

The Use of Intensive Behavioural Intervention for Children With Autism

Abstract

Autism is a pervasive developmental disorder with prevalence rates increasing yearly. Autism is characterized by impaired social interaction, specific language abnormalities, behavioural stereotypes, and a range of cognitive deficits. The presence of symptoms and the severity impairments vary from individual to individual with deficits ranging from non-verbal and severe intellectual disabilities, to high-functioning. Currently, there is no cure for autism. However, intensive behavioural intervention (IBI) is gaining worldwide popularity as the treatment of choice. Intensive behavioural interventions have roots in applied behavioural analysis. The efficacies of the methodologies that have been used worldwide have varied. This paper compares the original IBI program developed by Lovaas with the current program used by the Toronto Partnership for Autism Services. Research is needed to determine what aspects of IBI are most effective for children with autism, which children benefit the most, if IBI is needed on a continued basis to maintain gains that are made, and if IBI programs are cost-effective for the government.

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First described by Leo Kanner in 1943, autism was considered to be found in children who had a serious inability to foster relationships with other people before 30 months of age. These children had abnormal language development and participated in stereotyped behaviours with an insistence on sameness (Kanner, 1943). Today, it is considered one of the pervasive developmental disorders and diagnosis is usually made using the Diagnostic Statistical Manual IV-TR (American Psychiatric Association [DSM-IV-TR], 2000) or World Health Organization criteria (World Health Organization, 1994). (See also Fletcher, Loschen, Stavrakaki, & First, 2007a, 2007b).

In the mid to late 1990s, the prevalence of autism was estimated to be approximately 1 in every 1,000 children (Fombonne, 1999). Since then, there have been numerous reports suggesting that the prevalence is increasing (e.g., Bello, 2007; Coe et al., 2007; Rutter, 2005; Wing & Potter, 2002). The process of “diagnostic substitution”—the switching of children with another special education classification to autism—accounts for a substantial proportion of this increase (Coe et al., 2007). However, the possibility has not been ruled out that increasing prevalence is the result of environmental factors (e.g., Bello, 2007; Rutter, 2005).

Current treatment methods for the autistic spectrum disorders include the management of associated medical problems, pharmacologic and nonpharmacologic intervention for challenging behaviours or coexisting mental health conditions, and use of complementary and alternative medical treatments (e.g., Myers & Johnson, 2007). The application of intensive behavioural intervention (IBI) programs has received the most attention in the treatment domain. However, there is currently no cure for autism and no gold standard for therapy. The main focus of this review article is to summarize behavioural interventions based on applied behavioural analysis principles and also to summarize research findings about the efficacy of this particular type of behavioural therapy. In particular, the original program developed by Lovaas and the Toronto Partnership Autism Services (TPAS) program are discussed.

Applied Behavioural Analysis

Applied behavioural analysis (ABA) is a scientific approach that attempts to change behaviour systematically using the principles of operant conditioning. Operant conditioning is a training or learning process by which the consequence

of a behavioural response affects the likelihood that the individual will produce the behaviour again. According to B. F. Skinner, behaviour modification “consists of changing the consequences of behaviour, removing the consequences, which may have caused trouble, or arranging new consequences for behaviour which has lacked strength (Skinner, n.d.). According to this theory, the consequences of one’s behaviour directly influence the likelihood that the behaviour will occur again (Skinner, 1999). That is, behaviour frequency increases when it is rewarded, and decreases when it is followed by punishment.

There are seven elements that are contained in every ABA program (Baer, Wolf, & Risley, 1968). First, the program must be applicable. That is, behaviours that are being targeted must have functional significance. Second, the program must include behaviours that are observable so that performance can be recorded. Third, the program must involve analysis that contains data that shows that behavioural improvements are due to the therapy. Fourth, the techniques used must be clearly documented so that another person can easily replicate the program. Fifth, the program must follow established principles, such as those of operant conditioning. Sixth, the program should produce changes in behaviour that are relevant to daily living, thus increasing the quality of life of the person. Last, changes in behaviour produced during the therapy should generalize to other situations and environments.

Applied Behavioural Analysis and Autism

In a talk given by Dr. McEachin and summarized by Hultgren (1998), twelve particular behavioural issues in autism were outlined, and ways in which those issues could be resolved using the principles of ABA were proposed.

1. Children with autism are often not highly motivated. Thus, ABA should focus on making learning tasks interesting so that the child will be motivated to learn the task. This means that if the child has correctly learned the task, the positive consequence associated with learning the task should be clear and sufficiently different from the negative consequence of not having learned the task. In this way, the child is able to see the cause and effect relationship between correct learning of the task and its associated positive consequence. According to the theories of operant conditioning, consequences normally have behavioural reinforcements associated with them (Skinner, 1999).
2. Children with autism need tangible reinforcements. According to Dr. McEachin, social reinforcements, such as words of approval, are not usually sufficient to elicit the target behaviour. Instead, children with autism need tangible reinforcements, such as edibles or time to play with their toys.
3. Children with autism have very short attention spans. Thus, to ensure maximal effectiveness of behavioural treatment, ABA breaks tasks down so that small steps can be learned at a time.
4. Children with autism are also easily distracted. Therefore, ABA therapy initially takes place in a quiet environment with few distractions to maximize learning potential. The eventual goal of the therapy, however, is to be able to generalize the behaviours learned during ABA therapy to more natural settings, such as play time or at school. Thus, as children become more successful in performing a specific task, therapy may move to more naturalistic environments.
5. Aside from learning difficulties due to attention span, children with autism generally learn more slowly. Therefore, children with autism need a lot of repetition to learn a particular task. Consequently, it is imperative that lessons be as interesting as possible so that the therapist is able to hold the child's attention.
6. Sixth, children with autism have difficulty understanding abstract concepts. It is essential that the therapist use simple, clear, and concise language so the child is able to follow the directions necessary to learn and perform the task.
7. Children with autism have difficulty learning by observation. This drives the previous point about how children with autism need simple, clear, and concise instruction about how to perform certain tasks.
8. Children with autism have difficulty differentiating relevant stimuli from irrelevant stimuli. It is very important for the therapist to draw the attention of the child to relevant stimuli so that he or she is able to make the correction stimulus-response relationships. Making connections between the stimulus, one's response, and its consequence is fundamental for effective behavioural intervention based on ABA principles.
9. Children with autism often partake in behaviours, such as self-stimulation, that can interfere with their learning. Thus, the first goal of the therapist is to stop the interfering behaviour so that he or she can concentrate on teaching the task. This way, the child is able to devote 100% of his or her attention into learning the task.
10. Children with autism learn better in small groups. Because of this, most ABA therapy is performed on a one on one basis. The ratio of children to therapist is only increased once the child has shown that he or she is able to learn in a one on one setting.
11. Children with autism do not use free time effectively. For this reason, ABA therapy is very structured, and to keep the therapy interesting play skills are incorporated into the schedule.

12. Children with autism have sensory and/or motor impairments. Thus, ABA therapy incorporates that which stimulates motor skills and all the senses.

Applied Behavioural Analysis Based Programs for Children With Autism

Intensive behavioural interventions (IBI), also known as early intensive behavioural interventions (EIBI), are programs based on the principles of ABA that have been designed specifically to help children with autism. Thus, the conceptual basis of IBI is operant conditioning (Lovaas, 1987). It is a highly intensive form of ABA that has been associated most with autism.

The Lovaas Method

ABA principles were used by Dr. Lovaas to develop his model of behaviour modification while at the University of California in Los Angeles (UCLA) to improve the behaviour of children with autism. The Lovaas model is detailed in a training manual (Lovaas et al., 1981) and accompanying videotapes (Lovaas & Leaf, 1981) that assist parents in correctly implementing the model at home. The first stage of the Lovaas method involves improvement of basic self help and language skills. Improvements of non-verbal and verbal imitation skills are practised. Once this is attained, therapy moves towards toy play. The second stage involves working on expressive and early abstract language and interactive play with peers. Once a child has reached the advanced stages of the program s/he may be integrated into schools for normal functioning children.

The Lovaas method was further refined based on evidence from the Young Autism Project in UCLA (Lovaas, 1987). From this study, it was established that therapy should begin as early as possible with the

child, preferably between the ages of 3½-5 years. Due to the intensive nature of the therapy, parents are trained by therapists versed in the program so that the parents are able to deliver the therapy at home. In this way, the children are essentially immersed in the therapy during all the hours that they are awake. For maximal efficacy, therapy is performed on a one-on-one basis for 6-8 hours per day, 5-7 days a week, for 2 or more years. Built into the 40 hours/week of therapy are scheduled breaks such as naptime, meals, and playtime. Due to the learning difficulties of children with autism (see above), systematic behavioural teaching methods, such as discrete trial training (DTT), are used to break down each skill so that it can more easily be learned (Sheinkopf & Siegel, 1998).

Discrete Trial Training

Therapeutic sessions in the Lovaas model are taught using a series of discrete trials called units (Sheinkopf & Siegel, 1998). Since children with autism have short attention spans, learn more slowly, and have difficulty understanding abstract concepts, learning a new skill is divided into short units. Each trial consists of three parts: a stimulus (also known as an instruction), a response, and a consequence (also known as feedback). An example of a skill to be learned is being able to look at the therapist when asked. In this scenario, the stimulus or instruction can be the therapist asking the child to look at him or her. The response can be one of two things: 1) the child may turn to look at the instructor or 2) the child may not make a move at all. The consequence or feedback depends on the response. If the child looks, the therapist may reinforce the correct behaviour by praising the child and giving him or her an edible. This feedback occurs immediately after the response so that the child can easily draw the stimulus-response-consequence connection.

Interestingly, constant use of praise is not advocated by Dr. McEachin (Hultgren, 1998). He stresses that verbal feedback should be reserved for letting the child know that he or she has made an incorrect response. This can be done by forcefully and clearly saying no right after the incorrect response. If the child does not look, the therapist may say the instruction again, this time using a prompt. A prompt is used to demonstrate the correct response to the child. In this example, the therapist may use a physical prompt. That is, he or she could place his or her hand on the child's chin to guide the child's focus. A therapist does not wait long for the child's response – a prompt may be used after just 5 seconds of the stimulus. However, one of the goals of therapy is to have the child respond to the stimulus without prompts. Thus, as therapy progresses, prompts are used less often.

An important aspect of Discrete Trial Training is to evaluate whether or not the therapy is working. That is, the child with autism has to show measurable and observable changes. These changes need to be quantifiable to demonstrate a cause and effect relationship between the intervention and the outcome (Hultgren, 1998). Finally, an important part of ABA that is built into the therapy and in the outcome measure is to determine how generalizable the skills that have been learned are in non-therapy situations (e.g., during playtime). A truly successful intervention is considered to be the child being able to enter mainstream schooling (Lovaas, 1987).

Research Support for the Lovaas Method

The first report on the efficacy of IBI in children with autism was published in 1987 (Lovaas, 1987). To be eligible for this study, the participants had to meet two criteria. First, they had to have been diagnosed with autism by an individual

independent from those involved in the study. Second, the children had to be less than 46 months of age, or less than 40 months if mute. The reason for this early age target was twofold. First, Dr. Lovaas believed that children before the age of four would be better able to generalize what they learned at the clinic to different environments compared with older children. Dr. Lovaas assumed that such transfer of learning would be harder for older children to accomplish. Second, it was assumed that it would be easier to integrate younger children into mainstream schools while still young. Participants were placed in one of two groups: an intensive treatment group that received more than 40 hours of one-on-one treatment per week for more than 2 years, or the control group that received 10 or fewer hours of treatment per week for more than 2 years. A third group, considered the second control group, was also included in the data analysis. These were children with autism who were not receiving IBI. Each group had 19 participants. Pretreatment measures included conducting standardized tests to determine mental age, behavioural observations based on videotapes about self-stimulatory behaviours (i.e., ritualistic, repetitive and stereotyped), play behaviours, and the use of recognizable words. Further information about language development was gained from a one hour parent interview. During this interview, parents were also questioned about other pertinent behaviours and demographic information.

Intensive behavioural intervention was performed by student therapists trained at UCLA. However, parents were also extensively involved so they could administer the techniques as often as possible. The actual treatment procedures were not detailed in the paper, except to say that treatment occurred for a total of 40 hours in the child's home, school,

and community for 2 or more years. Details of the treatment procedures had been outlined previously in a separately published teaching manual (Lovaas et al., 1981). An excerpt from the paper does, however, describe how aggressive and self-stimulatory behaviours were dealt with. Strategies included: ignoring the behaviour, use of a time-out, shaping a more acceptable form of behaviour, or as a last resort, saying a loud “no” or slapping the child on the thigh (Lovaas, 1987).

The first year of the therapy concentrated on reducing both aggressive and self-stimulatory behaviours. The therapists also tried to teach the children how to properly comply with verbal requests, imitation, and appropriate play. The second year of treatment had a greater focus on verbal language development. The third year focused on teaching skills that would be necessary for integration into the school setting. These included: proper expression of emotions, reading, writing, arithmetic and observational learning.

The reported results of this study are astounding. By the age of seven, nine of the nineteen children (i.e., 47%) in the experimental group passed first grade for typically developing children and had intelligence quotient (IQ) scores that were average or above average for their age. Eight of the remaining ten students passed the language delayed class with IQ scores in the range typical of children with mild intellectual disability. The remaining two subjects in the experimental group had IQs in the profoundly disabled range and were placed in a special class. In contrast, only one child from both control groups achieved normal functioning, that is, this child passed first grade for typically developing children and had average IQ. Half of the remaining children in the control groups had IQs in the mild intellectual disability range and the other half had IQs in the profound disability range.

Further evidence of the efficacy of this method was reported in a follow up study in 1993 (McEachin, Smith, & Lovaas, 1993). In this paper, McEachin et al. (1993) assessed the same experimental group from Lovaas’s 1987 paper. At the time of assessment, the children had a mean age of 11.5 years. Eight of the original nine children that were assessed as having above average or average IQ could not be differentiated from typically developing children in terms of IQ or adaptive behaviour measures. The same could not be said about the control group that had minimal treatment. Thus, this study reported that the Lovaas method of IBI (Lovaas et al., 1981) produced long lasting positive changes (McEachin et al., 1993). This was the first study to demonstrate the long term effects of the Lovaas model of IBI.

Other Research With Successful Outcomes

Since the landmark study published by Lovaas (1987) and the follow up study published by McEachin et al. (1993), other researchers have reported similarly positive outcomes using the Lovaas method; albeit no study has reported results as successful as those claimed by Lovaas.

The same year the McEachin study was published, Birnbauer and Leech (1993) published a similar study that looked at the treatment of nine boys for two years using the Lovaas method versus a control group of five boys. Therapy was conducted for approximately 29 hours at home by various trained volunteers. The study reported that 4 of the 9 boys had non-verbal IQ scores of 89 or higher, with language levels in the experimental group double that found in the control group. However, how well the children were functioning is difficult to ascertain directly from non-verbal IQ scores.

The first study to report using the Lovaas method in a parent directed home-based setting was published in 1998 (Sheinkopf & Siegel, 1998). The importance of this study is twofold. First, treatment in the Lovaas (1987) and McEachin et al. (1993) studies were administered by university students. In fact, university-based interventions are known to be very effective (Casey & Berman, 1985; Weisz, Weiss, Han, Granger, & Morton, 1995). Thus, it remained to be proved whether the Lovaas method would be effective if therapy was performed by parents in a home setting. Second, both the Lovaas (1987) and McEachin et al. (1993) studies were subject to much controversy (Boyd, 1998; Gresham & MacMillan, 1998; Kazdin, 1993; Mesibov, 1993; Mundy, 1993; Schopler, Short, & Mesibov, 1989). Thus, more studies needed to be done to fully establish the efficacy of the Lovaas model of IBI (Lovaas, Smith, & McEachin, 1989; Smith & Lovaas, 1997; Smith, McEachin, & Lovaas, 1993). A prospective study by Sheinkopf and Siegel (1998) focused on a treatment group receiving IBI that was drawn from a larger longitudinal study on autism. According to parent reports, eleven children from this pool had been receiving the Lovaas method of IBI. These children were then age-matched and mental age-matched with 11 control children for data analysis. The results showed that children with autism who were receiving Lovaas style IBI had significantly higher IQ scores (mean difference of 25 points) compared with the control group (Sheinkopf & Siegel, 1998). Interestingly, such gains were still found even though the experimental group received less than 40 hours of therapy (mean = 19.45 hours), and IBI had only been going on for about 15 months. However, from this study it remains unclear if such cognitive gains resulted in changes in adaptive behaviour, and thus an improvement in quality of life.

Although many parents were starting to follow the Lovaas method as detailed

in the Lovaas et al. (1981) manual, it was not until the year 2000 that a study was published comparing the efficacy of intensive behavioural intervention versus parent training (Smith, Groen, & Wynn, 2000). This study is also novel in that it included not only children diagnosed with autism but also those diagnosed with pervasive developmental disorder not otherwise specified (PDD-NOS). The IBI group (n = 15) received approximately 25 hours per week for one year of individual therapy from UCLA trained therapists, with hours being gradually reduced over the next one to two years. By comparison, the parent training group (n = 13) received 5 hours/week of training in their homes for 3 to 9 months.

This study was also the first to report fidelity to treatment methods as described in the Lovaas et al., (1981) manual. Nonetheless, methodological differences between this study and the landmark Lovaas (1987) study existed: 1) IBI was less than 40 hours/week; 2) parents were not required to participate as extensively as was required of the parents in the 1987 study; and 3) the use of contingent aversives, found to be a significant factor in the 1987 study (Lovaas, 1987), was discontinued after a brief trial with four children. Results from this study show that children receiving IBI outperformed the parent training group on measures of intelligence, visual-spatial skills, language and academics.

One premise that has been followed by all of the studies discussed so far has been the strict adherence to the recommended age range as reported in Lovaas's 1987 study. Thus, it was unclear if the Lovaas method would provide any benefit to children older than four years of age. This particular question was addressed by Eikeseth, Smith, Jahr, & Eldevik (2002). These researchers compared behavioural treatment of four to seven year olds for

one year using IBI as described in the Lovaas 1981 manual and videotapes, except there was no use of contingent aversives ($n=13$) to that of another form of intensive therapy called the eclectic treatment ($n=12$). Eclectic treatment incorporated methods from Project TEACCH (Schopler, Lansing, & Waters, 1983) and sensory integration (Ayres, 1972) along with the Lovaas method (Lovaas et al., 1981). Both treatment groups received similar amounts of therapy (mean = 29 hours) and both treatment methods were administered at school. The researchers found that even older children can indeed benefit from Lovaas style IBI. The IBI group made significantly greater gains in IQ and communication scores compared with the eclectic treatment group at the one year follow up (Eikeseth et al., 2002). A very recent followup study confirmed and extended these preliminary findings, suggesting that behavioural treatment was more effective than the eclectic treatment for children with autism in the study (Eiseketh et al., 2007).

The Government Mandate for Children With Autism in Ontario

The model of behavioural intervention for children with autism developed by Dr. O. Ivar Lovaas in the United States is the pioneering method of intensive behavioural intervention. His method has received worldwide attention. For example, in the United Kingdom, about 250 Lovaas-style programs had been established as of 1999 (Johnson & Hastings, 2002). In Ontario, in the fall of 1999, the government announced that it would fund a province-wide initiative to support young children with autism to receive early IBI. The program was called: Regional Intensive Early Intervention Programs for Children with Autism (RIEIPCA). In the spring and summer of 2000, nine regional centres that would administer this program were selected. These regional centres were

expected to: 1) conduct assessment tests to confirm eligibility for the program; 2) create an individual service plan that would be followed; and 3) ensure that the treatment being received was based on best practices (Integrated Services for Children's Division, 2000). Parents had the option of receiving services from the regional centres or going to a private centre by opting for the direct funding option. With this option, parents received the funds for IBI therapy directly. The parents were then in charge of allocating payment to the therapist.

The program was created because of the evidence that has been reported over the years about the efficacy of Lovaas style treatments. However, the Ontario program is unlike the Lovaas method. The only factor in common between the Ontario program and the Lovaas method is that both are based on the principles of ABA (Sardi, 2005). See also Gindi (2004); Perry (2003); and, Perry and Condillac (2003) for additional information about IBI and best practices in autism.

To enhance the success of the RIEIPCA, the program set out guidelines based on previously successful research (Program guidelines for regional intensive early intervention programs for children with autism, 2000).

1. The program must begin early. As such, only those under six years of age were eligible for these government paid services.
2. The program must be intensive, with research suggesting between 20-40 hours per week for a period of at least 2 years. The RIEIPCA recognized, however, that there may be variations to this amount because of factors such as the child's age, tolerance for the level of intervention, stage of treatment, rate of progress, and the level of participation that the family was willing to undertake. This was in

contrast to the clear guideline in the Lovaas method that therapy must be for at least 40 hours a week. The strongest evidence for effectiveness of therapy using the Lovaas method was also demonstrated when therapy was set at 40 hours a week (Lovaas, 1987). What was unclear, however, was whether or not breaks such as meal and naptimes had been incorporated in the recommended times outlined by the RIEIPCA.

3. Systematic behavioural methods must be used to teach skills, and these skills must be generalizable.
4. The child's progress must be measurable so that program changes can be based on evidence of the child's development.
5. The curriculum must be comprehensive and must follow a developmental sequence.
6. The schedule should be predictable and structured. The programming must also allow for the opinions of the child and the parents.
7. Each program must be individualized based on the child's ability and the parents' goals for the child's development. Program intensity is determined by the therapist in consultation with the values of the parents. Furthermore, stimuli and reinforcements used are all decided in consultation with the parents so that they are applicable to child's likes and dislikes.
8. Therapy must be delivered by highly trained instructor therapists. The therapist has to implement and track the progress of each child that is under his or her care. The therapist is responsible for making changes to the program based on the measures being taken. The therapist is supervised by a senior therapist who ensures that the program is being followed and implemented according to government standards.
9. The therapy must occur in a variety of settings.

The Toronto Partnership for Autism Services

The Toronto Preschool Autism Service (TPAS), which now is called the Toronto Partnership for Autism Services program, provides a centre based program (Sardi, 2005; Surrey Place Centre, 2007). This is in line with previous practice that has found most behavioural intervention therapies occur in the clinic (Scotti, Evans, Meyer, & Walker, 1991). Therapy across various settings reinforces the fact to the child that what he or she has learned is not limited to a particular situation, thus contributing to the development of generalization. For children involved with centre based therapy, such as those that belong to TPAS, it is important that parents are involved in the treatment. In this way, even at home the parents are able to practise the principles being addressed during therapy time at the centre. Indeed, the ultimate goal of the program is to be able to achieve developmental levels that will allow the child with autism full integration into a school for typically developing children with minimal supervision. This means that therapy would move from the one-on-one situation composed of the child and his or her therapist to a group setting where most of the instruction is coming from the classroom teacher.

Although provincial guidelines have been set about the goals of IBI in Ontario, some differences exist among the programs in Ontario. For example, parents have the opportunity for direct funding. With this option, children may have therapy at home, unlike those children enrolled in TPAS. Thus, it would be misleading to speak of an Ontario Program of IBI.

Unlike the Lovaas method, TPAS puts a predominant emphasis on the analysis of verbal behaviour. The program is guided by research from Dr. Mark Sundberg, Dr. James Partington, and Dr. Jack Michael

(Sundberg & Michael, 2001; Sundberg & Partington, 1998). These authors have developed programs with roots in ABA. Thus, both the Lovaas method and TPAS are rooted in the same principles. The primary assessment tool being used to develop a language program in TPAS is the Assessment of Basic Language and Learning Skills guide (ABLLS). The ABLLS contains task analysis for the many skills necessary to communicate successfully and to learn from everyday experiences that have been specifically formatted for children with language delays (Partington & Sundberg, 1998).

Although originally intended for very young children with severe autism, TPAS now provides educational support for parents, and transition services to provide support for children who are in treatment to move into new environments, including schools and community centres. See the Ontario Ministry of Education Report #140 (2007) for details about the school program. The specific goals of the IBI program for children in TPAS are to improve language and communication skills, promote self-help abilities, increase appropriate behaviours while decreasing challenging behaviours, and build social skills. IBI programs are delivered by highly-trained specialists on a one-on-one basis or in small groups. At least 20 hours of therapy are required each week. Parents play an important role in the success of the program. TPAS offers specialized training to parents so they can help their children reach each goal. The IBI program is customized to meet the learning needs of each child. Individual program goals are established according to each child's unique strengths and needs. The methods of instruction are tailored to the child's behaviours and needs. Each child's progress is measured at regular periods and the program is adjusted to reflect any changes in the child's learning (Surrey Place Centre, 2007).

Some Approaches Used in TPAS

Teaching Language Using IBI

Early interventions for teaching language most often use DTT methods on a one-on-one basis using flashcards as stimulus (Koegel, Bimbela, & Schreibman, 1996). As mentioned previously, DTT breaks complex skills down into parts so that they can be learned more easily. Early indications were that this method was not shown to be efficacious (Lovaas, 1977), as language gains were minimal and what was learned during clinic did not generalize to more natural environments. On the contrary, it has been argued that initial language skills specifically may be taught using this format (Sundberg & Partington, 1998).

For example, these researchers suggested that a nonverbal child with autism should first be taught how to request or ask for an object (Sundberg & Partington, 1998). The method follows a social-pragmatic developmental approach (Prizant & Wetherby, 1998). The researchers claimed that this is an excellent starting point as the command intrinsically has a built-in reinforcement; that is, the child is given the item that he or she requested. If the object picked to be requested is one that the child particularly likes, this is further reinforcement. During initial training, a set of objects is chosen. These objects must all be desirable to the child. Equally important, these objects must be significantly different from one another by name and sight so that the child is not easily confused about which object is the topic of the command. Also, in the initial part of the training, the desirable object is always within the child's field of vision. Thus, the child always sees the object that he or she is being asked to ask for. Once the child has been trained to ask for the objects that he or she likes, the next step is to remove the object from the child's

field of view. This is done in a systematic manner. First, the child will be prompted to ask for the object. For example, the therapist may ask the child what object he or she wants. The more a child learns to ask for the object, the fewer prompts are given by the therapist. Once the child is able to ask for the object without the object being in his or her field of view and without prompts, the child is considered to have mastered the command task. Finally, the desired language response must be practiced in natural environments to promote generalization of the skill.

After learning five to ten commands the child moves on to learning how to name objects (Sundberg & Partington, 1998). The same principles used in learning how to make commands are used in learning how to name objects. First, the objects to be named must be objects that are of interest to the child. Second, the objects to be named must be sufficiently different from each other and must have names that will not present too much difficulty for the child. In fact, researchers suggest that the command objects are a good place to start the naming task as the child is already familiar with these objects. At first, the teacher may use verbal prompts to increase the child's correct response rate. For example, the therapist may say, "Give me (name of object). What's that?"

Concurrent with learning how to name objects, children also learn how to receptively discriminate between these objects, for example, by touching a specific object that has been requested. This is evident in the prompt used in the previous naming the object example. Receptivity is taught in three different ways, by: function, features, and class. To demonstrate the use of function, for example, if the therapist is asking the child to touch his or her toy bear, the therapist may say, "Touch the thing you play with." Features relate to characteristics of the

object: its shape, size, colour, or texture. So, following with the bear example, features would include such things as feels furry, has legs and arms, and has brown eyes. Classes are the larger group to which the object belongs. Thus, the bear belongs to the class of animals.

In an attempt to make language ability learned in the centre generalize to other situations, the social-pragmatic developmental approach described above has been slightly modified. The natural language paradigm has six main components (Koegel & Koegel, 1995). First, teaching is child-directed. That is, the therapist initiates teaching conversation only when the child attends to the target object or if the child makes an attempt to communicate about the target object. Second, to promote generalization, teaching only occurs in natural settings. Third, prompts such as time delay and verbal prompting are used to promote language development. Fourth, natural consequences are used (Koegel & Koegel, 1995). That is, if the child asks for an object, he or she is given that object. Fifth, all attempts at the target communication are reinforced. These include inaccurate attempts that are also shaped. Sixth, the paradigm emphasizes natural interactions, such as turn-taking. The natural language paradigm has been shown to be equally effective at developing articulation when compared to more traditional approaches to language development (Koegel, Camarata, Koegel, Ben-Tall, & Smith, 1998). However, Koegel et al. (1998) found that only the natural language paradigm generalized articulation improvement in a conversation.

The Picture Exchange Communication System

Another program used by TPAS is the Picture Exchange Communication System (PECS) (Frost & Bondy, 1994). Similar

to the natural language paradigm, the main emphasis of the program is to elicit spontaneous communication. In the initial phase of the program, an extra person is needed by the therapist to help teach the child. In a given trial, the therapist holds an object desirable to the child on one hand while on the other hand he or she holds a card with a picture of the object. The extra person positions him or herself behind the child, physically prompting the child, if necessary, to pick up the picture card. If the child reaches for the object, the therapist gives the picture card instead. Once the child has the picture card, he or she is encouraged to give it back to the therapist by putting it in the therapist's hand. The therapist prompts the child to give the picture card by showing him or her an open hand. When the card reaches the therapist's hand, he or she says, "I want (name of object on the picture card)." Physical prompts are decreased until the child is able to reach for the card in 80% of the trials. Lastly, open hand prompts are decreased until the child initiates giving the picture card to the therapist in 80% of the trials.

Teaching Schedules Using Intensive Behavioural Intervention

Besides language delay, a second major issue with children with autism is that they very often are unable to follow routine independently. Thus, most children need to be supervised at all times, and most activities are initiated and completed with adult prompts. Thus, teaching schedules is part of the TPAS program. As an example, McClannahan & Krantz (1999) described the use of picture activity schedules as a means for development of independence of children with autism.

The Future of IBI in Autism

The Lovaas (1987) and McEachin et al. (1993) studies have provided the autism

community with much hope about the positive outcomes their children may experience if they undergo IBI. However, these studies are not without controversy (Boyd, 1998; Gresham & MacMillan, 1998; Kazdin, 1993; Mesibov, 1993; Mundy, 1993; Schopler et al., 1989). Thus, more studies need to be done to fully establish the efficacy of IBI in autism. Although several published studies have reported positive outcomes (Birnbauer & Leach, 1993; Sheinkopf & Siegel, 1998; Smith, Buch, & Gamby, 2000) using the Lovaas et al. (1981) manual, as have other IBI programs including TPAS (Ben-Itzhak & Zachor, 2006; Eikeseth, Smith, Jahr & Eldevik, 2002; Eikeseth, Smith, Jahr & Eldevik, 2007; Freeman & Perry, 2006; Remington et al., 2007), none have reported gains to normal functioning as found in the Lovaas' 1987 study. Outcome studies of the Ontario autism program will thus be of great interest. Issues that should be examined include: determining what elements of the IBI program are most effective, including qualifications of the instructors and quality of instruction; identifying the characteristics of the children who most benefit; and clarification on whether continual IBI is needed to maintain achievements, and, if so, for how long. Perhaps most importantly, a question that needs to be addressed is whether or not IBI programs are cost-effective (i.e., in the long-run, are they cost-saving to the government). Such information will be very important to the government when it comes time for reassessing the program for continued funding. Such studies also will provide parents with a clearer picture about what to expect from this treatment method.

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