

The Tomatis Method with severely autistic boys: Individual case studies of behavioral changes

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Six severely autistic males ranging in age from 4 years to 11 years received the Tomatis Method to assist in alleviating the severity of behaviours contributing to the diagnosis of autism. Ten minute video samples were taken of each boy, under two conditions of play, every time he completed one section of the treatment programme. As measured by the Children's Autism Rating Scale (CARS) all of the boys were severely autistic at the beginning of treatment. Three (50%) of the boys demonstrated positive behavioural changes by the end of the treatment. One boy was no longer considered to be autistic, two boys showed mild symptoms of autism and three boys remained within the severely autistic range. Of particular interest were the changes that occurred in pre-linguistic areas for five of the six boys. These included Adaptation to Change, Listening Response, Non Verbal Communication, Emotional Response and Activity Level. These behaviours are considered prerequisites for successful verbal communication. The children who demonstrated behavioural change were 6 years of age or younger at the beginning of treatment. The author suggests that the Tomatis Method may be helpful in making prelinguistic behaviours manageable and thus help prepare the child to learn basic skills necessary for the development of language and learning.

Despite 50 years of interest and research, the etiology and remediation of autism continues to evade us. Many pieces of the puzzle have been found but the big picture is far from completion. The present research seems to offer another piece. Some children exhibit autistic behaviours as early as the perinatal period while others seem to demonstrate an early period of normal development with a significant shift toward autistic behaviour during the second and third year of life (Davidovitch, Glick, Holtzman, Tirosch & Safir, 2000). Such early interference in normal development seems to suggest a neurological basis stemming from prenatal life (Brown, Jenkins, Friedman, Brooks, Weisniewski, Raguthie, Frennd, 1982; Courchesne, 1989; Folstein & Rutter, 1977; Ornitz, 1989; Ritvo, Freedman, Mason-Brothers, Mo & Ritvo, 1985). Twenty years ago it was thought that genetic factors played little if any role in the etiology of infantile autism (Hanson & Gottesman, 1976). By 1998 Szatmari, Jones, Zwaigenbaum and MacLean can approach the topic of possibly mapping the susceptibility genes for autism based on the now large body of literature that has suggested genetic predispositions to the disorder. When autistic behaviours start at two or three years of age one suspects a probable predisposition or vulnerability which may be triggered by the demands of developmental differentiation occurring at the toddler stage. While the normal child is curious about the social environment and desires to make and maintain contact through the primary caregiver, the autistic child more often appears to have no such interest either toward the primary caregiver or a broader social environment.

Although the present state of research strongly suggests an organic component at the basis of this condition environmental interactions shape how this predisposition will unfold over time. Highly functioning adult autistics (Grandin 1992, Williams 1992, 1994) have reported that while they learn to deal with the world this fragile contact is accomplished only through a great deal of effort and vigilance. Interactions do not reach a level of spontaneity but continuously need to be worked out on an individual basis. This is an extreme form of what we find in some learning disabled children -- they too are often socially disabled but many do, with initial help, seem to "catch on" and eventually learn to "generalize", a task that seems to elude the individual with autism. The therapeutic intervention that is discussed in this paper -- The Tomatis Method -- is one of many possible interventions available to those with autism. Like other interventions, it is not proposed as a cure. Some children with autism and their families have found that the Tomatis Method has led to a better quality of life by stimulating the

growth of prerequisites to learning and thus rendering these children more capable of benefiting from specialized specific socialization and educational training programmes.

As described later in this article, the proposed neurological underpinnings of the Tomatis Method are such that through the auditory medium many aspects of physiology are reached. The Tomatis Method is not a treatment technique developed specifically to help individuals with autism but rather for the remediation of listening and language related problems. By enhancing auditory perception, the body and mind are better prepared to communicate. Individuals, whether they are language disabled, seriously depressed or autistic still need a social environment to facilitate the communication. Metaphorically the Tomatis Method can be compared to preparing the soil in which the seeds must still be placed if plants are to develop. In this particular study six boys with autism (4 to 11 years) were followed at regular intervals in their treatment process. Video observations, together with parental and teacher reports, were used to monitor prelinguistic behavioural changes.

Autism

Autism is a very complex disorder. In the case of the severely autistic, and even more so with the severely autistic child, a detailed diagnostic assessment, with standardized tests, is often not possible. The Diagnostic and Statistical Manual (DSM IV) outlines typical problematic behaviours that can be gleaned through observation as well as parental and teacher reports. Both the American Psychiatric Association (APA) and the World Health Organization (WHO) characterize autism as a severe and pervasive impairment in several areas of development including a triad of symptoms: restriction of reciprocal social interaction, reciprocal communication and the presence of stereotypical behaviours, interests and activities as well as onset prior to three years of age (APA, 1994; WHO, 1994). The label of autism is frequently deduced by the use of observational techniques, along with parental and teacher reports. Treatment programmes when used, are generally exploratory or carried out on a trial basis while assessing the autistic child's behavioural responses. These observations rely heavily on parental, teacher and other reports.

The Tomatis Method

Treatment is developmental in nature commencing with what is believed to be the earliest experiences of sound to the human

icus. Starting with a passive phase the individual listens to filtered sounds of the maternal voice and Mozartian music which are believed to be physically relaxing, and mentally stimulating, similar to the earliest experiences of sound, those of prenatal and early life (De Casper, Lecanuet, Busnel, Granier-Deferre & Maugeais, 1994). Later the individual is gradually introduced to the world of language (Active Phase) first through listening to recorded discourse and eventually through audio vocal exercises. Passage from one stage to the next is closely monitored by improvements in the Tomatis Listening Test (TLT) and/or behavioural observations when the individual is untestable (Roy, 1980).

Treatment is administered by passing high quality, specifically prepared music and voice tapes, through an apparatus called the Electronic Ear (EE). The EE attenuates low frequencies and amplifies higher frequencies that fall within the language area which allows the subject to gradually focus listening on the language frequencies. In the Passive Phase the subject listens through earphones with an attached bone conductor permitting the sounds to be heard through bone vibration as well as the usual air conduction. In the Active Phase the subject first repeats words and later reads into a microphone which sends the stimuli through the EE before it is perceived by the subject through headphones and conductor. In this way the individual auditorially experiences his/her own voice with the correct modulation of frequencies. More emphasis is progressively placed on feedback to the right ear which according to Tomatis theory and practice is better positioned to ensure good self-listening and clear articulation of vocal emission (Tomatis, 1963). Repeated experiences of such listening purportedly lead to the introduction of missing frequencies into the voice. Once this has occurred the individual continues to reinforce his/her own auditory preception through their own good vocal output.

Blocks of sessions (*Intensives*) are separated by three to eight week periods allowing the individual to adjust to or integrate the impact of each *Intensive* into their everyday experiences. Depending on the stage of the programme, an *Intensive* would consist of 20 or more half hour sessions.

In keeping with Tomatis procedures, at the close of each *Intensive* a progress interview (and, if applicable, a repeat TLT) allows the therapist and parents or client to monitor change and plan for the next *Intensive*. Consistent with Tomatis procedures, counseling may be offered to help parents and clients fully understand and take advantage of changes brought about by the treatment.

Knowledge about the process of developmental change gleaned from work with learning and language disabled children has led therapists at several Tomatis Centres to use this treatment method with autistic individuals. Tomatis (1991) himself speaks to the peculiarities of the autistic individual. He estimates that the Tomatis Method appreciably improves quality of life for about 60% of such children. Of those who do benefit about half show a quick positive response. He emphasizes that these are not dramatic cures but in some cases a child may move from very severely autistic to mildly autistic or to language delayed or even learning disabled but more in contact with their social and physical surroundings. At this point the autistic person becomes more amenable or responsive to the many excellent teaching programmes that have been developed to assist learning. Varied patterns of response to treatment seem to confirm the notion that autism has a multi-causal base and, like other treatment tools, the Tomatis Method may benefit only a select portion of autistic individuals.

The Tomatis Method is one of a group of therapies referred to as Auditory Integration Training (AIT). A double blind study

was carried out by Rimland & Edelson (1992) using another auditory-based but different retraining programme. These authors also noted difficulties in obtaining reliable measures of change in children with autism. They randomized autistic children into control and experimental groups then used a number of tests, including daily journal entries by parents, to follow the children during the ten day treatment and three month follow-up period. The purpose of Rimland and Edelson's study was threefold: (a) to assess changes in adaptive behaviour; (2) to assess changes in listening and comprehension; and (3) to assess changes in auditory discomfort. One aspect of the original design was to videotape the subjects in a unstructured social situation with a parent. Due to problems in data collection, the procedure was abandoned (Rimland & Edelson, 1992). This material, if it had been available, might have proved a useful comparison to the present project results.

While the AIT study by Rimland and Edelson in 1992 and the present Tomatis Method study both assume an auditory deficit and use an auditory remedial approach, the AIT is based on the assumption that the autistic individual experiences areas of hyperacusis - oversensitive hearing at the sensory level - which interfere with his/her ability to focus comfortably on the auditory environment. Remediation consists of exposing the individual to music (via headphones) that has been adjusted through the use of filters so as to dampen the specific frequencies to which the individual is too sensitive. Attainment of a hearing profile is essential for the development of each individual's treatment profile.

The Tomatis Method, on the other hand, is based on the assumption that the psychophysiological and neurophysiological construction of the hearing apparatus has important connections to the whole body as well as the brain (cortex and sub-cortical structures) which are stimulated when stable normalized auditory perception takes place. The hypotheses underlying the research questions on the Tomatis Method are psychophysiological, psychodynamic and developmental in nature. Hence, re-education of listening perception reproduces the developmental steps of learning, listening, and language. As such the Tomatis Method prepares the person physiologically to induce a desire to communicate. The emphasis is on the active perception, called listening rather than passive hearing. Good listening means tuning in, tuning out, quickly and at will. Treatment can be started without a specific listening profile although organic hearing deficiency should be ruled out. Such listening testing cannot generally be accomplished with severely autistic children by the usual audiometric assessment tools. Progress from one stage of the programme to the next is dependent upon development of specific aspects of the Listening Test and/or positive behavioural change. We have not had success administering this test to autistic children, at least not at the outset of treatment. Recent work by Rosenhall, Nordin, Sandstrom, Ahlsen & Gillberg (1999) describes both the problem of assessing hearing ability/disability in autistic individuals and the need for adequate auditory evaluations so that remediation, if necessary, can be implemented as soon as possible.

The present study was devised to monitor, in a non-intrusive way, the progress of autistic preschool and primary school age children whose parents had decided to use the Tomatis Method on a trial basis. All parents were cautioned about the limitations of the Tomatis Method with autism. They were told that the Method is not a cure for autism but at best could make the child more amenable to learning. Parents needed to understand that their child might not benefit from the treatment for reasons beyond the scope of our current understanding. They were then able to make an informed decision as to whether or not they

parents to initiate the Tomatis treatment with their autistic child.

The major research question in this study was: Do autistic children undergoing the Tomatis Method improve in general adjustment in such a way so as to become less autistic-like?

Method

Participants

Six boys ranging in age from 4 years to 11 years were entered into the study at the time parents requested Tomatis treatment for their child. These boys were consecutive referrals to a certified Tomatis treatment centre in a midwestern Canadian city. Following initial intake and preliminary evaluation, all families accepted to participate in the research project. Each child proceeded individually through the treatment programme at his own pace and remained until such time as the treatment was complete or a decision to terminate was made by parents in consultation with therapeutic staff. All children had been diagnosed as autistic by the APA and WHO (1994) criteria by a family physician or at a recognized treatment centre prior to entering the Tomatis Method treatment.

Participant A.

The first participant is an only child whose parent's marriage ended in divorce when the child was 1.5 years of age. The mother remarried three years later into what is presently a stable relationship. The boy was first assessed at the age of 2 years 10 months and was diagnosed with a severe language delay. One and a half years later (4 years, 4 months) he was given a further diagnosis of pervasive developmental disorder by the Society for Treatment of Autism in his home town. He was described as autistic in all areas according to the Autism Behaviour Check List by the Autism Resource Centre in another city one month later. This diagnosis was reaffirmed at the same centre with a score of 44 on the CARS placing the boy within the "severely autistic range." The young lad completed the Tomatis treatment programme at regular intervals over the space of one year and nine months. During that time he had eight *intensives*. For the purpose of the research he had already started the programme and was on his third *intensive* when the video tape sessions were started. While this may make it difficult to draw conclusions about his initial progress, we do have a pretreatment CARS score demonstrating the severity of his original diagnosis. This study traces the progress from the third *intensive* to the end of treatment.

Participant B.

This child's family immigrated to Canada when B was 9 months old. At 1.5 years he became very quiet, lost what speech he had developed and slept for long hours. He then developed many more autistic features such as hand flapping, walking on toes, gazing through or past people. B is the younger of two male children. The older sibling was reported to have had some mildly autistic features but was managing to make progress at school. At the age of 4 B was diagnosed with autistic features by certified staff at a well-known child treatment centre in a large western Canadian city. His parents brought him for the Tomatis therapy when he was 4 years, 8 months of age. These parents are very involved in all therapies available for autism so it was sometimes difficult to ascertain if changes were due to the Tomatis treatment, a specialized diet or other form of treatment that would be introduced from time to time. This particular boy followed the programme at regular intervals for one year (five *intensives*). At this time it was suggested by the therapist that while some progress had been made there was not sufficient change to warrant continuation of this particular therapy.

Participant C.

C is the older of two siblings. His mother experienced morning

sickness throughout her entire pregnancy. This was followed by a lengthy labour and a forceps assisted birth. As an infant, C was never cuddly but parents observed a marked regression in his skill development when he was 1.5 or 2 years of age. After that age a lack of motor development and sensory acuity were noted. The boy was diagnosed as autistic at age 3.5. He started the Tomatis Method when he was 5 years 5 months and completed the programme nine months later after five *intensives*. At the end of treatment he was slated to enter a regular Grade 1 programme but with a teaching assistant.

Participant D.

This child was diagnosed as moderately autistic with a severe speech delay. The first year of life was positive for him. His development appeared normal in all areas and he had a vocabulary of 10 words at the age of one year. He experienced severe ear infections and fibrile convulsions between one and one and a half years of age. After that language deteriorated and autistic features began to surface. His hearing had been certified as normal by an audiologist. He is the older of two boys in the family - the second is an infant who was not exhibiting any developmental problems when D started the programme at the age of 3 years 7 months. D completed the programme after six *intensives* over a 9 month period. Had the family not been moving to another province, he probably would have benefited from one or two more *intensives*.

Participant E.

This boy was seven years of age when he started the Tomatis treatment programme. As with the other autistic children it was suggested that an initial two *intensives* be tried and the boy's reaction monitored. After four *intensives*, E's school teachers saw encouraging changes, but the parents decided to discontinue treatment. A very quiet, reserved farm family, they decided to keep the boy at home during the off-school months.

Participant F.

At 11 years of age F has been the oldest autistic child to receive the Tomatis Method at this particular centre. He is the second oldest of four children in a very supportive family. He was first diagnosed as autistic at five years of age. The family, as well as the boy, had received help from several agencies before trying the Tomatis Method. F showed a normal developmental pattern, including language, until he was between two and three years of age. Mother reported that severe ear infections started after a routine inoculation and led eventually to a tonsillectomy. Deterioration of language and control of body functions appeared to follow the tonsillectomy and a family bereavement. After these events the boy seemed to gradually withdraw and regress. During the early years of intervention F had shown little gain in general adjustment and had become physically bigger. He was now on the verge of adolescence. Parents opted to try the Tomatis Method to see if it might make him easier to handle. In total he received five *intensives* at regular intervals over a period of 6 months. After this period was completed the therapist, in consultation with the parents, decided to terminate treatment. While some mild gains were reported, they were not deemed significant enough to warrant additional treatment.

These were the boys!

This group of boys with autism were consecutive referrals to the Tomatis Centre which deals with children and adults experiencing language and language-related problems. There was no attempt to screen the children according to specific criteria (other than diagnosis of autism) which was done and critiqued in the Early Intervention Program of Lovass and colleagues (Gresham & MacMillan, 1998). In addition, there was no attempt to develop a control group for several reasons.

First it would have been unethical to withhold treatment from any of the clients, there were no equally viable treatments available in the vicinity. Such a small group it would be next to impossible to find matched clients. Instead the research chose to use individual case studies to tease out the individual differences for each of the boys as they went through treatment. This type of quasi-experimental research often lays the basis for further questions and study in the area.

Procedure

Twenty-minute video samples were taken of the children at the completion of each *Intensive* treatment period. Ten minutes were used for solitary play in a room full of age appropriate toys and, ten minutes in the same environment with a parent who tried to structure the play situation. The four preschool and two middle childhood boys were followed for a period of six to twelve months depending upon their length of participation in the treatment programme. Participation in the research project was completely voluntary and parents were asked to complete a Consent Form which described the project in detail. At the end of one year all tapes were randomized and scored by trained raters naive to the treatment programme and not acquainted with the children. Each participant's video tapes were rated by two research assistants and the scores averaged. In the case of a large discrepancy the tape was scored by a third research assistant. Out of a total of 30 tapes only two showed such a marked discrepancy.

Assessment Materials

The Childhood Autism Rating Scale (CARS).

A review of objective scales available for the diagnostic assessment of autism indicated that the CARS, even with some weaknesses, emerges as the strongest scale in terms of demonstrated psychometric properties (Morgan, 1988). This behaviour rating scale was developed firstly to identify children with autism and secondly to distinguish them from children with other developmental handicaps. It also distinguishes children with mild and moderate autistic behaviours from those with severe autistic behaviours as well as those free of autistic behaviours.

The CARS is composed of 15 subscales each measuring a behaviour ranging from normal to abnormal. These include: Relating to People (I), Imitation(II), Emotional Response(III), Body Use(IV), Object Use(V), Adaptation to Change(VI), Visual Response(VII), Listening Response(VIII), Taste, Smell and Touch Response(IX), Fear or Nervousness(X), Verbal Communication(XI), Non Verbal Communication(XII), Activity Level(XIII), Consistency of Intellectual Response(XIV) and General Impression(XV). For each of these scales the subject is rated on a continuum from one to four -- one being normal, age appropriate behaviour and four being severely abnormal behaviour for chronological age. A change of one complete mark moves an individual from one category of behaviour to another. That is: one is normal, two mildly abnormal, three moderately abnormal and four severely abnormal. Individuals may be rated between points as well, for example 2.5 or 3.5. For the purpose of this research project an increase or decrease of one full point was considered a notable change.

Detailed reliability and validity standardization measures are given in the test manual (Schopler, Reichler & Renner, 1988). Reliability measures for internal consistency of the CARS yielded a coefficient alpha of .94 indicating a high degree of internal consistency. This confirms that the scale as a whole measures the unitary phenomenon we call autism, rather than 15 unrelated behaviours. Test retest reliability was established by correlating test scores of 91 cases taken one year apart. There was an 82% agreement between the annual scores. Using coefficient kappa to correct for chance, agreement was .64. Given that kappa of .60 or above is good, the results suggest

that the CARS is reliable as an instrument even over the period of a year. Since the CARS is a rating scale it is essential to have a measure of interrater reliability. In the standardization of the test an average interrater reliability of .71 was established. While a $p < .001$ was reached for each of the 15 subscales the highest agreement was in subtest I with $r = .93$; while the weakest was subtest XIV with $r = .55$.

A validity correlation of $r = .84$ ($p < .001$) was obtained when the total scores of the CARS were compared to clinical ratings and diagnosis made by professionals considered to be experts in the diagnosis of autism. The test authors made a further validity study by comparing scores on the CARS given by experts with scores given by professionals from related fields but with little training or experience with autism. A 92% agreement was achieved yielding a coefficient kappa of .81 ($p < .001$).

In the present project four research assistants were trained for 12 hours on the scoring system of the CARS and had reached an inter-scorer reliability of .91 prior to viewing the research tapes.

Interviews

Participants were followed and treated on an individual basis. At the end of each *intensive* a progress interview was conducted with the parents by a clinical psychologist trained in the Tomatis Method. The purpose of the interview was to record and monitor changes that had occurred in the participant's behaviour since the interview at the end of the previous *intensive*. This structured interview touched upon dimensions measured by the CARS as well as other developmental issues. In scoring the CARS the raters had parent/guardian and teacher comments available. These comments together with the individual video tape contributed to the scores on the fifteen subtests of the CARS.

Results

Figure 1 shows the total CARS scores for participants A, C, and D and figure 2 for participants B, E, and F over the number of *intensives* each received.

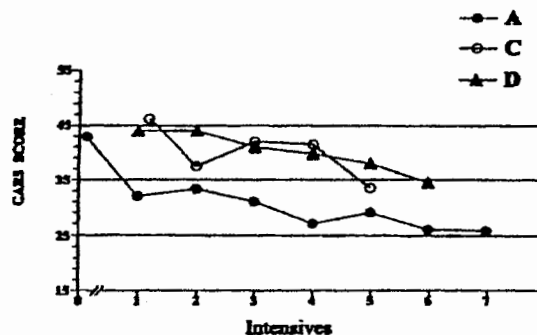


Figure 1. Total CARS scores for each *intensive* of children who demonstrated positive change. The lower the score, the less autistic the individual.

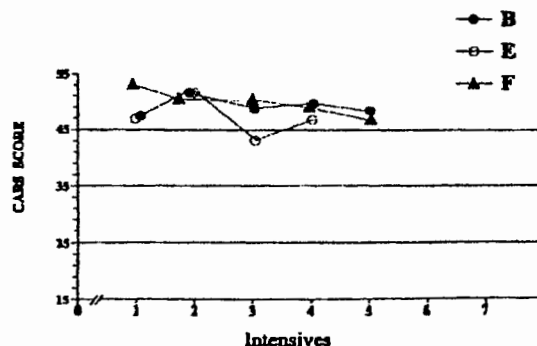


Figure 2. Total CARS scores for each *intensive* of children who did not demonstrate sufficient change to continue programme. The lower the score, the less autistic the individual.

severely autistic behaviour, 30 to 36 suggests mild to moderate autistic behaviour while 15 to 30 are scores typical of non-autistic individuals (Schopler, Reichler & Renner, 1988). According to Figure 1 participant A scored as non-autistic (25.8) at the end of his treatment sessions while participants C (33.5) and D (34.5) were in the mild to moderate-range. All three were in the severely autistic range (44, 46.8 and 44 respectively) at the beginning of the treatment programme. The three other boys (B, E and F) remained in the severely autistic range. Their post treatment on the CARS scores were 49, 47 and 47 respectively compared to 48, 47 and 53 at the outset.

As mentioned in the previous section, one of the benefits of the CARS test is its ability to measure 15 specific behaviours known to be typically problematic for autistic individuals. Tables 1 and 2 list the pre-and post-measures on each of the 15 subtests for each boy. Table 1 contains the measurements for participants A, C and D who demonstrated some overall movement during treatment while Table 2 contains the individual subtest pre-and post-scores for participants B, E and F who, according to total CARS scores, had changed very little.

Table 1. Individual subtest scores on the CARS of participants who demonstrated behavioural change

	A		C		D	
	Pre	Post	Pre	Post	Pre	Post
I	2.5	1.8	3.5	2.3*	2.8	2.3
II	2.3	1.5	3.0	2.3	3.0	2.2
III	2.3	1.8	3.5	1.5*	3.0	2.5
IV	2.5	2.0	2.3	2.8	2.8	2.5
V	2.0	2.0	3.3	2.0*	2.8	2.5
VI	2.3	1.0*	3.0	2.0*	2.8	1.8*
VII	2.3	1.8	3.8	2.0*	3.3	2.5
VIII	2.0	2.0	3.5	2.3*	3.0	2.0*
IX	1.3	1.0	1.8	1.5	3.0	2.0*
X	1.0	1.3	2.5	2.0	2.5	1.5*
XI	3.0	3.0	3.8	3.5	3.5	2.8
XII	2.0	1.5	3.8	2.5*	3.0	2.0*
XIII	2.0	2.0	2.8	2.0	2.8	2.8
XIV	2.5	2.5	3.3	3.0	3.0	2.5
XV	2.3	1.8	3.3	2.8	3.0	2.8

*Difference of at least one full point

Participant A entered the research project after he had been in treatment for five months. He was functioning within the moderately autistic range by the time the first video session was administered. Table 1 shows that with the exception of Verbal Communication (XI) he was functioning in the mild to moderate range in all areas. The one area that demonstrated marked improvement was that of Adaption to Change (VI). All of the final scores (with the exception of XI, Verbal Communication) show A to be expressing normal to mildly abnormal behaviour in each of the 15 subtests of the CARS by the completion of his treatment programme. Participant C was functioning within the severely autistic range when he first started the treatment programme. On 12 of the 15 subtests his behaviour was considered to be in the moderately to severely

range. His best level of functioning was in the area of Response to Taste, Smell and Touch (IX). By the end of treatment he had shown marked improvement in the areas of: Relating to People (I); Emotional Response (III); Object Use (V); Adaptation to Change (VI); Visual Response (VII); Listening Response (VIII) and Nonverbal Communication (XII). Participant D was also functioning within the severely autistic range when he started treatment. All 15 subtests were scored within the moderately abnormal to severely abnormal behaviour range in comparison to normal age-appropriate behaviour. By the end of his treatment programme he had shown improvement in six areas: Adaptation to Change (VI); Visual Response (VII); Listening Response (VIII); Response to Taste, Smell and Touch (IX); Fear or Nervousness (X); and Nonverbal Communication (XII).

Table 2 shows the pre-and post-treatment scores on the 15 subtests of the CARS for the three boys whose treatment was terminated after a seemingly unsuccessful initial period. In two of the cases (B and F) the boys did not appear to be making sufficient progress. Participant E was withdrawn by the parents following the initial trial sessions.

Table 2. Individual subtest scores on the CARS of participants who demonstrated behavioural change

	B		E		F	
	Pre	Post	Pre	Post	Pre	Post
I	2.8	3.5	3.3	3.3	3.3	3.0
II	3.0	3.5	3.3	3.0	3.5	3.3
III	2.8	3.5	3.0	3.3	4.0	3.0*
IV	3.0	2.8	3.3	3.3	4.0	3.5
V	3.5	3.5	3.5	3.8	4.0	3.5
VI	3.0	2.8	2.5	3.3	3.0	2.3
VII	2.8	3.8*	3.5	3.0	3.8	3.5
VIII	3.3	3.8	3.0	3.0	3.3	3.0
IX	4.0	3.0*	3.3	3.3	2.8	2.8
X	2.5	2.8	2.0	2.3	3.3	2.8
XI	3.8	4.0	4.0	4.0	4.0	4.0
XII	3.3	3.3	3.0	3.0	3.5	3.3
XIII	3.0	3.3	3.0	2.8	4.0	3.0*
XIV	3.0	3.3	2.3	2.3	2.3	2.8
XV	3.3	3.8	3.3	3.3	4.0	3.5

*Difference of at least one full point

According to the measures on the CARS participant B entered the training programme functioning at the level of a severely autistic boy. He continued to function that way throughout the five intensive sessions. More will be discussed about his particular dynamics in the following section of this manuscript. In the comparison of pre-and post-test measures Visual Response (VII) appeared to deteriorate while there was an improvement in the area of Response to Taste, Smell and Touch (IX). Participant E, as may be seen from Table 2, remained consistent in both pre and post measures. He also was the boy who received the least number of intensives but sufficient to constitute an initial trial phase. Participant F, the oldest boy in the programme, was considered by parents and programme directors to be exhibiting little change although he and his

ability wanted to continue for five intensives. Pre-and post-measures on the CARS indicate a positive change in the areas of Emotional Response (III) and Activity Level (XIII). Although Figure 2 suggests a gradual, positive change, the boy continued to demonstrate severely autistic behaviours as measured by the CARS.

Discussion

The behaviour of three of the boys in this study improved sufficiently to move them from a more severe to a less severe category on the CARS. At the end of his sessions A was no longer rated as autistic. A detailed analysis of his CARS profile (Table 1) shows that Verbal Communication (XI) was his weakest area and was considered moderately abnormal. The area in which he demonstrated the most improvement was in his willingness to adapt to change (VI). Since A came into the research study at the time of his third *intensive* we cannot tell which other behavioural areas were weak although his total score on a pre-treatment assessment was in the severely autistic range suggesting that several other areas were moderately to severely delayed. In all, participant A had the greatest number (10) of *intensives*. At the completion of the programme one might consider him "language delayed" but without the autistic behaviours. What little language he used clearly reflected gains in appropriateness and communication. He began to use personal pronouns in a meaningful way. For example, he now refers to himself as "I" instead of using his proper name. He also sought out children to play with in the treatment sessions. Following treatment he went into Grade 1 in a regular programme with a full-time assistant to facilitate or ease his transition into a normal, age-appropriate class.

The other two boys (participants C and D) who were considered to have made gains during treatment, were in the research project from the beginning of their treatment. Figure 1 shows their individual patterns of change. While participant D showed continuous gradual positive overall change, participant C showed the not uncommon pattern (or possible consolidation) of positive therapeutic change with the initial *intensive* followed by a period of withdrawal before a gradual positive change over the remaining sessions.

When considered together profiles of boys C and D (Table 1) demonstrate positive changes in the areas of Adaptation to Change (VI); Visual Response (VII); Listening Response (VIII); and Nonverbal Communication (XII). All three boys (A, C and D) moved in a positive direction on Adaptation to Change (VI) which according to the CARS measures one of the primary autistic features first identified by Kanner, supported by subsequent research data and maintained in most recent definitions of autism: Creak, DSM-IV; Kanner, NSAC, and Rutter (Schopler, Reichler and Renner, 1988). It is noteworthy that participants C and D improved in those areas that were not as delayed in participant A. It is even more striking that at the end of treatment Verbal Communication (XI) remained the weakest area for all three boys, suggesting that the pre-linguistic behaviours need to be remediated prior to attempting verbal communication.

Nonverbal communication was best handled by participant A who also had the best overall CARS score. If verbal communication is dependent upon prior development in nonverbal areas such as the distal senses of visual and listening response as well as the appropriate use of the proximal senses to taste, smell and touch, the ability to relate to people, imitation (social participation) plus the proper use of one's body and objects, then developmentally three out of six of these children have improved in the antecedents necessary to communicate verbally. In short, the ground work for verbal communication has been prepared. Treatment did not teach the boys to

communicate verbally, but rather exercised the developmental prerequisites. The three boys were communicating non-verbally in a normal to mildly abnormal way by the end of their treatment. All three were to continue in formalized programmes: A in a regular Grade 1 with full-time aid; C in half-time preschool programme run by an autism resource centre with the other half time spent in a regular kindergarten; I was to go to a regular school also with a student aid available on a part-time basis.

In the group of three boys (Table 2) who did not demonstrate change, participant B developed better use of the proximal senses of taste, smell and touch (IX). These are very primitive senses and developmentally the first an infant uses to relate to the world as well as the first to develop prenatally. While the child's parents consistently reported a marked settling effect in the child, this is not addressed by the CARS. According to the research measures Visual Response (VII) was less appropriate. This boy has since gone on to try Facilitative Communication, Mega Vitamin Therapy and Ocular Retraining. The boy's parents stated that the Tomatis Method rendered their son more accessible to profiting from other programmes available for autistic children, programmes in which their son could not participate earlier (Personal correspondence, 1993). The behavioural measures in the CARS demonstrated little, if any, differences between pre-and post-treatment scores. Because of the compounding effects from different treatments, it is difficult to know or evaluate the progress in this particular child. Understandably parents want to grasp at any and all treatments they feel might help their child. This was the only one of the six boys who had parallel treatments.

Participant E was older than the preschoolers previously discussed. He was in the programme for the shortest period of time. Results on the CARS virtually show no change. As described in the initial background of Participant E, the school personnel saw promising changes but the family support for continued treatment was not available. Since the child was seven years of age we might have seen some change with prolonged treatment. However support from parents is necessary for continued treatment.

Participant F was the oldest of the boys and had a history of unsuccessful treatment and programme placements. The parents brought their son for treatment on a trial basis. Parental observations reported mild positive changes in the boy's behaviour and these appear to be confirmed in the research scores on the CARS. However after several *intensives* the lad continued to exhibit mostly severely autistic behaviours. The two areas of positive change were Emotional Response (III) and Activity Level (XIII). It was recommended that the parents seek out specific environments where their son could continue to develop basic communication and work/play skills. If, as is assumed, the Tomatis Method facilitates the development of pre-linguistic skills, this boy at age 11 (on the verge of adolescence) may have been past the sensitive period for learning these skills. Time and effort might be better spent assisting the boy to develop basic life skills within a protected environment.

Half (50%) of the boys demonstrated behavioural changes while receiving this particular treatment. From a developmental point of view all of the changes were in prelinguistic areas. When the Tomatis Method is used with Learning Disabled individuals or those with other language disorders, progress in treatment is traced by the use of a Listening Test, an auditory perception test which focuses on an individual's initial receptivity to different sounds as well as their ability to accurately distinguish between these pure tone sounds. Both air and bone conduction thresholds are obtained. Resulting profiles are interpreted

within guidelines which take developmental and psychophysiological considerations into account. However, none of the autistic boys were capable of completing the Listening Test at the outset. Likewise they were not capable of responding to the demands of an appropriate IQ test or any other standardized assessment. Hence it might well be that some of the boys have distinctly more potential than others. Whatever their potential, all boys were exhibiting behaviours that placed them within the Severely Autistic Range when they commenced treatment. They had also received a diagnosis of "autism" from an outside source.

Given the small number of children observed, caution is appropriate in drawing conclusions. However, for fifty percent of the autistic children in this particular study, use of the Tomatis Method did stimulate changes in prelinguistic areas and prepared the children to participate in other learning experiences. If developmental theory of language holds true, the primary senses of touch, vestibular and audition need to be functioning adequately before an individual can begin to relate effectively to others and desire to imitate them (De Caspar, & Spence, 1986; Greenspan, 1992; Tomatis, 1991). Non-verbal communication must, under usual circumstances, precede oral communication. It is these forms of communication which evolved during treatment with the Tomatis Method in the children observed in this study.

Despite years of research, we continue to be humbled by the mysterious condition called autism. It is quite possible that these individuals are obliged to learn in ways very different from our traditional developmental models. Moreover, it is possible that different subtypes of autism exist, as is the case in learning disabilities. However, this possible differentiation awaits more refined diagnostic procedures. Therapy or treatment programmes may succeed or fail based on the individual differences of the participants. Many autistic individuals, and particularly the young ones, are truly untestable by the usual procedure (Arnold *et al.*, 2000). This was apparent in the present research. For this reason, most assessment tools for diagnosis and placement are based on first-hand observational techniques as well as information gleaned from primary and secondary caregivers.

The present research contains some methodological weaknesses. First, it was dependent upon parents of autistic children who learned of the Tomatis Method and brought their child for treatment. As with any therapy client, the children lived within a family environment and their autistic problems affected the normal developmental atmosphere of the household, some to a greater extent than others. For some of the children the Tomatis Method was not their first encounter with treatment and for one boy (B) simultaneous treatments were being tried. Hence the interaction of Mega Vitamins, Facilitated Communication and the Tomatis Method cannot be accounted for in this study. All of the participants were boys – not surprising given the higher ratio of boys to girls who develop autism. The author is presently following one girl in treatment. There is nothing in the literature to suggest that boys and girls react different to the interventions commonly used for children with autism (Pilowsky, Yirmiya, Shulman & Dover, 1998). These research results do suggest however that it would be worthwhile to evaluate the effects of the Tomatis Method on children with autism in a research environment where experimental conditions can be more rigorous perhaps comparing more than one treatment. This would do away with the problem of having to leave participants out of treatment.

Both the Rimland and Edelson study (1992) and the present study have been hampered by the realities of attempting to use methodologically rigorous models of research with children

who cannot co-operate with such structures. This faces us with our own humility and limitations in working with this much studied, but still poorly understood, group of individuals.

The pilot and individual case studies using auditory training methods with autistic individuals suggest that some autistic individuals may be assisted, particularly in prelinguistic areas, with one or other of these techniques. As in most treatment procedures for autism, it still remains to sort out which treatment programme will best assist which autistic individual and at what period in their development.

The present qualitative study assessed the behavioural changes exhibited by a group of autistic boys ranging in age from 3 years, 7 months to 11 years 0 months. Of the six boys, three demonstrated positive changes in behaviour considered to be prelinguistic in nature. It should also be noted that these three boys were younger than at least two of the group which did not demonstrate measurable change. Further, while all three boys were in the severely autistic range when they entered the programme, they were not as severely autistic as the others in this sample.

Many questions remain to be answered: Is age a factor here? Were all the autistic boys free of organic difficulties, auditory or otherwise? Are different types of auditory retraining appropriate at different stages of perceptual auditory development? Do the impediments of severe autism, moderate to mild autism, severe language delay and learning disability form a natural progression from severe to healthier communication? The results of the present study with the three progressive cases seem to suggest such a continuum.

In conclusion the present study suggests that the Tomatis Method may be helpful in assisting the autistic preschooler to develop in areas known to be prelinguistic predecessors or necessary physiological stepping stones for the perception of human interaction and later language. It is not proposed as a cure for autism but may potentially be a valuable approach, when used in conjunction with other behavioural programmes to stimulate growth and learning readiness for a significant number of children with autism. Given the fact that 50% of the children in the present study did show improvement under selection procedures that were trial in nature, it seems that more scientifically controlled studies should be considered on a larger population of autistic preschoolers. Perhaps different assessment tools need to be used such as auditory brain stem measures. Less intrusive physiological measures that will screen for auditory organic problems would also be helpful. The Tomatis Method is most frequently used with specific language problems such as severe learning disabilities and spoken and/or receptive language difficulties within the normal population where auditory perceptual assessment presents few problems. It is an interesting and challenging task to ascertain if such a remedial programme might unlock one more piece to the understanding of and intervention in the world of the autistic child.

Notes

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