-chords. Very often the piano student with special needs will not have the physical ability to play a given exercise. This is the point at which the teacher may step in, modify, divide into smaller units, or withdraw until a later time.

Teaching notation

I am a great advocate of teaching improvisational and by-rote music with this population at the beginning of piano studies, because of the instant pleasure it gives the player, and the motivation and self esteem resulting from it. There is nothing more rewarding for any beginner than playing a familiar tune or a theme of one, for family and friends, and get all the praise. A creative teacher is able to make musical short cuts to any tune requested by a student, or make suggestions for the student to choose from. Familiarity with the recent popular pop and rock music, favorite musicals, the Beatles, or any other genre that children like to listen to is an integral part of working with special students on piano skills, since it shortens the learning time and gives instant reward.
Many students mix musical concepts and interchange “high” with “fast” and “loud” as well as “low” with “slow” and “soft”. This can be due to associating the term “high” with turning the volume “louder” on the radio or the television. Many musical terms have other meanings in regular everyday language such as staff, scale, interval, measure, rest or step, among others. The different association of the word may interfere with the musical understanding (e.g. a # is sharp, like an edge of a knife, a flag for an eighth note is sometimes attached below, but to the mind of the slow learner it should be above).

There is also a confusion between the notes getting higher in pitch, but to the right side on the keyboard. The notes that get higher in pitch move to the right on the written page, while “up” and “right” have two different meaning otherwise. To minimize these multiple applications of the words to note symbols, every term should be introduced independently. Therefore, first teach ‘high’ as a student recognizes the literal meaning of the word (e.g. get on your tip toes, stretch up your hands, jump up, etc) and only then introduce the aural and then notated concept. It can be a good strategy to avoid terms like quarter, eighth or whole note at the beginning and, instead, introduce symbols with other meanings or coin temporary terms (e.g. marching steps, running steps, resting steps) to avoid overload of abstract terminology. Introducing rhythmic values matched to words and syllables of familiar songs is also a suggested strategy. Due to the difficulty of the student with ASD to integrate four different sensory stimuli like visual, auditory, tactile and kinesthetic simultaneously; every new term, technique and activity on the keyboard should be introduced separately and drilled singly for a considerable amount of time.
Another multisensory strategy that can reinforce learning with the ASD student can be placing notes on a felt board staff, and taping keys with the letter names, going back and forth, as a kinesthetic way of learning notation, staff and keyboard orientation. Using parts of the body, walking to the felt board and back, working on rhythmical exchange with the therapist, taking turns, and using fine motor movements (fingers) are all meaningful ways to teach children with special needs, that will gradually transfer to the written music page (Shore, S. M. 2002).

It takes talent, patience, innovation, creativity and spontaneity to successfully teach an ASD piano student. A therapist needs to be in close touch with the parents, and if appropriate, have them present at the lessons. Therapists must have knowledge of the diagnosis in order to teach effectively. A strict lesson routine is needed along with many repetitions and gradual change from stage to stage. One should be on guard for any distractions that may interfere with the lesson like disorganized studio, too many remarks on the music page, background noise, powerful lighting, etc. Method books should meet the slow pacing of the special learner, or can be revised and supplemented by the therapist. Any means that can help with sensory integration can be used, like highlighting the score with different colors, enlarging music, taping the numbers or letters on the keys, marking the fingers, having recordings of the song available, modeling, accompanying the student, or having him/her play with a disc accompaniment. A music therapist needs to find many creative alternatives to teach musical concepts and be ready to shift if one does not work.

Practical Suggestions Related to Adaptations in Piano Pedagogy for the Child with ASD
In providing explanations of how the learning needs of the child with ASD, and general piano pedagogy impact on providing piano lessons for the child with ASD, I find that the following points are prominently featured:

1- Establish good rapport and closeness to student as being essential for good progress.

2- Be realistic and pace lessons according to student’s level of functioning.

3- Adapt to student’s learning style (auditory, kinesthetic, visual, motoric).

4- Teach improvisation and keyboard orientation first.

5- Incorporate colors, enlargements, movements and rhythmic instruments to capture the child’s attention.

6- Use consistent lesson plans, repetitions, and constant reviews.

7- Give short lessons, change activities often, be ready for last minute changes.

8- Teach basic concepts as high-low, fast-slow, loud-soft before notation.

9- Black keys are easier to depress for low muscle tone fingers.

10- Teach both hands away from and towards body midline first (mirroring).

11- Give freedom for improvisations.

12- Rave about every little progress, reward student with primary reinforcers to
enhance motivation.

13- Start teaching notation without staff, by showing up and down directions.

14- Start teaching rhythmic values from the basic marching beat the quarter note.

15- Incorporate motor activities and movements.

16- Incorporate lyrics for better understanding of rhythms.

17- Enable a student to perform small works for family and friends for self-esteem.

Sample Applications in Adaptive Piano Pedagogy:

Case Examples:

Enclosed are sample lesson plans I have devised for three fictitious piano students representative of different functioning levels on the autistic spectrum. I describe these levels as beginning, intermediate and advanced.

Joy

Joy is a low functioning 11 years old with poor communication skills. She is attractive and does not disclose her disability on the outside, until she attempts to talk. Her expressive language comes out fragmented, mumbled and hard to understand. She is echolalic, and imitates mostly the children's story figure Barney, with a deep tone of voice, which is not her natural one. Her receptive language is better, she understands everything I say, but does not respond to my verbal requests. At times I need to touch her
Joy comes to the lessons with her mother, who always promises rewards for good effort like going out for a hamburger or to the library after the lesson if she does well (primary and secondary reinforcers). Joy is very affectionate towards me, she hugs and kisses me occasionally, she also needs to hug and get support from her mom few times during the lesson.

Joy’s attention span is short, and I need to change activities every 5 minutes on average. My lessons start with a greeting song “Hello to Joy” as I go around the room greeting everyone present including her mother and myself. She loves the energy, smiles, and usually roams around the room using a number of the rhythm instruments scattered around for that purpose. This is done while keeping in mind the emotional barriers of children on the spectrum. These activities help with establishing rapport, connecting with the therapist, feeling at ease, and warming up for the lesson. When Joy finally sits near me at the piano I ask her to play one of her favorite tunes but she does not initiate it herself. I ask for “Ode to Joy” which she can play well with harmonic intervals grounding her left hand to the keys, concentrating on the moving right hand. Joy can change harmonies from I to V7 on time, and can discriminate the stressed beat in a measure. She is the auditory type student. We always rave about her playing when she reaches the end of the theme; she smiles happily. Considering adaptive strategies for teaching children on the spectrum, as mentioned in Literature review, I am using many rehearsals and repetitions, while keeping reassuring Joy of her good progress to boost her self esteem.

Joy’s fingers have no muscle tone whatsoever, therefore it is hard to establish a good palm position on the keyboard, but we try to drill and improve some of the technical
limitations in this part of the lesson. I use a little ball under her palm so her fingers will have to round up from their natural straight position, but it does not last long. I am usually successful in having her play a few clusters of 5 fingers together around the ball, but her fingers get flat again once it is removed.

I play marching music for Joy to march around the studio, changing the quarter note duration the activity to a longer step (half note), asking her to show the length of the step in her motions. She chooses different ways to show me, either stopping, or making movement with her hands. Joy likes this break away from the piano bench. Another rhythm training I use with her is filling in the missing beats of a familiar song at the keyboard when I stop, as she presses any key of her choice.

Joy likes to transpose, and can keep transposing chromatically on all the keys. This ties with the characteristic for individuals with ASD of the need for perseveration, and I try not to encourage it, even though her pitch discrimination is impressive. When she says: sharp black, she wants me to go on and play the tune on every note of the chromatic scale. Instead, I teach her a song on the black keys for distraction, keeping in mind that a characteristic for individuals with ASD is their love for sameness and repetition.

Joy is resistant to new songs (love for sameness) and I ask her mother to bring in songs that she likes, like Raffi, the Beetles, and show tunes. I modify them and teach her by rote, keeping in mind that children tune in to song they like and identify. Teaching Joy how to read music has been my greatest challenge so far. She recognizes the middle C
shared between the two hands, the D and E going up to the G clef, and B and A going
down from the middle C to the F clef. Her method book has few songs using these notes,
but is quickly advancing to a broader range notation, while Joy is not ready for it. I have
been using a felt board with the grand staff marked on it, but still need to help Joy with
replacing the note called in its right place (using visual and kinesthetic teaching aids).

I try to introduce new musical material every few lessons to see what captures
Joy’s interest. She did well with Sakura, Kumbaya (filling in the missing “kumbayas”
every time I stopped) “Frère Jacque” Michael Row and Vivaldi’s spring theme from
“Four Seasons”, “Egyptian Theme” from the opera Samson and Delilah, to name a few.
A teacher needs to be realistic about the level of achievement the student is capable of;
therefore I rearrange all the above music for Joy’s level of competence.

Joy is proud when a song she plays with both her hands comes out right and on
time. She is very musical in her ability to imitate, and in her pitch discrimination.
Devoting too much time to drilling notation with Joy would have painfully slow the
progress of her study and make it boring and tedious, as well as add to her low self
image. I realize that notation symbols are too abstract for Joy at this stage, and
compensate the teaching by as many by rote songs that are within her cognitive
capability, to keep it fun, keep her motivated and enthusiastic, and let her do something
unique in spite of her limitations.

Chris
Chris is a 16 years old youth with Asperger syndrome. He goes to the same high school where I teach, and is delayed one year from his age group. He is verbal and high functioning at school, but has problems with communication and social interaction with his peers. There is clumsiness about the way he moves and looks, he is overweight, and has a nervous unnatural sounding laughter when feeling tensed. Chris has an exceptional talent for the keyboard and is extremely musical. Coming to me from another teacher who started teaching him at a young age, he has reached a very respected level of pianistic proficiency and execution. He is very methodical, disciplined and orderly. His assignments have to be written down precisely, in the same format every lesson, and he is checking his watch regularly for the time during lessons. Chris’s need for order and completion makes him master and memorize musical pieces quickly and thoroughly, however, his playing is mostly dry, mechanical and matter of fact. There is not much expression, nuances or dynamic changes. I give Chris technical drills to advance his technique, but show him through modeling that also etudes can be beautiful if played with feelings. I purposely choose for him two Bach inventions which he learns quickly, and easily memorizes. This works well to boost his self-esteem, because of the simple lines inherent in Bach’s music, which come naturally to him.

I am aware of the impairments Chris have with understanding and expressing emotions, I want to expose him to a more sentimental and impressionistic work by Debussy, sharing the bench with him in a duet playing. I model to Chris the dynamic map of the musical work, which is colorful and romantic (The Boat from Petit Suite by Debussy) through my playing, as well as through body language. I stop the playing to
demonstrate crescendos and diminuendos, subito pianos, and use mostly light touch of
the fingers with very little leverage, to create a more transparent sound. I try to elicit from
Chris answers to musical questions such as: who is leading and who is following in the
music by finding the melody lines and harmonic progressions. I ask Chris to try and
imagine the lulling movement of the waves we alternate in our parts, and make believe he
is on that boat. I can see his imagination is ignited, and he is trying to copy the mood. The
benefits of playing duets with Chris go beyond achieving a more sophisticated sound, as
it is one of the most gratifying rewards of piano playing, being an ensemble of two
players sharing one instrument. I believe I enable him to feel and be rewarded with great
expression. Counting has to be synchronized, as the two players count like one, and are
attuned to each other. Melody needs to be marked, as the other player backs off. Taking
over the leading part takes control and coordination. Chris needs to learn, in music as
well as in life, how to be supportive of the other player in his dynamics and how to
dominate them. For a shy and somewhat insecure youth, this feels very reassuring.
Ritardandos, accelerandos, crescendos and diminuendos need to be worked together;
Chris needs to be in tune to nuances and changes in both parts.

After working on joint relaxation of his fingers, palm, forearm and shoulders, his
playing becomes freer and has a more personal message. Chris is very serious, I try to
lightly joke with him in a simple manner, even though I know his disability makes it
difficult for him to understand intricate speech, double meanings, puns, and jokes, my
purpose is to ease up the atmosphere in the lesson and add an adventurous element to it.
Occasionally, I have to admit, that I am happy when I see a flicker of understanding in
his eyes. My strategies and techniques with Chris are to teach him form and structure, to balance his sound, to foster balance between his hands, to establish student-teacher rapport, to make him alert and sensitive to touch and sound, and to help him loosen his hand and palm muscles and better finger dexterity.

\textit{Claudia}

Claudia is a 7 years old high functioning child on the spectrum who goes to a special school. She is a sweet warm and loving girl who seeks physical closeness, and likes to touch and hug me all through the lesson. However, her attention span is very short, and would not last any activity for more than few minutes. Her escape mechanism sends her to the bathroom numerous times during the lesson, and many other times she wants to lay down being tired. She loves singing, and her lesson is practically conducted in singing, starting from a welcome song: “hey, hey, what do you say” she calls me “hey” sometimes, with a hidden sense of humor. Her mother attests that she keeps singing all the songs I teach her at the lesson throughout the week at home from morning until evening.

I understand the nervousness in Claudia’s insecure behavior and where it stems from, and let her dictate the lesson routine, which she keeps repeating for her need for familiarity and surprise free territory. Claudia is very distractible, and needs quick changes in pace to keep her interested. After the welcome song she does movements to different rhythms I play for her, occasionally using rhythmical instruments that are always available for her. It is hard to get Claudia to sit down at the piano bench; all she
wants to do is play. I teach her through games and singing, for example: “there is a little C hiding in the keys”, and she responds by pressing the key in the correct rhythm as an answer. Keyboard orientation is still difficult for Claudia, especially her orientation to the middle C, since she mostly plays the black keys. Because of low muscle tone, it is hard to shape her palm, but she can hit the black keys easier for being higher. The only notes she can read from the page are numeral representation of her fingers, and only one hand at a time. I also tried marking her fingernails with erasable marker with the correlating numbers. Her poor visual discrimination does not allow me to proceed into actual note reading, but I can do tracing notes, clefs, coloring certain lines on an enlarged staff on a big sheet of paper, which I believe will gradually build her capacity to read notation in the future. For now Claudia does not have to tackle a more complex task of integrating visual and auditory input (seeing the note, striking the key and hearing the sound), and is happy with the ability to produce little melodies and sing along with them. When she tires of the bench we move to another corner of the room and I use my guitar for her singing, and fill-ins by her plucking the strings, manipulating an instrument, or just using her voice. Claudia connects well with the lyrics and insists on singing all the verses. A good bye song with Claudia usually concludes the half hour piano lesson.

**Summary**

This thesis is an introduction to show the possibility of adapting piano strategies and techniques for teaching children on the spectrum basic piano skills based on review of up to date literature, and using examples of private experience working with various
ages of this population as a piano teacher and music therapist. Various approaches of teaching children with autism in general, suitable to their special needs, were examined, dealing separately with each field of functioning: the emotional, the communicative, the cognitive, and the behavioral. Comparisons between the general pedagogical concepts of teaching the instrument, and the ones adapted to the limitations of children on the spectrum, such as: rhythm, notation, technique, listening, rapport with teacher, and the auditory, visual, tactile and kinesthetic were made as adaptive ways of working with the disability.

An attempt was also made to stress the importance of enabling children on the spectrum be exposed to instrumental instructions on the piano, or any other instrument, not only because of the unique aesthetic value of expression, creativity and individuality, but also for the gains in coordination, attention span, visual, auditory and tactile discrimination, sensory integration and muscle toning.

In my opinion, music there provide an open venue for children with ASD, who experience failure in many other fields, so that they may approach instrumental learning to the best of their ability.

The results of such activity will hopefully make it possible for these special learners to occupy their leisure time, decrease their loneliness, give them something to be proud of, and make them contributors to their circle of family and friends or to society in general, no matter the level of instrumental competence they can attain.

Recommendations for Further Study
Not every therapist is equipped educationally and/or mentally to work with this population of children with ASD. The ones who venture into teaching piano skills to children on the spectrum need to have the knowledge of where pedagogy meets therapy, when to resort to one or the other, and when to use techniques derived from both. Children with ASD range greatly in their level of functioning, and since therapists need to draw upon the strengths of each student, there should be more resources for them to use besides the standard method books that do not fit this population.

More investigation in the areas of visual and audio perceptions as related to the study of a musical instrument is needed. More research on how tactile and kinesthetic information can help the special learner process information in the musical domains is necessary in order to help us choose the best approach for different students. Not many studies answer the question of whether instrumental skills for children with ASD help them academically, or if there is a correlation between reading notation and reading in general. Piano instructions for children on the spectrum are an intriguing subject, with rich research possibilities in the overlap between piano pedagogy, special education, music therapy and psychology of music.
References


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