Chapter-V

DISCUSSION

In 1943 Kanner had coined the term autism. Since then intervention of autism has also started. Desperate attempts have been made to penetrate the glass wall and enter the autistic world-in order to communicate and socialize with them. The discovery of autism also led to the finding that persons with autism are receptive to strange sounds and are driven towards melody and rhythm. Music is the eternal love of human beings and more so of persons with autism. Sitting tolerance, ability to focus, taking instructions developed through a pleasurable activity has helped the children to receive better in the other therapeutic situations as well.

This paved the way for AIT (Auditory integration therapy)

Processing of auditory information is a problem with persons having autism. Bundy (1996) in her book Sensory Integration Theory and Practice, has referred to Central Auditory Processes. The American Speech-Language-Hearing Association described CAP as functional entity: Children with CAPD share some common symptoms with autistic children. They can hear even the faintest speech signals, but when listening to speech input in a dynamic environment, they have difficulty in understanding the speech message. This is possibly caused by an internal distortion of the signal or an 'overloaded' auditory system.
The following problems are seen in them:

- Problems in following directions
- Easily distracted
- Easily flustered or confused
- Appears confused in noisy places
- Has short attention span
- Is sensitive to loud noise

As it is known that for any form of therapy to take its course the client needs to be receptive and relaxed. Getting a person with autism to focus on external stimuli and stay relaxed is a mammoth task.

The reason behind the same has been found in sensory integration dysfunction.

Persons with autism are bombarded with innumerable sensory inputs. Very often it is assumed that the difficulty in focusing upon one stimulus is because they are exposed to several other stimuli of the same magnitude.

This sensory dysfunction is noted in all the senses including auditory sense. The persons with autism are exposed to equipotent sounds all at the same time. As a result focusing on any one of them and responding becomes almost impossible.
Music is a good sound—it by surpasses all other sounds in the environment, in melody and rhythm. It is much more potent than all the other sounds in the environment. As a result, it is easier to focus on it than any other sound available. So exposure to music inevitably helps persons with autism to be relieved from all the other sounds in the environment. This might explain their undisputed devotion to music.

To utilize this devotion many researchers have devised music therapy to enable children with autism to lead happier and more productive lives. In the western world such studies are available quite easily. But in India such studies are quite rare, even though India has a rich cultural heritage. It has within its treasury numerous ragas which claim to heal various symptoms and syndromes.

The very first objective of the present study is to find a raga suitable for the improvement of autistic children.

Indian Ragas can be divided into 2 groups. The exciting ones like Dipak, Hindol, Vasanta, Iman and Pancham. The tranquilizing ones like Sree, Hanswadhani, Bilabal, Pilu and Brindabani Sarang (Danielou, 1980). The group of exciting ragas was eliminated because children with autism are mostly bombarded with too much stimuli and that itself become very difficult for them to handle.

Among the tranquilizing ragas, Sree, because of its credentials in the review of literature was the first choice. However, an
instrumental demonstration in Sree was not available. A pilot study with Raga Hanswadhani was started. However, an obvious rise in hyperactivity was seen in the children after being exposed to it. So, the intervention was stopped immediately. There are some similarities between Raga Hansdhwani with Raga Bilabal and Brindabani Sarang. So those two ragas were also rejected. A pilot study started with Raga Pilu.

Pilu raga is meant to be improvised for demonstration of lighter forms of Indian Classical music like Thumri, Dadra, Hori or Kajri. It is also a well known fact that these lighters forms emphasize more on the emotional aspects, rather than focusing upon hardcore technical correctness.

In its improvised versions Pilu popularly encourages the sequential usage of the usual and softer versions of the same note. For example a “Meer” (rolling from one note to another) combination can be “sa ni Ni dha Dha pa ma ga Ga sa ni sa”. This smooth gliding of notes all across the octaves can create a very soothing effect on the mind.

Raga Misra Pilu was selected. Mishra Pilu is a variant of Pilu and thus inherits most of its parental traits. The pure raga would involve more of technical correctness and that might lead to a compromise in the aesthetic appeal of the rendering. A pilot study was conducted. There was a significant decrease in arousal level. A flute composition by Raghunath Seth was selected.
The pilot study found the raga harmless. So Raga Misra Pilu was accepted as the raga to be used for therapeutic purpose.

Thus the present study met its first objective of selecting and Indian raga suitable for children with autism.

It is a known fact that, music therapy helps persons with autism because it is a non-threatening sensory input.

Most learning situations contain certain sensory inputs which are unmanageable by them. In kindergarten we very often see children happily making loud noise and enjoying. The children who are not enjoying it can accommodate it and play happily in his own way. But being in such a situation can turn off a child with autism forever because he will experience sensory trauma. In music therapy persons with autism are relieved of their sensory fear at least at the auditory level. So they release their glass capsule and tune in.

*This acceptance of an external stimulus is the first victory of music therapy over autism.*

In the present research work, the experience of the researcher also revealed that at first the child accept the music and further developments follow thereafter. Observation of one particular case can be illustrated here to prove the acceptance.

Mst. S.B is a 14 year old boy with autism. He expressed pleasure from the first session. In the third session he repeatedly took off his headphone and pushed it in the experimenter's hand. Then she
realized that owing to a loose connection the boy was not being able to receive the musical experience provided. This observation once shows the keenness of the child for the musical experience.

As the person with autism tunes in, melody and rhythm enter his being and give him pleasure. So he feels motivated to sustain his focus on the stimulus. He voluntarily sits. As a result he is motivated to maintain focus. The increase of focusing and sitting tolerance is the second victory of music therapy over autism.

Through music the persons with autism develop a dependency over the therapist. Accepted it is only need based. But this dependency makes them recognize her face, go towards her and insist her in their own way to resume the therapy. This opportunity can be taken to teach the children appropriate communication. This motivation for need based communication is the third victory of music therapy over autism.

Reference can also be given of S.G a 10 year old autistic boy. Everyday as the experimenter entered the school the boy took her hand and lead her to the room assigned for the therapy. These opportunities can be taken to help the children with autism to become more social. The opportunity is created because the child is so motivated to participate in the musical sessions.

The motivation to communicate has to be coupled with that of socialization. Because communication is complete only when the other person understands. For this taking the perspective of the other person is also important. As a result the child feels the need
to master the communication rules of the society. *Creation of this need for socialization is the fourth victory of music therapy over autism.*

In this case example can be given of Ms. A.D - a 12 year old child with autism. She had developed an ability to sing before she could speak. In the sessions also she sang along with the tunes in perfect rhythm and harmony. The remedial educators of her school took this as an opportunity to hone her skills further. She taught her a few more songs and gave her an opportunity of stage performance. Long after the sessions ended she could be gradually taught stage manners. This level of socialization was possible because of the pleasantness and motivation created in the musical sessions.

It is accepted that any skill mastered can easily if not automatically be generalized. But we know that persons with autism face a problem with generalization. The children in this particular study are exposed to a multidimensional education program. So, the musical intervention provided alone does not need to shoulder the responsibility of the generalization of the skills.

*Therefore, it can be said that the generalization of the developed skills, is the fifth and the final victory of music therapy over autism.*

A success story can be shared here as well. R.D is a 10 year old boy with autism. He readily took part in the sessions. His remedial
educators reported that on 'music days' he was much more manageable.

Though this example is not of transfer of skills it does show that the level of sitting tolerance and spirit of co-operation sown during the musical sessions can be reaped in other areas as well.

Along with this it needs to be humbly stated that this feat cannot be achieved without support from the rest of the education program.

So it can be said that music, developed in the children the precondition essential for learning skills for more mature socialization and communication. It also made behaviour therapy easier and made them more receptive to the learning situation in the institutions.

As previously stated music made the children more receptive to other therapies. The children enjoyed the music sessions and this helped them to have faith upon other therapy sessions as well.

So, to materialize the last and final victory the quantitative data should be interpreted.

Musical intervention

This brings us to the 2\textsuperscript{nd} objective of the study which is threefold. The first part is to improve the communication of the children through the musical intervention as a whole.
Communication: It is a known fact that children with autism face severe problem in communication. It has often been said that autism is mainly a disorder of communication. It is very difficult for them to express their needs especially the emotional ones and it is also very difficult for them to understand the needs of others. This puts them in their self exile which is difficult to break. Children with autism are genuine music lovers. So, the present study having music as a tool has kept the tall aim of improving their communication.

Here, it is seen that the experimental group has gained significantly in communication while the control group has not. So we can say that the gain is due to music therapy. The control group started their journey with a mean of 29.38 months on PEEP. At the end of 2 months they reached 34.64 months. This slow and steady rise took place under the loving and able guidance of the special schools the children attended. However the experimental group started their journey with 32.62 months upon PEEP holding the hand of the musical intervention. They reached 56.62 months. The experimental received the therapy while the control group did not. Musical intervention therefore have helped the children with autism to mature in communication. At this juncture sharing a case study seems to be relevant. The post hoc ANOVA computed also shows that there is significant difference between the pre data and post eastern data of the experimental group.

A.C 16 year old autistic girl during the sessions through out hummed the tunes of the music provided. She did not have
speech. The repeated exposure to music prompted her to exercise her vocal cord which in turn played a vital role in her speech development. Objective evaluation supports this observation.

Music therapy has been able to successfully enhance communication in persons with autism.

As previously stated music provided the preparatory set upon which all the other therapies worked and helped the children to be more communicative.

There are some preconditions for verbal communication, e.g., vocal play, vocal imitation (Sundberg & Partington, 1998). Music provided enabled the children to focus on auditory input, which they usually find difficult. Awareness of the sound motivated and enabled them to imitate them. This helped the experimental group to gain more out of speech and communication therapy and adopt a more mature level of communication.

This aim is perused by various mental health professionals since the last 5 years.

Wigram et al (1998) conducted a research with 24 children with ASD. 12 children received weekly musical intervention. While the other group did not receive the same. After three months the children were assessed. A significant improvement was seen in verbal and gestural communication.
These studies are therefore in sync with the present one which shows that musical intervention does help to mature communication in persons with autism symptoms.

This brings us to the 2nd part of the 2nd objective of the study of improving the socialization of children with autism with the help of the musical intervention provided.

Children with autism face problems in Socialization. They lead poor social lives and often are incapable in the regular social activities of day to day life. Children with autism are receptive to music. So, the present study having music as a tool aims to improve their Socialization.

Past researches found out that socialization also improves with music therapy. The present research has also found the same. In the pre-intervention assessment the children in the control group showed a mean of 29.27 months in PEEP. At the end of two months they moved up to 33.24 months. The experimental group in the pre-assessment showed a score of 36.96. At the end of the musical intervention the rise was till 61.84. Results obtained therefore show that the children have gained significantly in socialization post the therapy. This difference has not been seen in the control group. So it can be attributed the musical intervention.

As previously stated music provided the preparatory set upon which all the other therapies worked and helped the children to be more socially mature.
Children with autism often have sensory impairments and are hypersensitive to certain sounds. For example, they may perceive some people to have a much louder or high pitched voice than others. Additionally, they may not be able to filter out noises in crowds which lead to confusion and discomfort in these situations. Some demonstrate difficulty expressing them through speech resulting in impersonal grunts, shrieks, humming, echolalia, or complete mutism.

The sensory impairments make the children defensive in every learning experience. They are forever afraid of a painful sensory input or a seeking a sensory stimulation to cover up for their deficit.

Music therapy has proven to be a very effective method in dealing with autism, allowing individuals to build social relationships and learn how to properly behaviour in social situations (Shore, 2003).

So, here we come to the last part of the 2nd objective of reducing problem behaviour of children with autism through the musical intervention provided.

Problem behaviours are those behaviours which a person compulsively does and they hamper his personal adjustment. Children with autism exhibit several kinds of problem behaviours like hand flapping jumping, pressing the eyeball etc. These are obvious distracters in a learning situation and can be embarrassing as well as harmful in a social situation. The present study has also
aimed at reducing problem behaviour through music therapy. It has been achieved.

As previously stated music made the children more receptive to other therapies. The children enjoyed the music sessions and this helped them to have faith upon other therapy sessions as well.

Problem behaviours are those, which hamper the daily adjustment of the child and keep him away from age appropriate as well as skill developing activities.

In its report, “Educating Children with Autism,” the National Research Council noted that problem behaviours of children with autism spectrum disorders are among the most challenging and stressful faced by families and schools. Some of the behaviours of children with autism are observed in typically developing children but they tend to be more intense and frequent, and longer lasting. Studies have shown, for example, that repetitive motions such as rocking or head-banging, which often occur with autistic children, happen in many normally developing children during the first and second years of life, but decrease as the children begin to crawl and walk.

Here, in the present study, we see that the children have reduced their problem behaviour considerably after receiving the musical intervention.

The children of the control group in the pre assessment showed a score of 105.33. A reduction of the same to 95.84 applauds the effort of the professionals in the special schools. In the
experimental group the journey started with a score of 142.11. The reduction took place till 93.13. So, it can be said that the musical intervention provided did reduce problem behaviour in the children.

*At this juncture the following case studies are relevant:*

R.S. a 10 year old autistic girl, having a low auditory threshold, used to put her hand on her ears if a slightly loud sound was made in her presence. This symptom was healed in course of the therapeutic sessions. In the initial sessions the child refused to use the headphone forcing the therapist to provide a few trial sessions with surround sound. But after them she gradually became so receptive to the music that she allowed the headphone. It was visibly seen that her habit of covering her ears with her hands was healed following the musical intervention.

Examples can also be given of S.T. (M12) and O.G. (F 8) who have problems of hyperorality. The beginning of the therapeutic sessions saw them mouthing the wires of the headphone. This problem was reduced as the intervention progressed.

Music provided gave the children a positive sensory experience as a result of which their own frantic efforts of sensory integration (interpreted as problem behaviour) reduced.

*Hinduastani Rāga*

The third objective of the study is again three fold.
The first one is to find the effect of the Hindustani raga upon the communication of autistic children. Quantitative result obtained show that the children have gained significantly after being exposed to the Indian Raga. The pre assessments show a score of 36.62. After exposure to the Hindustani ragas the score shot up to 53.22. This difference is significant. Such a difference is not seen in the control group. There the journey stared with a score of 29.33. After the first phase of assessment the score increased till 32.38. This difference is not significant. So we can say that the increase in communication post exposure to the Indian raga is an effect of the raga itself.

Till date various tall claims have been made about the healing effects of Indian ragas. From the present research, it can be said scientifically (through quantitative analyses) that feat of music therapy. Those ragas which are known to light fire, bring rain when rendered properly has significantly improved the communication of children with autism. The quantified data is right in front of us applauding the long neglected treasury of Indian ragas.

Different professionals all over India have started their work with Indian Ragas. There has been considerable awareness in the past couple of years. Reddy P. (2008) has started a course in the chain of the Apollo Hospitals. The year long course will throw light on Psychology and classical music, emphasizing on the unique aspects of the raga with particular effects on human mind and body.
According to Reddy music therapy treatments can be executed by two ways to in-patients in hospitals

(i) Passive mode - Listening to music that is, the receptive form.
(ii) Enactive mode - Participative music that is active form, utilized in the group treatment.

Classical music may also help to increase the production of endorphins (natural pain relievers) and sig-A (salivary immunoglobulin A). It speeds healing, reduces the danger of infection and controls heart rate. (www.onehealth.com)

It is also proven that Music Therapy is especially effective in three key medical areas.

1. Pain, anxiety and depression,
2. Mental, emotional and physical handicaps,
3. Neurological disorders

This effort can draw quantitative support from the above mentioned data of the present research. The quantitative increase following the exposure to raga misra pilu does highlight the positive effect of Indian ragas upon neurological disorders and disabilities.

Banerjee (2006) in her study “Efficacy of music therapy as an intervention procedure for autism” examined the effect of both verbal and tune music Indian on ’autism’. A group of 40 autistic children participated in the study music therapeutic sessions were
given equally to all children. The findings indicated the positive and highly significant effects of music (verbal and tune) in communication

**NADA center for music therapy** under the guidance of Sumathy Sundar has started music therapy with the following goals:

- To propagate the therapeutic effects of Indian Music in clinical and non-clinical environments.

- To document the traditions relating to the use of sound and music in ancient cultures across the globe with special reference to the Indian sub-continent.

- To popularize the prophylactic and therapeutic role of music among children and adults and to spread the music consciousness among the general public, through lectures, seminars, workshops and published literature (books, journals, newsletters, pamphlets, posters, tableaux etc.)

- To evolve 'appropriate music', tailor-made to help individuals and professional organizations through consultations.

- To introduce greater use of such 'appropriate music' as a part of life style for the health of the individuals, families, organizations, and the nation as a whole.

- To undertake studies and research on acoustics and music and to disseminate the findings thereof through research publications.
• To undertake comprehensive training programs, using the state of art technologies to produce an army of professionally trained music therapists, and to certify them for their professional competence.

• To produce and release Audio and Video Cassettes and CDs having therapeutic effects for common ailments.

So we see that India has started realizing its potentials and working with Indian ragas on the clinical population. Positive results are also being found. However quantified results have not been available till now. The present findings highlight that children with autism can improve their communication after exposure to an Indian raga.

To meet the 2nd part of the 3rd objective, the present study conducted intervention with Raag misra pilu. Results show that the socialization of the children has improved post exposure to Mishra Pilu. The experimental group started a journey with a score of 33.00 in socialization. It increased to 53.91 after the sessions in Hindusthani raga. In the control group the initial score was 29.27. A rise till 31.89 is seen. This rise has not been able to meet statistical significance. So, here we see that the Indian ragas have lived up to its claim. The children have gained in socialization post exposure to the eastern music. This finding has been confirmed by the 2 way ANOVA post hoc as well.
In India music therapy with the help of Indian Ragas is gradually gaining force all over India:

Rani Pal Salani (2008) has reinvented the concept of raag chikitsha. Raga chikitsa was an ancient manuscript, which dealt with the therapeutic effects of raga. The library at Thanjavur is reported to contain such a treasure on ragas that spells out the application and use of various ragas in fighting common ailments.

While the descending notes in a raga (avarohana) do create inward-oriented feelings, the ascending notes (arohana) represent an upward mobility. Some ragas like Darbari Kanhada, Kamaj and Pooriya are found to help in defusing mental tension, particularly in the case of hysterics. For those who suffer from hypertension, ragas such as Ahirbhairav, Pooriya and Todi are prescribed. To control anger and bring down the violence within, ragas like Punnagavarali, Sahana etc. do come handy. Calming the inner emotion inevitably leads to better skills in relationships and hence better socialization.

In a case study by Sengupta & Banerjee (2006) a significant effect of dance therapy was observed on socialization and communication of a 13 year old autistic child.

Shankar R. (2004) is working with autistic children. She finds raga Malahari effective. She claims, though without quantified evidence, that Indian ragas used as receptive musical therapeutic device enhance socialization of autistic children.
The present study has added a scientific flavor to the ever present traditional ragas.

Here we come to the concluding part of the 3rd objective, i.e., reduction of problem behaviour with the help of Pilu raga. In the present study the children have definitely gained out of Indian music significantly. The experimental group started with a score of 142.42 in problem behaviour. It reduced to 94.18 in the post eastern music sessions. However this difference is from 105.33 to 93.13 in the control group.

So, it can be said exposure to pilu raga can reduce problem behaviour in the children. Effort to do the same with different raga is going all over India.

Sumathy Sundar has introduced the concept of nadopasana. (Dedication to music) She feels music can alter states of consciousness to enhance healing.

The previous studies show Indian music often have a calming effect upon the psyche of the listener. The raga selected i.e., Misra pilu have a tranquilizing effect (Danielou 1980). The problem behaviours stem from heightened arousal of the children. Misra Pilu have calmed down the children and hence been able to reduce problem behaviour.

In the study by Barber (1999), titled "The effect of music and colour therapy as a behaviour modifier", a totally different aspect was dealt with. This study emphasized the peaceful and relaxing effect of music and colour therapy which would soothe the chaotic
Mukherjee, B. (2008) conducted a study designed as a set of individual case studies of ten children affected by ASD aged between 3 and 7 years, selected on the basis of a common diagnosis of autistic spectrum disorder. The analysis of episodes helped to reveal different factors that influenced children's communication in musical interaction. The analysis of vocal and gestural communicative expressions proved that the child was engaging in intentional communication in the context of musical interaction with the researcher. In conclusion it is estimated that this form of engagement with autistic children has clear benefit.

Partheeban (2010), works closely with autistic children every day. He explains that people with special needs have "disturbed body-mind-soul relationships" which can be "strengthened by bringing rhythm into their lives."

"Rhythmic music which is in conjunction with the heartbeat can be really soothing and rejuvenating," he adds. Good rhythmic music, whether it's drums, guitar, flute or veena, can stimulate the mind, depending on how the music is presented to the children.

Rakshit S (2007), music therapist practising at a hospital studies in severe cases Rakshit starts the therapy with only instrumental music which is later upgraded to vocal music. She recommends that the patient should listen to the music during the advised time.
period with a headphone. Usually each session is an hour long. The room should be dark and if that is not possible then eyes should be covered with a dark coloured eye band. The patient should be comfortable so that musical vibrations seep into the body. She is also finding the Indian ragas therapeutic in nature.

So the data obtained in the present day study is seen in the light of past researches. We can say that in India quite a few individuals have started working with Indian ragas to heal different ailments.

**Western Music**

This brings us to the first part of the 4th objective of the study-the effect of western ragas upon the communication of children with autism. The statistics computed show that the children have gained significantly after the western sessions. No such gain is seen in the control group. The experimental group has moved from 36.62 to 56.62. This difference is significant. However in the same time the control group has moved from 29.33 to 34.64. This difference is not significant, for western music the present study has used Mozart's Sonata K448.

Mozart's Sonata 448 is a known reliever of both autistic symptoms and epileptic attacks. Numerous researches have proved its effectiveness. Mozart's Sonata for Two Pianos in D major K.448 has also been known to reduce the number of seizures that people with epilepsy have. The University of Illinois Medical Center did an experiment on 29 epileptic patients. After listening to the piece for up to 300 seconds, 23 of the 29 patients experienced
significant decreases in epileptiform activity, even from patients in comas. They are not certain if this effect is immediate or if it requires 40-300 seconds to become apparent (Jenkins, 2000).

Campbell (2004) defines the term "Mozart Effect" as "an inclusive term signifying the transformational powers of music in health, education, and well-being. It represents the general use of music to reduce stress, depression, or anxiety; induce relaxation or sleep; activate the body; and improve memory or awareness. It can improve listening disorders, dyslexia, attention deficit disorder, autism, and other mental and physical disorders and diseases."

In the present study the children have gained significantly in communication after being exposed to Mozart's Sonata K448. The Post Hoc ANOVA computed show significant difference between the pre session and the post western session.

Some case studies seem to be relevant at this juncture.

Reference can be given of S.M. a 10 year old autistic boy with epilepsy. He did have love for music. But he was not used to the headphone. In the first session he violently refused the therapy, in the second session he accepted it with much coaxing. Before the third session as the experimenter was setting up the intervention arrangement the boy came to the room and fixed the headphone himself. It is known that autistic persons dislike novelty. But the present study can put forward the finding that autistic people do accept novelty if it is provided in a way they appreciate.
Reference can also be given of cases like V.K a 10 year old girl with autism, epilepsy and spasticity. Her spasticity made movement difficult for her. But she showed motivation to move to the therapy room to receive the musical experience provided.

The celebrated Mozart effect (Jenkins, 2000) has once again proved itself in therapeutic use.

However this observation is no news. Research work with western music especially Mozart is going on all over the world. Here an account of the same is provided.

Staum (2007), has a specific model which he uses for music therapy to enhance communication of children with autism.

Music Therapy is particularly useful with autistic children owing in part to the nonverbal, non threatening nature of the medium. Parallel music activities are designed to support the objectives of the child as observed by the therapist or as indicated by a parent, teacher or other professional. A music therapist might observe, for instance, the child's need to socially interact with others. Musical games like passing a ball back and forth to music or playing sticks and cymbals with another person might be used to foster this interaction. Eye contact might be encouraged with imitative clapping games near the eyes or with activities which focus attention on an instrument played near the face. Preferred music may be used contingently for a wide variety of cooperative social behaviours like sitting in a chair or staying with a group of other children in a circle.
Music Therapy is particularly effective in the development of speech. The severe deficit in communication observed among autistic children includes expressive speech which may be nonexistent or impersonal. Speech can range from complete mutism to grunts, cries, explosive shrieks, guttural sounds, and humming. There may be musically intoned vocalizations with some consonant-vowel combinations, a sophisticated babbling interspersed with vaguely recognizable word-like sounds, or a seemingly foreign sounding jargon. Higher level autistic speech may involve echolalia, delayed echolalia or pronominal reversal, while some children may progress to appropriate phrases, sentences, and longer sentences with non expressive or monotonic speech. Since autistic children are often mainstreamed into music classes in the public schools, a music teacher may experience the rewards of having an autistic child involved in music activities while assisting with language.

It has been noted time and again that autistic children evidence unusual sensitivities to music. Some have perfect pitch, while many have been noted to play instruments with exceptional musicality. Music therapists traditionally work with autistic children because of this unusual responsiveness which is adaptable to non-music goals. Some children have unusual sensitivities only to certain sounds. One boy, after playing a xylophone bar, would spontaneously sing up the harmonic series from the fundamental pitch. Through careful structuring, syllable sounds were paired with his singing of the harmonics and the boy began incorporating consonant-vowel sounds into his vocal play. Soon simple 2-3 note
tunes were played on the xylophone by the therapist who modelled more complex verbalizations, and the child gradually began imitating them.

Since autistic children sometimes sing when they may not speak, music therapists and music educators can work systematically on speech through vocal music activities. In the music classroom, songs with simple words, repetitive phrases, and even repetitive nonsense syllables can assist the autistic child’s language. Meaningful word phrases and songs presented with visual and tactile cues can facilitate this process even further.

The therapy described above is interactive in nature, while the therapy provided in the present study is receptive in nature. However, both these studies believe that musical intervention can enhance communication in children with autism.

The Alternate Medicine Center of India (2008) conducted a study on effects of music therapy on autism. It showed that music facilitates improvement in communication skills due to reduced stress and strain. It provides for greater interaction, both verbal and non-verbal, and builds relationships. Verbal communication can be bettered in steps by music therapy. Parents singing simple songs with identifiable words and phrases get them to verbally repeat them ecologically. Actions mimicked while singing induces to attempt the same, helping to improve nonverbal communication too.
American Music Therapy Association (2007) states that an overall positive direction is noted in meta-analytic reviews of the literature on the subject of music therapy and autism in terms of an array of outcomes related to both therapeutic and specific educational goals. Variations for effect size occur within the broad category of the autism spectrum disorders and tend to reflect the idiosyncratic nature of the disorders between individuals. This is typical across disciplines.

Survey research indicates goal areas typically addressed by music therapists among persons with autism include language/communication, behavioural/psychosocial, cognitive, and musical, to perceptual/motor. Goal attainment was found to be high within one year, and parents and caregivers surveyed indicated subjects generalized skills/responses acquired in music therapy to non-music therapy environments.

So, it is seen that the finding that children with autism communicated in a more mature fashion post music therapy is supported by research findings all over the world.

The 2nd part of the 4th objective of the study is to observe the effect of western music upon autism. Mozart’s K448 has enhanced the socialization of children with autism.

Here we see that there is significant improvement in socialization of the children post music therapy. The experimental group has moved from 36.62 to 61.84. The control group has moved from 29.38 to 33.24. The first
difference is significant while the second is not. It therefore proves that Western music is effective in increasing socialization of children with autism.

Music is a non-threatening sensory experience. This ensures the development of a trusting bond between the therapist and the children. Gradually this trust got generalized. As a result the children were more motivated to socialize.

Here, the findings of the present research do tally with those of the previous ones.

**Otakar Musical Trust under the guidance of Dr. Margaret Lobo** uses sound in a playful manner to enhance socialization in children with autism. When setting up a session of music therapy there are goals that have to be kept in mind. Some specific goals or objectives for music therapy and auditory training are sound detection, sound discrimination, sound identification, and comprehension of sound.

There sessions often start off with music and sounds that are familiar to the client, so they are easily recognizable. Then, gradually throughout the sessions the music and sounds become more technical and harder to discriminate. In a typical session, the sounds that are used are generally recorded sounds that clients listen to through headphones.

However when music therapy is added to the session a variety of instruments can be used. For example, any percussive instrument like the metallophone, xylophone, piano, or any drum can be
used. These can be used very effectively because not only can the client see when the instrument is being played, they can also feel the vibrations coming from the instruments to feel when there is sound being made and when there is not.

Otakar Musical Trust believes it is important to use a multi-sensory approach, especially when dealing with children on the autism spectrum. The more senses that are incorporated into a session, the better the result will be. Musical instruments such as the ones stated above, are pitched in various frequencies and they can be played very loudly, which allows the client to recognize these sounds sooner than they would recognize the human voice (Davis 1999). Speech is greatly affected when someone has a deficiency in his or her auditory system. We learn how to speak from what we hear as a young child. By using music therapy for auditory training, it helps to develop speech as well. It encourages free vocalization and vocal imitation. By singing songs that use words that begin with the same letter, or focus on one certain sound, the client will learn how to say that sound.

When working on speech and socialization, using music therapy for auditory training, there are also certain goals and objectives to work on; for example, an increased use of voice for free vocalization and an increased awareness of speech patterns and subsequent production of more natural speech rhythms, pitch and inflection.

Mozart’s K448 enhances socialization of persons with autism.
Here we come to the last part of the 4th objective of the study i.e the effect of Mozart K448 upon problem behaviour. Western music here also has reduced problem behaviour significantly as well. The celebrated Mozart effect has once again achieved a feat. The experimental group started with a score of 142.11. After exposure to the western tune music it was reduced to 90.02. In control group the pre assessment session showed a score of 105.33. In the post western session it was reduced to 95.84. The first difference is significant while the second is not.

Though not exactly Mozart’s symphonies different tune have been used in the western world to reduce problem behaviour in children with autism.

Landqvist et al. (2008) conducted a research with vibroacoustic music on self-injurious, stereotypical, and aggressive destructive behaviours in 20 individuals with autism spectrum disorders. The first group received 10-20 min sessions with vibroacoustic music treatment for 5 weeks. Then the second group received the same treatment during the next 5 weeks. The results revealed that vibroacoustic music reduced self-injurious, stereotypic, and aggressive destructive behaviours in the participants. However, generalizations are difficult to make with such a small sample size.

In the present study a reduction in problem behaviour has been noted following the musical intervention.
Music has two obvious components:

  a. Rhythm
  b. Melody

a. Rhythm- The association of human beings and rhythm dates from conception. The infant in the mother’s womb can hear the rhythmic heartbeat of the mother. So, rhythm reminds us of our dream life in the womb where all needs are met before they are expressed, at least felt. Rhythm also gives us a sense of security. It happens at regular time intervals. This reinforces the predictability

b. Melody- Music is basically a good sound. Children with autism have difficulty in focusing upon a particular sound in the environment. Since music is a good sound it’s attention value is much higher than its competitors. As a result children can immediately focus upon it. This would give them a sense of relief because it immediately stops the additional noise inside the brain and releases them from their frantic efforts of auditory integration. It takes place naturally.

When this noise stops children with autism can focus and relax much more. As a result there is reduction of problem behaviour.

Comparison

Thereafter coming to our 5th objective we have compared the results of eastern and western music. Logically it was expected that they would respond better to Hindusthani raga than to Mozart
(the children are of Indian origin and are more familiar to Indian tunes than to western ones).

The children are all of Indian origin. They are much more exposed to Indian music than to western. So, logically it was expected that they would respond better to Hindusthani raga than to Mozart.

**Communication** But contrary to our expectation, the statistical analysis of the data obtained showed that the children have responded to Mozart significantly better than misra pilu.

Then we see the 2nd part of the 5th objective which is to compare the two treatments upon socialization. Here we see, that once again our children have responded better to Mozart.

This brings us to the last part of the 5th objective of comparing the effect of the two kinds of tunes used on the basis of problem behaviour. Western tune music has lead to significantly more improvement in the children.

It is seen that in all the three variables western music has yielded significantly better results.

It is true that today’s Indian popular songs better known as numbers are more aligned to western guidelines than to eastern ones. As a result the principle of familiarity has gone more in favour of the western tune than the eastern one.

In Hindustani Classical music the movement from one note to another is subtle. While in western music this movement is obvious
and hence easy to detect. As result it has been easier for the children to attend to western music than to eastern music.

We can here say that persons used to relaxing with the help of music might find eastern music more therapeutic in nature because it takes more concentration and focus to actually benefit from the subtleties of eastern music. For novice listeners western music is more therapeutic because of its simplicity and richness. The group the present study is dealing with is essentially of children and adolescents with little or no practice in appreciation of music. For them it has been easier to attend to the obviousness of western music than the subtleties of the eastern one.

For symphonies of Mozart there is a specific notation adhering to which the musicians play. K448 can be played in only one correct way. So, it is easier to reach a conclusion.

But in Hindustani music one raga can be demonstrated in a number of ways. There only the notes to be played and the nature of movement from one note to another is specified. The rest depends upon the creativity and skill of the musician rendering the raga. There is no single structure of one raga. So, it is very difficult to specify any one demonstration as a standard structure of a specific raga. The same artist can present one raga in different ways at different concerts, let alone the freedom of different performers.

It is better to keep the comparison to the specific rendering used in the study than to pin point one raga. However, research
findings show that Pilu actually decreases task orientation, though promotes relaxation (Roy & Banerjee, 2005). This fact was well observed by one remedial educator in one of the schools availed. She said that on 'music days' the intervened children could be managed easily but getting them to do a particular work was tough. This is because pilu helps a person to relax but does not improve task orientation.

For symphonies of Mozart there is a specific notation adhering to which the musicians play. K448 can be played in only one correct way. So, it is easier to reach a conclusion.

It might be that the same raga played differently will yield different results.

It is needless to say that a different raga will produce a different result all together and might surpass even the Mozart effect.

But it is also a fact that modern Indian music is based more upon western guidelines than upon eastern ones. So, the benefit of familiarity with eastern music could not be procured.

Age

Now, we come to our 6th objective. The present study has divided the sample in three groups according to age:

1. Group A-4-8
2. Group B-8-12
3. Group C-12-16
The modern diagnostic techniques have made diagnosis of autism possible in 30 months of age. Early diagnosis is essential because it makes early intervention possible which in turn leads to better prognosis.

"Infant brains are quite malleable so with we’re trying to capitalize on the potential of learning that an infant brain has in order to limit autism's deleterious effects, to help children lead better lives," said Sally Rogers (2009), a professor of psychiatry and behavioural sciences.

Children with autism who receive a high intensity developmental behavioural intervention starting by age 18-30 months show major improvements in IQ, language, adaptive behaviour, and severity of their diagnosis, according to an NIMH-funded study. (Dawson 2009)

All the 3 age groups have gained significantly across the sessions. More gain is seen after the western sessions.

The eldest group has gained more than the youngest one but less than the middle one. This might be because in the earlier years of intervention sensory issues often hinder the development of the children. Once these issues are managed in the therapeutic program the children develop much faster. So, it is seen here that the elder children have developed more than the younger ones.

These children have been in the therapeutic for a considerable time as a result their receptivity to new therapeutic programs is also higher.
Severity

The 7th objective of the study is to determine the effect of musical intervention upon severity of autism.

Every person with autism is unique. Two children with the same severity and even a similar scatter in CARS can manifest diametrically opposite symptoms of the disorder. Nevertheless the score gives an indication of how much the child is into his autistic world.

A child with a score showing more severity indicates that his related to the rest of the environment is less. Therefore his motivation to learn communication and socialization is less. He is mostly interested in playing with the toys in a stereotypic manner or he demonstrates a set of repetitive behaviour. The glass wall is so thick that communicating with him through it becomes a big challenge. However this challenge becomes manageable with a person with a lesser severity of autism. He can be coaxed to engage in a level of communication and socialization.

So, lesser the severity easier it is to bring him out.

The present study has been conducted with 2 levels of autism:

- Group A Mild-Moderate
- Group B Moderate-Severe

Both the groups have gained significantly from the therapeutic program provided but there is no significant difference
between the two groups. The gain from western sessions is higher.

May be a larger group would have been able to show more significant results.

This brings us to the 8th and last objective of the study. This is to study the effect of music upon the epileptic and non epileptic children.

There is an increased and variable association between autism and epilepsy (Kaplan & Saddock, 1995). Autism is a complex neurodevelopmental disorder. When associated with epilepsy, it places the child and the family in a very demanding and stressful situation to cope with.

Kanner (1943) reported one case of epilepsy among his 11 children. The prevalence of epilepsy among autistics is much higher than the normal population. There is also an increased prevalence of abnormal potentially epileptogenic activity in children with autistic spectrum disorder. About one in four autistic children develop seizures at puberty.

Children with symptomatic infantile spasms (sudden generalized muscle contractions usually beginning between the ages of three and eight months) tend to develop both epilepsy and autism. Complex partial seizures or temporal lobe epilepsies show different clinical features in children of different ages. The general course tends to be favourable. Adverse course may be seen in children with perinatal complications, spike-wave
complexes in the EEG and those with psychomotor and psychosensory seizures. Hashimoto et al. (2007) reported a tendency for epileptic foci to occur in the frontal region in autistic children and they suggest that frontal dysfunctions may be important in the mechanism of symptoms of autism (Ramanujapuram Anand, 2007).

Both autism and epilepsy should some abnormal brain activities. Music regulates brain activities. So the present study has included autistic children both with and without epilepsy.

To reach the 6\textsuperscript{th} objective the experimental group was rearranged into 2 groups again

- Group A- 15 children with epilepsy
- Group B- 15 children without epilepsy

The 2 groups were matched according to age, gender and level of autism.

The result obtained shows both the groups have gained through the musical intervention provided. However the epileptic group has experienced more reduction in problem behaviour.

Different researchers have attempted to problem of children with ASD in different ways.

"Understanding what causes these problem behaviours to emerge during early childhood and preschool years, what maintains them, and what evokes their moment-to-moment expression holds promise of treatments to prevent them from becoming permanent
and abnormal,” researchers say. "Once moderate to severe problem behaviours become an established part of a child’s repertoire, unlike children with typical development, children with autism spectrum disorders or other disabilities do not usually outgrow them. Without appropriate intervention, these behaviours persist and worsen” (Adams 2000).

So it can be said that problem behaviours occur because of the child’s inability to master other age-appropriate skills and activities.

In this research the children developed near age appropriately in socialization and communication. As a result their need to socialize and communicate started being satisfied in an age appropriate way. Therefore the need for problem behaviours reduced and so did the problem behaviours.

The problem behaviours of persons with autism develop and persist because they serve them a purpose. Once that purpose is satisfied in some other way the problem behaviours can be tackled.

Problem behaviours often provide sensory stimulation to the children. Music provided gave the children a positive sensory experience as a result of which their own frantic efforts of sensory integration (interpreted as problem behaviour) reduced.

Problem behaviours often provide sensory stimulation to the children. The children with autism have difficulty in focusing upon one stimulus. They are constantly hit by numerous equipotent
noises. This paved the way for AIT (Auditory Integration Therapy). Berard Auditory Integration Training or Berard AIT was developed by Dr. Guy Berard, an otolaryngologist (Ear, Nose and Throat or ENT physician) in Annecy, France. Dr. Guy Berard originally invented AIT to rehabilitate disorders of the auditory system, such as hearing loss or hearing distortion (hypersensitive, hyposensitive, or asymmetrical hearing).

In case of music therapy in the receptive form the epileptic children in spite of being in a passive state experienced a therapeutic session which helped them to reduce their problem behaviour.

There is no significant difference between the effects of the two groups. They have gained almost equally and more from the western music.

The children in the epileptic group were taken when 1 attack in the past 3 months was taken.

It is often seen that an epileptic brain shows abnormalities (reflected in EEG and MRI) only during the seizure or immediate after the seizure attack. Thereafter it gradually normalizes. (www.epilepsy.com)

So, here it can be said that the epileptic group had epilepsy no doubt but during therapy they were not at in or immediate after epileptic stage.
As a result a significant difference between the two groups could not be obtained.

3 months after the final quantitative data collection another round of qualitative data was taken from the institutions. Data thus obtained showed that the children in the intervention program are maintaining the progress achieved.

The present study shows that musical intervention can improve children with autism. Their love for music can also be culminated into a therapeutic program which can help them to overcome the apparently insurmountable deficits and difficulties they face even while doing the simplest of jobs. In general western music seems to be more effective. But significant therapeutic gain has been contributed by the eastern music as well.

With this observation we can sure move towards exploring the treasury of Indian ragas more extensively to find out more therapeutic ragas and therefore move towards a better and fulfilled life.