

# **Treating Children With Autism**

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## **Chapter 1**

### **Introduction**

Autism has risen to almost epidemic proportions in the United States with current estimates suggesting that the probability of having a child born with autism is about 1 out of every 166 births. In reaction to this startling number various treatment programs have been developed to address the needs of this growing population. Starting with the ground breaking work of Dr. Ivar Lovaas at UCLA behaviorists have been on the frontline fighting to remediate deficits related to a diverse set of problems associated with the autism spectrum disorders. Many other approaches have sprung up in an attempt to duplicate or surpass the treatment effectiveness of the behavioral approach. Many alternative treatments claim equal or superior results but none to this date have been able to duplicate the research base which supports the efficacy of a behavioral approach. In our opinion these other approaches, although not a substitute for a behavioral approach, often highlight an area of focus allowing an expansion of behavioral principles to new areas of treatment.

The advent of Verbal Behavior as described by Sundberg and Partington (1998) led to a focus on Manding (requesting) earlier in treatment than what was traditionally done in a standard Lovaas approach. The use of the ABLLS provided an alternative to a standard Lovaas flow chart that was not available to everyone. Verbal Behavior also increased the focus of therapy on referencing objects by form, function and class and being able to appropriately respond to verbal stimuli (Intraverbal responding). The work of Stanley Greenspan (1997) led to more of a focus on increasing what he calls circles of communication during downtime play. Greenspan's work also highlights the need for

parental involvement. Whether it is the integration of principles of Theory of Mind, the teaching of PEC's, the use of social stories or video modeling each of these new approaches adds to the basic Lovaas approach. We do not need to throw out and replace a standard Lovaas approach when integrating these other approaches. The principles of behaviorism can be used to understand what added benefit these other approaches may have and to systematically integrate them into a full Applied Behavior Analysis approach.

There is so much out there about treatment that many therapists trying to integrate these approaches are left wondering what to do next when developing a treatment plan. Those who follow the Lovaas approach have access to the Lovaas flow chart and move from one program to another as a child masters items. The ABLLS-R tries to provide guidance on what program to move on to after one is mastered. What is missing in the field of autism treatment is a comprehensive theoretical rationale for moving from one program to another.

New Senior therapists, who run intensive early intervention programs on a day to day basis, are often in the dark as to why they are doing what they are doing. They move on to the next program not really understanding why the program just mastered had to become a solid skill before we could move on to the current program. This book is an attempt to provide a theoretic rationale for programming. Our goal is for readers to more fully understand how behavioral skill sets build upon one and other resulting in developmental progression. Developmental progression occurs as behaviors are taught and combined into more complex behavior patterns. As this occurs an individual is able to move more comfortably through their world. They can solve problems and accomplish

goals more readily. The ultimate goal is for people to increase their ability to function in the world and achieve what they desire to achieve.

We begin by discussing the most basic research in the field of Autism and Autism treatment. We have mainly focused on research which has been consistently replicated. Our hope is that this information will provide a backdrop for the beginning therapist to understand that Autism is largely a genetic condition which has its basis in the neurological functioning of a person's brain. There are critical times when the brain is developing new dendritic connections and pruning old connections. Early intervention is an attempt to capitalize on the plasticity of a child's brain to remediate deficits before they become debilitating. Understanding that early intervention is in essence neurological habilitation helps a therapist deal flexibly with programs. Every child has strengths and weaknesses. As early interventionist we must build on a child's strengths and their weaknesses.

The next chapter provides information on basic principles of behaviorism. When discussing behavioral principles we do use hypothetical constructs to some degree. We discuss expectation and an internal locus of control. From a pure behavioral perspective these are hypothetical constructs that are often used as explanatory fictions. When we discuss expectations or an internal locus of control we are not using these terms as explanations. These terms could be removed from this writing completely. When we mention hypothetical constructs they should not be thought of as explanatory fictions, we use them more as alternative (cognitive) descriptions. They do not add anything to a pure behavioral account of what is happening. We use these constructs not as explanatory fictions but as a way to increase heuristic understanding in a society that values cognitive

explanations. This book could have been written from a purely behavioral perspective but we feel people will get more out of the book with a few cognitive hypothetical constructs presented as descriptions to encourage heuristic understanding. The use of cognitive hypothetical concepts also makes the work less dry and robotic.

Behaviorism can be understood by the average person and can be used to remediate many problems. Behaviorism involves using a systematic approach of observing and recording behaviors and adding a systematic plan to help children understand, predict and control their environment. The principles of behaviorism, much like the principles of physics, are general and apply to all organisms. Systematic use of the laws of behavior change allows a therapist to help children grow intellectually, emotionally and socially. Behavioral laws much like physical laws apply whether you understand or believe in them or not.

After the chapter on Behaviorism we turn to discussing some developmental patterns. We believe that it is very important to understand typical developmental patterns. Developmental patterns are basically complex behaviors. The question is at what level of complexity are behaviors occurring. Highly complex behaviors are considered advanced development. Yes, there are neurological changes that occur as the complexity of a child's behavior increases. Neurological development occurs as complex behaviors are learned. We do not need to wait for neurological readiness. Neurological readiness occurs as prerequisite behaviors are learned. We hope to provide new therapists with an understanding of how behaviors build upon one and other to become complex behavioral patterns. We hope that when a child can not learn a program or task that the therapist will

be able to look at the child and the task and break the task into smaller or easier tasks so that they can work toward attaining the larger task.

After this background we will move into describing the building blocks of therapy, including developing environmental acceptance and promoting environmental expansion. Here a therapist learns how to develop rapport with a child. We begin to present the concept of motivation and give the therapist tools to understand and harness motivation. Motivation is a key to success as a therapist. Without understanding and being able to harness motivation a therapist and the child's program of change will flounder. As motivation is harnessed and the child moves in the direction of being motivated by more objects and activities the focus of therapy moves to building self-initiation and the ability to communicate with non-verbal gestures. Next, the child learns about contingencies and how to maximize control over the world by being responsive to contingencies.

We next move on to discuss learning to label the world based on physical characteristics. The major work of building socially derived perceptions and labeling those perceptions originally will be developed through the three stage process of providing a physical signal to the child, waiting for the appropriate behavior, and reacting to the child in a fun way when the behavior occurs. Here the child is trying to achieve a desired goal. Next, as perceptions and the ability to label and integrate labels become more complex, the therapeutic method will continue to rely on the above three step process but will begin to rely more and more on acquisition of knowledge guided by information in the form of rules.

The child is taught to perceptually make distinctions between objects and sounds based on if they are the same or different. The child learns to match 3-D to 3-D objects, 2-D to 3-D objects, 2-D to 2-D objects and then to construct, sort and pattern the objects learned. The child is then taught to receptively interact with the perceived objects and eventually to label the objects. The child learns to imitate single movements and then complex movements and eventually to imitate vocal and verbal sounds. At the same time, the child can be taught to respond to vocalizations. All of these skills culminate in the ability to request concrete objects and label concrete objects.

The stage is set for more complex behavioral patterns as the child starts to learn about the world in a more abstract sense. Relations between things are not necessarily based on physical characteristics but now are based on a socially derived (decided upon by society) meaning. Here the child can start to rely on information provided, although much learning is still based on achieving desired goals. The child is taught to relate objects and abstract ideas and to integrate objects and ideas in novel ways. At the same time, the child responds verbally to cues and then open ended questions which lead into the natural give and take flow of conversation. Next, the child starts to understand abstract social relations and gains a more abstract understanding of self and others.

The child is helped to move through developmental stages by harnessing natural motivation and using a systematic approach to progress them through adaptive stages of functioning. In other words a child develops more complex behavior patterns and his or her behavior patterns become more functional at solving problems in the child's world. Behaviors at this stage could be physical behavior patterns or the manipulation of verbal behavior patterns to accomplish goals in the world.

We close with a discussion of special topics highlighting certain challenges facing children with autism and their therapists. Attention and the direction of attention to socially appropriate objects and people in the world is one of the biggest keys to a successful outcome. We will give special attention to attention. Next the discussion turns to self-stimulation or as we prefer to call it self-soothing behaviors. Self-soothing behaviors are very distressing to parents and often set the child apart obviously from their peers. Finally we provide background neurological information in the appendix for people that are interested in more information about the information processing model we use when assessing a child's challenges.

Programs are presented at the table to structure the learning periods. Play therapy is used throughout as a general rule between programs. We rely on increasing interactive patterns and teaching the child how to play with developmentally appropriate toys on down time between programs. Programs are also presented in a play format when possible, using the child's natural motivation and interest in the world. All programs are taught with the overall emphasis of guiding the child to the next higher level of adaptive functioning. Building attention, self-control, interest in the physical world and abstract world of thought and language is an ongoing focus, realizing that all of this comes to fruition through the most important aspect of life and therapy, the development of a deep, emotionally engaged relationship with other people.

## **Chapter 2**

### **State of Current Knowledge Related to Autism**

Covering the vast amount of research on autism is beyond the scope of this book. There are texts such as the Handbook of Autism and Pervasive Developmental Disorders (Volkmar, Paul, Klin & Cohen, 2005) and The Neurobiology of Autism (Bauman & Kemper, 2005) which provide a fairly comprehensive overview of what is known and not known about autism. There has been an enormous amount of research related to autism which often leads to unsupported or minimally supported results. We have tried to focus here on research which consistently supports certain conclusions about autism.

There is estimated to be about 10 people diagnosed with Autism for every 10,000 people (Bauman & Kemper, 2005). When associated conditions such as Aspergers Disorder and Pervasive Developmental Disorder- Not Otherwise Specified (PDD-NOS) are included the number is estimated to be about 27.5 people on the spectrum for every 10,000 people (Bauman & Kemper, 2005). More recent surveys have suggested a rate as high as 60 people on the autistic spectrum for every 10,000 people. These estimates would suggest that there are between 220,000 and 483,000 people diagnosed with autism that are under 20 years of age in the United States (Bauman & Kemper, 2005).

Genetic studies related to autism have suggested there is a huge disparity between the co-occurrence of autism in twins with identical genes (monozygotic) and twins whose genes are no more identical than non-twin siblings (dizygotic). Autism occurs 60% of the time in the identical twin of a child with autism. In non-identical twins, Autism only occurs 5% of the time. Non-identical twins are no more alike genetically than non-twin siblings and carry no greater risk. Autism is thought to be 90% genetic and 10%

environmental. This huge difference suggests that autism is the result of multiple genes (Rutter, 2005). The numbers of genes involved is estimated to be between 2 and 10 (Pickles, 2000).

Autism is thought to involve a broader condition that includes non-diagnosable social functioning deficits occurring in 10% to 20% of first degree relatives of a person with autism. This broader expression of autistic symptoms is not associated with mental retardation or epilepsy (Rutter, 2005). Autism is not considered to be one condition. It is thought to be many similar conditions resulting from different combinations of genes (Rutter, 2005). Genetic studies have suggested that Autism is caused by multiple genes that come together to produce different variants of the autistic picture and includes a non-diagnosable form in some first degree relatives.

Autism is found to occur in males more than females and it is estimated that there are 4.3 males for every one female diagnosed with autism. Autism is associated with mental retardation in about 70% of cases (Fombonne, 2005). Approximately 65% of people diagnosed with autism also have anxiety and depression (Lainhart & Folstein, 1994; Klin, Mcpartland, & Volkmar, 2005). The areas of development that are often delayed in young children with autism include problems with nonverbal communication, social skills, verbal communication, selective visual attention to social cues, development of play skills and deficits in imitation and emulation abilities (Chawarska & Volkmar, 2005).

Deficits in imitation are considered to be a primary deficit in autism which can lead to problems in other areas such a play (Rogers, Cook, & Meryl, 2005). In addition

initiating complex behavior in an unstructured setting is considered to be a fundamental deficit (Tsatsanis, 2005).

The symptoms of Autism change as a child experiences the world and learns to adapt in the world. The maturation of their neural and behavioral systems along with new learning experiences and the quality of social reciprocal interaction results in a changing picture of autism as the child matures (Loveland & Tunali-Kotoski, 2005). This changing symptom picture results from the maturation of the nervous system which is achieved through providing a strategically designed enriched environment, the teaching of compensatory strategies to get around neurological deficits, neurological habilitation strategies, and the teaching of adaptive and social skills.

Neurological studies suggest that Autism is a neurological disorder that constrains information processing. More specifically information processing breaks down as information is integrated from different brain regions. Imaging studies have suggested that there is intact functional connectivity between brain regions during simple tasks but that functional connectivity between brain regions breaks down for more complex problem solving, social and language tasks. The neurological abnormality in autism is considered to be pervasive. Social, communication, and information processing tasks require a high degree of integration and are most effected when integration of information processing breaks down. Numerous specific brain regions have been the target of research with mixed results (Minshew, Sweeney, Bauman, & Web, (2005).

Neuro-chemical studies consistently find that there are increased blood levels of serotonin (5-HT) in people with autism (Anderson & Hoshino, 2005). This finding has not led to productive treatment options.

Research on deficits in executive function related to the function of the prefrontal cortex has most consistently supported the idea that mental flexibility including shifting attention and changing mental sets is compromised in people with high functioning autism. Difficulty with mental flexibility predicts problems in social understanding and competence (Ozonoff, South, & Provençal, 2005).

Research has suggested that typically developing children have a preference to orient to the human voice and face. Children with autism do not typically show this preference and are more likely to orient to mechanical non-human sounds and physical objects (Klin, Jones, Schultz, Volkmar, 2005). There is also preliminary research to suggest that children with autism may have basic difficulties with perception-for action (Klin, Jones, Schultz, Volkmar, 2005). This research could also suggest that children with autism may have basic difficulties forming perceptions of the environment. These difficulties could directly lead to problems perceiving faces, human language, and social situations and lead a child to focus attention on information that is less complex such as mechanical sound and physical objects.

Lovaas (1987) found that preschool age children with autism who received intensive behavioral treatment of approximately 40 hours of therapy a week for two years resulted in 47% of the children achieving normal intellectual and educational functioning as compared to only 2% of children with autism who received less intensive therapy. The Lovaas approach has been criticized on the grounds that it is a highly adult directed approach that involves bringing behaviors under tight stimulus control which interferes with the spontaneous use of the behavior (Carr, 1981). It is also suggested that using too much structure and artificial reinforcers will interfere with generalization to the natural

environment (Spradlin & Siegel, 1982). Finally the Lovaas approach has been criticized as not being representative of natural adult-child interactions (Schreibman, Kaneko, & Koegal, 1991). Because of these criticisms naturalistic approaches have been developed. Naturalistic approaches have not demonstrated similar or superior intellectual improvements in children with autism as compared to the Lovaas intensive intervention program (Lovaas, 1987).

## **Chapter 3**

### **Review of Behavioral Principles**

In this chapter the goal is to outline certain behavioral principles and give basic background information about behaviorism to help the reader better understand what guides our thinking about treatment. We will cover respondent conditioning, operant conditioning, social learning, and new information on derived relational responding. We also provide an outline of applied behavior analysis which is the guiding therapeutic method that we use to progress a child's development.

#### **Classical Learning**

Sensory inputs from the external world have either excitatory or inhibitory effects on the central nervous system. Homeostatic equilibrium of the central nervous system is the result of interplay between reflexive excitatory and inhibitory effects of the incoming sensory information. The central nervous system collects and organizes the incoming information and respondent conditioning (classical learning) is the most basic process of integrating the information from the external world (Pavlov, 1927/1960). Classical conditioning also known as respondent conditioning is referred to here as classical learning.

Classical learning is stimulus-stimulus pairing. An unconditioned stimulus evokes reflexive autonomic reactions in an organism. If a stimulus that does not cause the autonomic reaction (S) is paired with a stimulus that does (UCS) it becomes a conditioned stimulus (CS). In other words a stimulus that did not evoke a reflexive autonomic response now evokes the reflexive autonomic response as a result of being paired with a stimulus that did originally cause the response. Speaking in this way makes

it difficult to understand how to use the principles of classical learning in every day life. For that reason we will provide some heuristic explanatory fictions to help people understand how classical learning can be used in day to day life.

Classical learning (Conditioning) allows an individual to predict the occurrence of environmental events based on an earlier cue from the environment. Children will often associate certain activities with certain therapists and request the activity every time the child see's the therapist. Here the child sees or hears the therapist (environmental cue) and anticipates certain behaviors and activities from the therapist. As the child anticipates a connection between environmental events, certain environmental cues, like the therapists appearance, begin to take on the emotional characteristics of what that environmental cue predicts. If the therapist does not initiate the behavior expected the child will often try to communicate with the therapist by whatever means possible to inform the therapist about what they expected. The ability to change behavior based on consequences will be described later as learning by consequences. Through classical learning the child learns to associate certain environmental events. When the phone rings mom walks to the phone. When the dinner bell rings food is often on the table.

Children learn to predict what will happen next based on the perceptual cues they experience. If the result of the prediction is better than the child expected, excitatory learning takes place (Resorla, 1968). As excitatory learning takes place the early cue (environmental event) takes on the stimulus qualities of the predicted event. What do we mean by "Takes on the stimulus qualities"? Suppose a child hears the sweet sound of bells and music coming down the street. Every time after hearing these sounds an ice cream truck pulls up and the child gets an ice cream bar. The ice cream bar has the

stimulus quality of evoking salivation. When the music is associated with the child receiving an ice cream bar the music takes on the stimulus qualities of the ice cream bar. In other words the music evokes salivation. The music will also come to evoke other autonomic responses such as a feeling of excitement in the stomach, shaky limbs or an increased heart rate. These autonomic responses are usually referred to as emotions and are the basis for what people talk about as emotional intelligence. What is actually occurring is basic classical learning and learning by consequences which are outside of the realm of verbal behavior. Since classical learning and learning by consequences do not rely on language to be effective the most salient concomitant experience people have are their experience of emotions. When a person behaves in a certain fashion without the ability to put into words why they behaved as they did their behavior falls within the area of emotional intelligence.

As mentioned earlier children learn to predict what will happen next based on the perceptual cues they experience. If what is predicted is better than the child expected, excitatory learning takes place. If the cue overestimates the result, inhibitory learning takes place and the process of extinction begins (Resorla, 1968). In other words the earlier cue (environmental event) predicts a big payoff but you only get a small payoff you learn that the environmental event did not predict the big payoff. Because the cue did not accurately predicting the result you learn that the result will not occur to the magnitude you want when that cue is available and the cue does not take on the stimulus qualities of the predicted event. The cue may take on negative emotional stimulus qualities resulting from the under prediction. If the music does not consistently predict ice cream bars the music will not evoke salivation, or heightened positive emotions. If the

music used to predict Ice cream bars but now Ice cream bars never follow the music the music may produce negative emotions. Finally, if the result of the prediction is as expected no learning takes place (Resorla, 1968).

Excitatory learning involves the cue accurately predicting the second environmental event. The child learns that when one event occurs, the second event always follows. The child has learned a predictive relationship between two events. If the expectation is disconfirmed because the second environmental event didn't occur as expected extinction of the predictive relationship will begin. The child will no longer believe that the second event is going to happen after the first. Associated with this predictive ability are negative and positive emotional states driven first by the stimulus qualities of the predicted event and secondarily by the history of negative and positive predictive experiences generated around the stimuli. For example, the process of extinction usually evokes the emotional experience of anger or rage.

The behavior of a child can roughly be divided into behavior that is voluntary and behavior that is involuntary or reflexive. Voluntary behavior is very goal directed and is strongly influenced by what occurs after the behavior or in other words the consequence of the behavior. Involuntary behavior is evoked by environmental events causing sensory stimulation which results in reflexive behavior, emotions and physiological reactions. Some environmental events naturally cause reflexive behavior such as orienting to the environmental event, emotional reactions and physiological responses. Events in the world that do not ordinarily cause behavioral reflexes, emotional and physiological responses can start to cause these effects if they are predictive of an event in the world that automatically causes the reaction.

A final important principle from classical learning involves the process of reciprocal inhibition. The theory of reciprocal inhibition suggests that two opposite emotional states can not exist simultaneously (Wolpe, 1958). This principle can also apply to behaviors and physiological reactions. You can not run and stand still at the same time or sweat and not sweat.

Classical learning has many practical implications for the treatment of children with autism. Children who have anxiety reactions can, through the process of reciprocal inhibition, become comfortable with the environmental events that cause the anxiety reaction. The aversive environmental event can become predictive of an event that causes an incompatible response resulting in a decrease of the aversion to the previously aversive event. At a basic level classical learning suggests that a child can be comforted by increasing the predictability of their world. Physiological, emotional and behavioral instability can be stabilized by implementing routines and by adding structure and consistency to their lives. A child does not have to be continuously affected by the environment in a distressing way. An understanding of how environmental events relate to one another provides us with tools which allow us to change the child's reactions to the environment.

For example, suppose a child gets very anxious around crowds of people. The crowd, which is an environmental event, is resulting in the reflexive emotional response of anxiety. If we can make the crowd a predictive environmental event for the attainment of fun and excitement, the child will no longer be anxious. When they experience crowds in the future they will anticipate the fun exciting event. The end result is that the crowd of people will no longer cause the same anxiety reaction in the child.

## **Learning by Consequences**

Classical learning as just described mainly teaches a child to be able to predict what is going to happen in the world around them. A child gains control through the ability to predict how events in the world fit together. Classical learning also gives us a way to change how environmental events are experienced as well as a way to change reflexive behavior.

Learning by consequences (operant conditioning) allows a child not only to be able to predict what is going to happen from an event they experience but also to control what is going to happen through altering their own behavior. Behavior does not have to be reflexive and at the mercy of environmental triggering events. Behavior can be purposely emitted without triggering events from the environment. A child can move out into the world and actively seek out environmental triggers.

Children and adults learn practical information about the world by interacting with the world, learning to predict what is going to happen, and changing their behavior based on previous results obtained when interacting with the world. The law of affect basically says that behavior that is successful at achieving its goal will occur more often and behavior that is not successful at achieving its goal will decrease (Catania, 1998).

Incentives to do things in the world can be categorized as intrinsic to the task and extrinsic to the task. Intrinsic tasks have positive and negative value built into the task. Working usually has some negative value and often people would quit working if it wasn't for the extrinsic incentive of receiving a pay check. Going mountain climbing for some people may be intrinsically rewarding and for others intrinsically aversive. Intrinsically motivated behavior is maintained by the natural pleasure a child receives

from the activity. Extrinsic motivated behavior needs to be arranged by a parent, teacher or the larger society as a whole. In other words extrinsically motivated behavior is a social phenomenon.

Providing therapy to progress a developmentally delayed child can be much more enjoyable to the child if the therapist can take advantage of as much intrinsic motivation as possible. A flexible, clear, understanding of what is intrinsically and extrinsically motivating to the individual child is an important part of motivating the child to progress. Intrinsic motivational factors and activities should always be considered when extrinsic motivation is lacking and visa versa. Extrinsic and intrinsic motivations are usually considered to be controlled by states of deprivation and aversion. You are not motivated by extrinsic or intrinsic rewards if you are satiated with those rewards. The only way to not be satiated is to not have access to them. Children do and say things in the world to get something they do not have or to escape from something they do not want.

Learned passivity can result when all good things come unrelated to contingent behaviors and instrumental effort just as learned helplessness can occur from aversive stimulation which is not contingent on behaviors. Children who are often exposed to punishment that is not contingent on their behavior become overly cautious and nervous. Dealing with and solving contingencies to achieve control over desired outcomes stabilizes a child's behavioral, emotional and physiological well being. The mind of a child who is not solving contingencies on a daily basis will be confused and chaotic and the child will appear to be out of touch with reality. Adding structure and a program designed to place contingencies before a child on a daily basis will lead a child to better

contact with reality and feelings of confidence related to understanding and knowing how to control the world.

When trying to decide what will motivate a child to learn the therapist should always keep in mind the Premack Principle which states that behavior occurring at a high frequency can be used to increase the rate of behavior that occurs at a low frequency? Premack states that: “For any pair of responses, the independently more probable one will reinforce the less probable one” (Premack, 1962:255). For example, suppose a child likes to eat pie but does not like to eat vegetables. If the child has to eat vegetables before they can eat pie vegetable eating will increase. The Premack Principle is also called “grandma’s law”.

When a child with autism learns a new behavior, the behavioral response is tied to the context in which it was learned and it may not readily generalize to a new context or environment. New tasks are learned more easily under familiar, consistent conditions. After a task is learned in a familiar consistent environment it should be moved to less familiar and more distracting locations. Plateaus in learning are often easily overcome by varying the teaching environment and methods.

Although the principles of classical learning and learning by consequences as described above are separated into two discrete learning processes, they both are occurring at all times. Classical learning leads to predictive relationships between environmental stimuli and effects and alters our reflexes, glandular responses, and emotions. Reinforcement in classical learning occurs when a preceding environmental event accurately predicates a subsequent environmental event. Adults and children, including children with autism, strive to predict and control their environment. Learning

by consequences allows us not only to predict environmental events but also to change our behavior in order to optimize outcomes. When significant environmental events are adequately predicted and controlled the result is adaptive success and a feeling of calm confidence about the child's place in the world.

Learning by consequence (operant conditioning) involves a signal (previous environmental event) which is part of the context in which the behavior will occur. The signal (SD) says that desired outcomes are available in the environment and that efforts to solve the contingencies presented will lead to attainment of desired outcomes. If you solve the contingencies you will get what you desire. Second, we have the response (R), or the child's behavioral attempt at solving the contingency presented. Finally we have the outcome (O) which is whether the child is successful or not at solving the contingencies presented. If the child successfully solves the contingency he/she receives the desired outcome. If the child doesn't solve the contingency the desired outcome does not occur. The desired outcome when it occurs strengthens the behavior that occurred to produce it and the stimulus qualities of the desired items become associated with the signal and other contextual environmental events that predicted the occurrence of the positive outcome.

Learning by consequence is an attempt to control the outcome. If a child controls the outcome better than they expected, the result is *pleasure* in attaining the desired outcome and *pleasure* resulting from being able to successfully control the world. As a result the behavior will occur more often. When a child does not control the outcome as much as they had predicted the behavior aimed at achieving the outcome will decrease. New strategies will be tried if the child has a history of successfully being able to

problem solve contingencies and has learned that when one thing doesn't work try something else. This way of reacting to unsolved contingencies comes from facing many contingencies and having success solving many contingencies. Infants who have a history of successfully controlling stimulation are, later on in life, better able to understand the contingencies between their behaviors and environmental events (Finkelstein and Ramey, 1977). As a child learns that they can be faced with contingencies and successfully solve the contingencies *self-efficacy* and an *internal locus of control* develop.

### **Social Learning**

*Self-efficacy* involves a child developing *expectancies* about future events based on a feeling that the child is personally capable of solving the contingencies presented (Bandura, 1977). An *internal locus of control* is a belief about what causes an outcome (Rotter, 1966). If a child believes that outcomes occur regardless of their own behavior they are said to have an external locus of control. If a child believes that they can control the outcome they are said to have an internal locus of control. Expectancies of positive outcomes results in anticipatory excitement or joy. Expectancies of threat or harm result in sadness (Kirsch, 1990). The expectancies created through respondent and operant conditioning result in emotional changes in the child.

### **Motivation**

All organisms including human beings interact with their environment based on states of need. States of need or states of motivation are mainly controlled through the incoming sensory neurons. A child experiences their environment and body through their senses. All physiological, behavioral and social processes try to maintain homeostasis.

Every sense modality has a set point or a range of nervous stimulation that does not cause the organism to behave in their environment to achieve homeostasis. In other words if I am not cold I do not need to do anything to become warm and conversely if I am not warm I do not have to do anything to cool myself down. This set point is a state of lack of motivation. Any deviation from the set point will cause corresponding states of motivation to act which are proportional to the distance from the set point. It is much less likely that I will engage in behavior to become warm if I am only slightly cold. The colder I get the more likely it is that I will engage in behaviors that will lead to becoming warm.

Human beings are born with unlearned motivation built into the nervous system. These unlearned motivational states, in behavioral terms, are called Motivating Operations. There are unlearned (unconditioned) Motivating Operations and Learned (conditioned) Motivating Operations. Unlearned Motivating Operations are all a product of homeostasis of the organism. Learned Motivating Operations become Motivating Operations by being paired with and predictive of Unlearned Motivating Operations mostly through the process of Classical Learning. Learned Motivating Operations are also acquired to some degree through the process of learning by consequences.

Each sense modality (sight, hearing, taste, smell, tactile, kinesthetic, vestibular, and deep tissue sensors) have a set point at which the organism is not motivated to act. In the process of achieving homeostasis as sensory stimulation decreases or increases from this set point corresponding behavior will occur to restore equilibrium and bring the sense modality back to the set point. This is the basis of unlearned motivation. When it is too bright behaviors will begin to decrease the brightness. When it is too dark behaviors will

occur that increase the brightness. When a sound is too loud behavior will occur that will decrease the sound intensity. The most basic unlearned motivators are based on establishing equilibrium. It should be noted that Motivating Operations are aspects of the environment like the temperature of the room or the presence of a wild bear. The organism experiences the environmental conditions through the senses. The main Unlearned Motivating Operations are:

Set points of deep tissue senses involve hunger, thirst, carbon dioxide levels and sexual arousal. Food deprivation when in effect increases the value of food to the individual and makes all behaviors that have been successful in the past at attaining food more likely to occur. Excessive food satiation will decrease the value of food and increase all behaviors that have been successful at decreasing excessive satiation. Water deprivation when in effect increases the value of water to the individual and makes all behaviors that have been successful in the past at attaining water more likely to happen. Sleep deprivation increase the value of sleep to the individual and increases all behaviors that have been successful at attaining sleep. Excessive levels of carbon dioxide will result in an increase value of oxygen and will increase all behaviors that have been successful at increasing oxygen levels.

Deprivation of visual stimulation will increase the value of visual sensation and increase all behaviors that have been successful at increasing visual input. Excessive visual stimulation will decrease the value of visual stimulation and increase all behaviors that have been successful at decreasing visual stimulation.

Deprivation of auditory stimulation will lead to an increased value of auditory stimulation and will evoke all behaviors that have been successful in the past at

increasing auditory stimulation. Excessive auditory stimulation will lead to a decrease in value of auditory stimulation and there will be an increase in all behaviors that have been successful at decreasing auditory stimulation.

Deprivation of physical sensations will increase the value of physical sensations and increase the likelihood of all behaviors that have successfully resulted in physical sensations. Excessive physical sensation will decrease the value of physical sensations and there will be an increase in all behavior that has been successful at decreasing physical (tactile, warmth, cold, pain) sensations.

Learned (Conditioned) Motivating Operations achieve their motivation altering effect by pairing and prediction with Unlearned (Unconditioned) Motivating Operations. Most of what motivates us is learned. In today's society hunger, thirst, body temperature, and tactile sensations are often taken care of for a child by a care giver. One of the first Learned Motivating Operations is social affiliation. Closeness with a caregiver is often paired with and predictive of equilibrium in regard to the senses described above. As a result social affiliation becomes one of the strongest Learned Motivating Operations.

Children with autism often have sensory issues. In other words their set point for equilibrium is different from the set point of most other people in their environment. This profoundly confounds our understanding of motivating factors in the child with autisms life. It might be difficult for a parent or caregiver to accurately asses the needs of the child. Accurate assessment is necessary to help the child regulate their sensory environment. Accurate assessment of a child's needs leads to paring of the caregiver with biologically determined motivational states and results in establishment of the caregiver and others as secondary or conditioned motivators.

A parent should also be very aware of how environmental events predict successfully establishing sensory equilibrium. Everything that predicts sensory equilibrium will be experienced by the child as a conditioned reinforcer.

### **Derived Relational Responding**

It was mentioned above that research suggests that children can learn new tasks better in familiar, consistent conditions yet one of the main criticisms of the Lovaas approach is that we provide such familiar and consistent conditions that generalization of results will suffer. Some children need extreme consistency to learn and will not learn in a natural environment. If they could, they would be learning much more like a typically developing child. Usually a child with autism needs to originally be taught in a familiar and consistent environment. After a child is taught information in a structured familiar environment the information needs to be generalized into the natural environment.

Derived-stimulus-relations involve a child being able to respond to items and language that they have not specifically been taught. Derived-stimulus-relations involve reflexivity, symmetry and transitivity (Hayes, Barnes-Holmes, & Roche, 2001). Reflexivity involves matching identical items.

**Given a picture of a dog a child will pick an identical picture of a dog.**

Symmetry involves the reversibility of relations. If a child learns to point to a picture of a dog when shown a live dog the child will be able to point to a live dog when shown a picture of a dog without this response being specifically trained.

**Child learns Picture of Dog = Live Dog child will also know that Live Dog = Picture of a Dog.**

Transitivity suggests that if a child is taught to point to a picture of a Dog when shown a live Dog and then learns to Say Dog when they see a live Dog when shown a picture of a Dog the child will say Dog.

**A child learns Picture of Dog = Live Dog and separately learns Live Dog = word “Dog”. Transitivity suggest that the child will know spoken word “Dog” = Picture of Dog.**

Notice that the three combine and the Picture of Dog leads to the saying Dog even though saying Dog to the picture of the dog has never been trained. Derived-stimulus-relations (knowing that a Picture of Dog = Spoken word Dog without being trained in this association) rely on the real physical qualities of the items for generalization. The child relies on what the object looks like or feels like. The child relies on a real physical quality of the item presented.

Children with autism often have difficulty with symmetry and transitivity most likely because of the grater complexity of information processing involved. It may be important to specifically train items in both directions early in therapy to teach the concept of symmetry and transitivity. A focus on teaching symmetry and transitivity early in therapy may help with generalization in later programs. This research also suggests that item mastery should be based on the ability to generalize the items learned.

Once a child is taught specific items in a structured consistent familiar location, the items should be reversed and then practiced in multiple locations with varying degrees of distraction. Generalization should occur between programs, on community outings with therapists and by parents in the child’s daily life. This highlights the importance of parents being involved with therapy.

Relational Frame Theory suggests that when language is involved the same process will occur without the need for similar physical characteristics between the items (Hayes, Barnes-Holmes, & Roche, 2001). For example as the child learns words the words are not necessarily based on physical properties of the objects. The words bigger and smaller are relational and do not apply to any physical characteristic other than the relation.

Big	Big	Big
Small	Small	Small

There is not a size that corresponds to big or small. Something is big or small based on what you are comparing the object to. An elephant is big unless you are comparing it to a building in which case it would be small. When discussing verbal events, the meanings established are socially determined. Big and small are social concepts and have no absolute physical characteristic. Relational Frame theory (Hayes, Barnes-Homes, 2001) suggests that one of the main things we learn with verbal language is socially derived arbitrary relational responding. We respond to how things relate to one and other. Are two things the same, different, distinct, how do they compare? Are two things hierarchically or temporally related? How are they related in space? How are two things related causally? According to Relational Frame Theory what we learn through language is how to frame things by how they relate to one and other.

Relation Frame theory suggests that one focus of therapy when treating children with autism should be teaching them what is the same, different, distinct, what classes

they belong to and how are they hierarchically or temporally related. The child learns to abstract social concepts as they solve contingencies in their environment. The contingencies are presented by the therapist and the child learns the social values of society as they learn to predict and control their worlds.

### **Applied Behavior Analysis**

According to behaviorists learning involves the principles of respondent (classical learning) and operant conditioning (learning by consequence). The systematic application of these principles is often referred to as Applied Behavior Analysis or abbreviated as ABA therapy. Applied Behavior Analysis is the systematic application and adaptation of behavioral principles using the single-subject-design. The single-subject-design looks at an individual and analyzes the individual behavioral responses to antecedents and consequences.

ABA therapists follow the A-B-C model. In the A-B-C model the therapist evaluates and manipulates Antecedents, Behaviors, and Consequences. Antecedents are any discriminative stimulus (any environmental event) that consistently predicts reward or punishment. As a child experiences environmental events, they start to predict from the environmental event what will likely happen next. They change their behavior to try to alter the consequences predicted by the environmental event. After altering their behavior they experience a second environmental event in the form of the consequence of the behavior. Their experience of the consequence leads them to alter their behavior in the future.

Consequences can be discussed in many ways. One standard way to speak about consequences is to define them by if the consequence is presented or taken away

combined with whether behavior increased or decreased. Consequences can be discussed as positive reinforcement, negative reinforcement, positive punishment and negative punishment depending on whether something is added or taken away combined with whether behavior increased or decreased.

	<b>Behavior Increased</b>	<b>Behavior Decreased</b>
<b>Present Stimuli</b>	Positive Reinforcement	Positive Punishment (Type 1 Punishment)
<b>Remove Stimuli</b>	Negative Reinforcement	Negative Punishment (Type 2 Punishment)

If you present something the child likes and the target behavior increases in the future positive reinforcement is said to have occurred. If you present something the child does not like and behavior decreases in the future Type 1 punishment has occurred. If you remove something that was desirable to the child and the behavior in question decreases in similar circumstances in the future Type 2 punishment is said to have occurred and if you remove something that was negative and the behavior increases in similar situations in the future negative reinforcement is said to occur. The above chart provides a handy way to look at and think about consequences. In reality consequences are not so straight forward. Positive reinforcement, negative reinforcement, type 1 and type 2 punishments are always working together and can not be separated. It is really a matter of which is more salient at any particular time.

Applied Behavior Analysis involves the use of the behavioral research strategy of the single-subject-design to change behavior. Learning has occurred when behavior

changes. The basic strategy of ABA therapy involves operationally defining the behavior in question, taking data on some dimension of the behavior, implementing a treatment and observing and recording how the data changes.

Let us first look at how to operationally define a behavior. The target behaviors should be defined in observable terms. Say we want to target a child's frustration level. How do we define frustrations so that it is observable and recordable? Frustration could be defined as physical aggressive acts toward the environment or other's. We may want to go further and spell out what aggressive acts will count. Hitting others, throwing objects, hitting objects, kicking objects, kicking people could all be specified as target aggressive behaviors.

Once we have a definition of the behavior, we want to change, we will want to take baseline data on the behavior. We will record the frequency, duration, latency, intensity or quality of the behavior before any intervention is implemented. Once we get a baseline, our treatment is implemented. A change in the frequency, latency, intensity or quality of the behavior after treatment tells us that the treatment is working. No change in the recorded levels in the above dimensions of the behavior would suggest our treatment attempt was not successful. When a treatment is not demonstrating that it is successful through the data collected it is likely that there is no functional relationship between the behavior in question and the variables you are targeting with your intervention. At this point we would evaluate the variables in question and formulate another treatment strategy.

There are many methods for recording data on each of the dimensions of behavior such as frequency recording, duration recording, and time sampling recording.

The three types of time sampling methods are discrete trials, partial and whole interval recording and momentary time sampling (Rudrud, 2007). Once the method of recording data on a dimension of behavior is determined an experimental design must be chosen.

The most basic single subject design is the A-B design. During the A phase you take a baseline of a dimension of behavior. Then you initiate a treatment (B) and continue taking data. Other single subject design techniques include A-B-A-B design and multiple baseline designs. In the A-B-A-B design you take a baseline, add a treatment, withdraw the treatment and take another baseline and finally add the treatment back. What you would see with an effective treatment is that the data change in a consistent way between baseline and treatment conditions. Baseline data should be collected until the data is stable or shows a consistent trend (Rudrud, 2007). There are ethical considerations that need to be considered when choosing an experimental design. We usually use the basic A-B design because withdrawing a successful treatment would be unethical in most cases.

Usually when treating children with autism we use an A-B design. We take baseline data on some dimension of behavior (A), implement a treatment strategy (B), and continue taking data to see if the trend of the data has changed. A change in the trend of the data leads our direction of treatment. For more detailed information about design strategies please refer to Applied Behavior Analysis (Rudrud, 2007).

For example, suppose a child hits his peers often. First we would record data on the antecedents, behavior and consequences. Johnny hits most often when he is playing with blocks. In each situation where Johnny hits he is approached by a child who wants to play with Johnny and the blocks. Johnny hits the child and the child cries and runs off.

From this information we have the antecedents of blocks and being approached by another child. We have the behavior of hitting and the consequence of the child running away and crying. To evaluate what the controlling variables are in this situation we could manipulate some of the variables. Remove all blocks and give Johnny cars to play with and see if he still reacts to other children by hitting. In the above situation Johnny's hitting is probably being maintained by the child leaving. Johnny is experiencing an aversive situation because of the child's presence. He hits because in the past when he hits other children they leave. He no longer has to deal with them playing with his toys or intruding on his play. In this situation we may develop a plan to have the therapist play with Johnny and his blocks. When Johnny hits the therapist continues to play with Johnny ignoring the hit. Since hitting no longer solves his problem Johnny must come up with another solution. We would often give Johnny other ways to solve this problem as an alternative to hitting. We would also play with Johnny more so that he started to find more rewards when other people were playing with him than he would when he plays alone.

Behaviors can be classified as excessive and deficit. Deficit behaviors are behaviors that do not occur often enough. Excessive behaviors are behaviors that occur too often. In order to increase behaviors reinforcement procedure are used. To decrease behaviors punishment procedures are used.

Rudrud (2007) describes a proactive approach to decrease the use up punishment when changing behaviors. Many behaviors that are problematic are behaviors that occur in excess. Usually problem behaviors are defined in excessive terms by teachers or parents. Johnny hits too often or yells too much. The problem with defining the target

behaviors in excessive terms is that punishment procedures must be used to decrease the behaviors. The proactive approach recommends that the therapist find the opposing deficit behavior and use reinforcement strategies to increase the deficit behavior. Punishment procedures tell a child what not to do. Reinforcement procedures tell a child what to do instead.

For example, Jonny hits children on the playground and in the classroom whenever he is frustrated. Hitting is an excessive behavior. We could provide a consequence (time out) every time Johnny hit someone. The problem with using punishment procedure is that Johnny learns what not to do but is not taught an alternative behavior. Another problem is that all behavior that is occurring is present because it is being reinforced. So in essence when we use a punishment procedure we are overlaying a punishment over a reinforcement paradigm. When the punisher is gone the behavior is still being reinforced and will likely return.

The proactive approach would involve identifying an opposing alternative deficit behavior that we can reward. In the case of Johnny hitting a deficit behavior could be defined as standing with arms comfortably at his sides. We would then set up a program where we rewarded Johnny for having his arms comfortably at his sides when he was frustrated. This is a strategy which uses differential reinforcement of an incompatible behavior often referred to as a DRI procedure.

Another alternative would be to use a DRO procedure. DRO stands for differential reinforcement of other behavior. In general, Johnny would be rewarded on an interval schedule for the absence of hitting. As long as Johnny is not hitting at the end of the interval Johnny would be rewarded. One final means of decreasing the behavior

would be to place the behavior on a schedule for extinction. If the behavior is being maintained by the reaction that Johnny gets when he hits, we can ignore the hitting and not respond. Since Johnny would no longer receive the reward for the behavior the behavior would decrease.

When teaching new behaviors with an applied behavior analysis approach we need to start with a task analysis. We break the behavior that we want to teach to the child into its component parts. A task analysis provides consistency in teaching and allows you to assess the learner's skills (Rudrud, 2007).

Many of the tasks we teach children are tasks that the child was never able to master. Since the child could not master the tasks the child could not progress developmentally. The developmental perspective provided in the next chapter provides an outline of some of the developmental tasks that need to be addressed. Many of the tasks can be determined by watching typically developing children. Usually we want to work on the simplest developmental tasks first because more advanced skills build on earlier skills.

If we are going to teach a child to come when you call the child's name the child must have mastered earlier developmental tasks such as the ability to understand and differentiate words, knowledge of contingencies presented in the environment and the ability to stand and to walk. A task analysis would identify every skill involved in coming when called. Each skill would then be individually taught. Each individual behavior would be chained together to make the more advanced behavior of coming when called. A task analysis is never complete until we are at a level with the task analysis that allows us to teach the behavior to the child. If the child can not learn the

individual steps the steps are broken down further until we have a behavior that we can teach the child with the discrete trial format. There are many ways to teach behaviors including forward chaining, backward chaining and total task presentation. Total task presentation is often used with typically developing children. Children with autism often learn faster with forward and backward chaining of behaviors.

The most basic way to teach new behaviors is to shape the behavior. Shaping refers to the process of differential reward of behaviors that approximate a target behavior. You provide positive reinforcement for closer and closer approximations of the desired behavior. Pure shaping takes a fair amount of time. We often use prompts to speed the learning of behaviors. If someone does not know what behavior is expected you prompt the correct behavior. There are many types of prompts including physical hand over hand prompting, imitative prompts or modeling, gestural prompts, verbal prompts and pictorial prompts. You can also have environmental extra-stimulus and within-stimulus prompts. Prompts when added need to be faded systematically. There are many ways to fade prompts including the most to least method, the least to most method, graduated guidance and try another way (Rudrud, 2007). In general it is important to use the least invasive prompts and to fade prompts as quickly as possible without losing the behavior.

Applied behavior analysis uses a very systematic approach to teach new behavior. The new behaviors are chained together to create complex behaviors. Often we decrease distractions to simplify behaviors enough so that they can be learned by children with autism. Because of this, behaviors that are taught in a distraction free or distraction low environments need to be systematically expanded. Many behaviors that are learned by

children with autism are very situation and environment specific. We have to program for stimulus generalization and response maintenance. One of the best ways to program for response maintenance and stimulus generalization is to tie the behaviors that are learned into functional skills that are rewarded naturally from the environment and the community.

After a behavior is learned in a distraction low environment the behavior must be practiced in many natural environments. People who interact daily with the child need to be very familiar with what the child knows and should be given a plan to systematically generalize the learned behaviors in the natural environment. Behaviors that work for the child and make the child more successful at getting what he or she wants in the world will be maintained better than behaviors that have no practical significance to the child. Behaviors that the child wants to learn will be remembered. Schedules of reinforcement need to be thinned and reinforcement has to be transferred to natural reinforcement from the environment and society. The child should be taught how to self manage antecedents and consequences (Rudrud, 2007).

## **Chapter 4**

### **Developmental Issues**

An infant is born into an environment which, from a perceptual standpoint, is undifferentiated. Initially, the child does not know the difference between the self and the non-self. The child first begins to experience sensations from outside itself and inside itself without the ability to differentiate between the two. Sensory stimulation from all the senses are bombarding the child's central nervous system whose job it is to make sense out of all of this new information. The main problem faced by the child is to learn to integrate and understand all of this new information. The first task for the child is to become comfortable with the physical, visual, auditory and vestibular sensations that impinge on the child from the environment and to integrate these sensations into meaningful perceptions.

Originally the child has very little ability to control the sensations impinging from the environment or emanating from its own nervous system. The child relies on a caregiver to control these sensations and diffuse crying, body movements, and facial gestures become the first functional behaviors the child emits. Through these behaviors the child connects with a caregiver. As a result of these first reflexive behaviors the child connects with his/her environment and initiates contact with a caregiver. As this occurs, contingencies are doled out and eventually reacted to and understood as a way of being more successful at controlling sensations.

As the child learns that there is a visual/spatial outside world and that outside world is separated into discrete objects, the child gains more ability to control sensations. One object may stop hunger while another does not. While this is occurring the child

also learns about the auditory/verbal world and the adaptive function of vocalizations. One cry or movement will bring milk; another results in being picked up or a diaper change. Through interacting with the sensations in this auditory/verbal and visual/spatial world, the child begins to behave through motor functions, motor planning and vocalizations in relation to the perceived world. The child learns to respond to the discrete sensations and to use motor and vocal patterns to imitate, respond to, and manipulate the world. It becomes adaptive to label the differences between things and to respond to them differently.

Originally the child learns to label things based on physical characteristics. Eventually the child learns to label things not based on physical characteristics but instead based on what others say it is or it's socially derived meaning (Hayes, et. al., 2001). Therapy involves systematically building these perceptions of the world to be consistent with the perceptions of the larger society, hence supporting object constancy, teaching the child to label discrete perceptions, and finally, teaching a child to understand how those discrete perceptions relate to one another and what social meaning is attached to each.

Understanding and building complex behavioral repertoires form the basis for advanced developmental patterns. Every therapist should have a strong understanding of typical developmental milestones. In this chapter we will present basic information about typical developmental milestones and provide some commentary related to observations of the struggles children with autism have achieving the milestones. Piaget is widely regarded as one of the fathers of developmental psychology. The work of Piaget is often contrasted with and seen as in opposition to behaviorism. We do not believe that Piaget's

work needs to be viewed as incompatible with behaviorism. Behaviorists do not believe that it is necessary to speculate about structures developing inside the brain. We do believe that the brain changes as a child interacts with the world. We generally believe that we do not need to speculate about what is happening inside an organism to be able to predict and change behavior. Every time a person takes a step forward or says one word to another person neurological changes are occurring in the brain.

Piaget believed that infants are born with the ability to categorize the world but that they must interact with the world to construct knowledge about the world (Rosenblith & Sims-Knight, 1985). From our behavioral perspective it is a given that the neurology of the brain creates an information processing system which reflects the external world and one of the main functions of the nervous system is the systematic organization of the information that is taken in. The second main function of the nervous system is the systematic organization of motor and verbal output. Through thousands of years of evolution the nervous system has evolved to systematically organize sensations and motor behavior. The nervous system must have contact with the external world in order for that organization to occur. Children are born with reflexes that permit them to act upon the world. The reflexes develop through the process of adaptation into what Piaget termed cognitive structures. The behavioral perspective would not deny that neurology changes. We would argue that labeling the neurological changes “Cognitive Structures” adds nothing to our understanding.

According to Piaget there are three possible ways that a child will deal with new information. If the information is too complex the child will ignore it. If the new information is close to what they already know they will assimilate the information.

Finally if the information is in opposition to something they know they will change what they know to accommodate the information. Adaptation occurs through the process of assimilation and accommodation (Rosenblith & Sims-Knight, 1985).

From a behavioral perspective information provided by the world is a discriminative stimulus (SD). Information that is too complex is information that does not clearly convey to the child information that can be used to predict outcomes of success or failure in the world. It makes sense that this information would be ignored. It conveys no predictive information so for all intensive purposes it is useless. We find children with autism often turning away from and ignoring much information in their worlds. It is very likely that this occurs because of the level of complexity of the information. When the information is broken down into smaller bits of information children with autism can often understand the information.

Information that is close to what a child understands is said to be assimilated. In other words the information does predict future success and failure but it is slightly different from the information that is known. In this case the child is able to generalize and expand on an already predictive relationship between an environmental event and an outcome.

If information is in opposition to what the child knows accommodation occurs. The child has learned that a predictive relationship between two events does not work. The child learns a new predictive relationship. The child adapts or progresses developmentally by improving his or her ability to predict outcomes in the future.

Piaget did not believe that reinforcement was necessary to motivate a child to act (Rosenblith & Sims-Knight, 1985). A behavioral perspective would agree that

reinforcement is not necessary to motivate a child to act. A child acts in the world because of deprivation and aversion. A child acts in the world because he/she *needs or desires* something. In other words a child's set point for sensory stimulation needs to return to equilibrium. Reinforcement occurs when a behavior increases because it was successful at achieving its end. The ideas of Piaget and the developmental literature that has developed out of his work should not be seen as in opposition to behavioral principles. Information about developmental milestones can inform the therapists as to typical development and provide insight into typical behavioral patterns and how they develop.

Research on the perceptual development of infants suggests that the major senses of vision and audition are intact and functional at birth. Newborns are most easily stimulated by complex and continuous sounds. Infants will look toward stimuli they see out of the corner of their eyes and exhibit saccadic eye movements. Saccadic tracking movements are jerky and discontinuous until about six to eight months of age. At that time they become smooth and sustained. Attention is first focused on high contrast external contours of objects (Rosenblith & Sims-Knight, 1985).

Infants learn a great deal about language before they understand or can produce words. Infant language production starts with cooing and then moves on to babbling. They move from being able to discriminate single-syllable sounds such as "ma" versus "pa" to being able to discriminate larger combinations later in development such as consonant/vowel, consonant/vowel/consonant/vowel combinations. Typically developing children also recognize changing intonation of syllables and can discriminate between statement and question intonations (Rosenblith & Sims-Knight, 1985).

By the first month of life babies start to predict the occurrence of a second event from cues in the environment. This was described earlier as the result of classical learning. For example, a child will show anticipation of being fed when hearing footsteps coming into the room. Babies also start to exhibit what Piaget calls primary circular reactions within the first month of life. They will explore their sensory and physical world through the repetition of behavior. The rhythmic repetition of an individual behavior will occur rapidly and then slow in frequency as the child habituates to a new experience (Rosenblith & Sims-Knight, 1985). In essence the child is learning to process new sights and motor movements. A typically developing two month old may show this rhythmic repetition for a few days. We may see these rhythmic patterns last for months or years in children with autism.

By 2 months infants start to scan multiple features of objects. Newborns are considered to be nearsighted and there is controversy over whether newborns can see objects focused on the fovea (Rosenblith & Sims-Knight, 1985). Children with autism often focus for extended periods of time on insignificant parts of objects and have a difficult time integrating multiple features. The area of the occipital cortex involved in organizing the projections from the fovea is very large and complex. It is believed that perception of information coming from the fovea may develop later than projections from the visual non-fovea periphery. This is possibly a more striking delay in some children with autism. Many children with autism look at objects out of the corner of their eyes and hold objects very close to the eyes. Looking at objects out of the corner of the eye removes the object from the fovea. If the occipital cortex is not completely organized to take in and integrate visual information from the eyes direct eye contact and directly

looking at objects may provide less information to a child with autism than averting the eyes. The problem is that averting the eyes will also delay the development of the visual cortex causing further problems.

By the second and third months of life a newborn starts to demonstrate true perceptual processing in being able to detect similarity in the form of perceptual invariants. They begin to know the difference between their mothers and strangers. They can imitate simple same class movements and show recognition of familiar events within a twenty four hour period (Rosenblith & Sims-Knight, 1985).

By three months they have enough control over airflow to make vowel like sounds. Back and forth vocal interactions can occur at this time in typically developing infants (Rosenblith & Sims-Knight, 1985). Many of these skills continue to be delayed in children with autism. Treatment must focus on the ability to form and integrate perceptions along with coordination of muscle movements to speak and behaviorally demonstrate understanding of perceptions. At three months typically developing children have the ability to do non-verbal imitations. The ability of an infant to reliably disengage from a stimulus develops between 2 and 4 months of age (Johnson et al., 1991).

By four months infants can coordinate visually guided reaching and are more responsive to environmental events. Secondary circular reactions start to occur where the infant makes something happen again through their actions. This is the first obvious sign of purposeful learning as a result of consequences. Babbles are modified and gestures as well as facial expressions are used to convey needs and feelings at this age. (Rosenblith & Sims-Knight, 1985). At this age it becomes clear that learning by consequence is

occurring and the child not only can predict events that will occur from previous events but also can start to control those events through their own actions.

By 4-6 months infants can see objects in depth and discriminate amongst objects tactile, auditory and visual characteristics (Rosenblith & Sims-Knight, 1985). Children with autism often have a difficult time discriminating between objects. Object discrimination abilities must be broken down and trained through matching exercises. Auditory, tactile and visual perception should never be taken for granted in a child with autism. It is clear that a typically developing child at this age can perceive the three-dimensional nature of objects.

By 6-7 months of age infants start to organize perceptions based on common attributes and configurations of attributes (Rosenblith & Sims-Knight, 1985).

By 8 months of age intentional behavior becomes more apparent and the infant is beginning to develop object permanence. They can now search for something that is out of sight. They may at this age still make errors such as looking for an object where it usually is instead of where they last saw the object. Imitation becomes intentional. An infant will imitate unfamiliar actions and start to learn about the environment through imitation of others (Rosenblith & Sims-Knight, 1985). At this age typical children exhibit intentional two-way communication (Greenspan, 1998). Children with autism usually have a hard time with imitation and learning from imitation of others. We need to break down imitation tasks to the simplest form to begin to teach imitation. Object cued imitation is usually one of the easiest tasks. From there we move to non-object cued gestural non-verbal imitation. Eventually we move into verbal imitation.

By 10 months of age a typically developing child will start to communicate through gestures (Rosenblith & Sims-Knight, 1985). Many children with autism struggle with developing a communication system. Breaking down and teaching PEC, sign language, gestures or verbal language as appropriate helps to provide an avenue for continued learning.

By 12 months of age a child becomes more interested in novel aspect of the environment. They pay more attention to the distinctive features of objects they encounter and manipulate. Objects are seen as discrete and separate from the self. Infants at this age start to do mini experiments to see how objects change under different conditions. They can now start to solve more complex problems and use means to achieve an end (Rosenblith & Sims-Knight, 1985). Typically developing children may do experiments with physical objects for ten minutes to a few hours. A child with autism may do the same experiments for months.

At 12 months of age a typically developing child can give someone an object when it is requested. The child can imitate face and hand gestures and hold up their arms or feet when they are being dressed. A child will look for and find hidden toys and show affection to familiar people. At this age a child can put blocks into a box, pick up small objects with a pincer grasp, point to desired items and hold a spoon. A typical child at this age can pull themselves to a standing position and stand alone for a few seconds, crawl on all fours and sometimes walk. They can usually imitate sounds, recognize their name and follow simple one step instructions. Babbling is usually strong and varied with variations in pitch. They can recognize familiar people from a distance of 20 feet and watch small objects move from a distance of 10 feet (Lovaas, 1984). Each of these

developmental tasks is tackled one by one with a child with autism as they master earlier developmental milestones.

At 12 to 16 months of age a child's ability to solve contingencies in their environments can include novel behaviors that have not been tried. At this point they still have to physically try the solutions they come up with and they often use a trial and error style when solving problems. At this age a typically developing infant will be able to respond to a small number of words even if they are presented in isolation. Intonation and stress are used to convey intent and emotions, and an infant can begin to comprehend words out of context (Lovaas, 1984). Understanding intonation and stress is often difficult for a child with autism to master. Much of this relies on the ability to integrate information from multiple senses into a perceptual gestalt. These higher level integration skills are often a challenge and each sensory perceptual system has to be trained separately before integration can occur.

By 18 months of age a child can usually remove some of their clothing such as shoes and socks. They can raise a cup with two hands and drink from it without spilling. They can imitate complex actions such as sweeping the floor or hammering a nail. They usually prefer to be near adults and will alternate between dependence and independence. By 18 months of age a typical child can usually scribble with a crayon and build a tower of three blocks after observing a demonstration. They are starting to explore objects more with their hands than their mouth. They can push large objects and do two things at a time such as carry a chair across the room. They can climb onto and off of an adult chair. They often walk with their feet slightly apart and usually crawl down stairs backwards. By 18 months children can usually speak 6 to 20 words that can be easily

recognized. A child at this age will echo the last word said to them. They can usually point to two to three body parts on themselves or a doll. They will often be able to point to a distant object and retrieve a ball that is rolling away (Lovaas, 1994).

By the end of the second year a typically developing child is starting to use language symbolically, can start to solve problems without physical trial and error means, can classify two classes of objects at the same time, and is demonstrating mature object permanence (Rosenblith & Sims-Knight, 1985).

Words are used first as holophrases where a single word conveys the meaning of an entire thought. They are often context dependent and the meaning of the single word can vary based on intonation. Knowledge of word meaning usually develops in a systematic fashion moving from words that refer to people, to objects and finally to actions that are meaningful to the child. Words are usually used in an under-extended manner and then in an over extended manner. Combination of words often also develop in a standard order (agent + action, action + object, agent + object, possessor + possessed, demonstrative + noun, attribute + noun, location + object, action + location, negation, question. (Rosenblith & Sims-Knight, 1985).

By two years of age a typical child can often feed themselves with a spoon and they are proficient at chewing food. They usually need a lot of attention from their caregiver and may cling to the caregiver when they are tired or afraid. They will often play next to other children in parallel play. They may become very possessive of their toys and may throw temper tantrums. They can remove a wrapper from a small piece of candy, build a tower of six blocks, draw a line across a piece of paper and pick up an object as small as a crumb. They can often run easily with changes in speed and

directions, walk up stairs holding on to a railing putting both feet on each step. They can kick a large ball and throw a small ball (Lovaas, 1994). In therapy a child's behaviors and abilities are compared to what a typical child can do and we try to progress the child from one developmental milestone to another. Each child with autism will have different strengths and weaknesses. There is no way to say that a child with autism is usually at any particular level in relation to any of these milestones. For that reason continued evaluation of the child's functional, social, adaptive, verbal and motor skills is necessary.

By 36 months a child can eat with a spoon and fork, wash their hands and be able to put on pants with elastic waist bands. They may like to help with adult chores and generally be cooperative. They will seek out and play with other children and share their toys. You often see an increased affection for younger children. They can draw circles with a crayon on a piece of paper, paint with a large brush, and draw the figure of a man which includes a head and 1 to 2 features. A typical child at 36 months will be able to build a bridge out of three blocks and pile nine blocks on top of each other. They can alternate their feet when walking up stairs, walk on tiptoes, jump off a bottom stair and stand on one leg for a moment. At this age they can often ride a tricycle for at least six feet (Lovaas, 1994).

At 36 months a child can tell someone their full name, sex, and age, when asked. They begin to ask who, what, and where questions and use pronouns such as I, me, and you correctly. You can often engage them in short conversations as they talk about experiences and themselves. Their vocabulary is becoming very large but there may be some minor articulation errors and occasional stuttering. They enjoy listening to nursery

rhymes and stories and often ask for them to be repeated many times. At this age they can match two to three primary colors (Lovaas, 1994).

By the time a typical child is 48 months they can eat with a spoon and fork without spilling and dress and undress themselves with the exception of tying their shoes and proficiency with buttons and snaps. They understand how to take turns and prefer to be with other children instead of adults. A child at this age can draw lines connected at right angles and has good control of a crayon. They can thread beads onto a string and pile over 10 blocks on top of each other. A child of 48 months can stand on one foot for 8 seconds, hop forward two yards, and walk proficiently on a line. They climb, swing, and slide on playground equipment and enjoy a variety of ball play. They can run on their toes and bend down and touch their toes without bending their knees (Lovaas, 1994).

A typical child at 48 months can tell you their address, count by memory up to 20 and often knows and can recite many nursery rhymes. Their conversations are connected and they can talk about their recent experiences. They can ask why, what, when and how questions and enjoy jokes. Their speech is grammatically correct with only a few sound substitutions (Lovaas, 1994).

By 60 months of age a typical child can use a knife and fork, wash and dry their face, and dress and undress proficiently. They select their own friends and are protective of those younger than them. They understand rules in games and understand the importance of playing fair. A child at five years of age can demonstrate a sense of humor and fears of animals or physical dangers often emerge. Children at this age speak fluently with only minor errors and can tell someone their full name, age, address and

phone number. If they hear a word they do not understand they will often ask for the meaning and start to use the word in the future (Lovaas, 1994).

By five years a child can often draw a house with a roof, doors, windows and chimney and a man with head, arms, legs, and a trunk. They can match 10 colors and copy patterns made with 10 blocks. They are starting to be able to write capital letters. They can now move rhythmically to music, hop forward on one foot with ease and understand rules and scoring in ball games (Lovaas, 1994).

A thorough understanding of these basics of typical child development and other typical childhood milestones provides caregivers and therapists with general guidelines related to what adaptive skill or milestone should probably come next. Children with autism have unique strengths and weaknesses as a result of their unique neurological conditions. A child's neurological status will set timelines and limits on attaining adaptive skills. Therapists and caregivers should become familiar with all of the adaptive skills that a child will need to learn and be familiar with the child's individual neurological challenges.

One child may have more difficulty with motor functions. Another may have problems with receptive or expressive language. Yet another may have problems accurately perceiving the environment through hearing but perceive quite well with their eyes. Any combination of neurological strengths and weaknesses may be present. In general we want to work on the child's strengths and try to remediate their weaknesses.

In the chapters to follow we will try to give guidance on when to focus on adaptive skills at the different stages of therapy. Each child will be different and it is important to keep in mind the general sequence of adaptive growth within each of the

domains of gross motor, fine motor, social skills, daily living skills, and communication. In general progressions within a particular domain are much more consistent than progression between the domains. For example a child in the motor domain will in most cases crawl before they walk. In the social domain a child will usually show affection to a familiar person before they will show interest in a child of the same age. Moving across domains usually involves the child's neurological strength and weakness and just because a child is at one year for gross motor activities does not necessarily mean they will be at one year for socialization. Becoming very familiar with the Vinland Adaptive Behavior scales (2005) and the Bayley Scales of Infant and Toddler Development (2006) or other texts that chronicle adaptive skills is very helpful to assess a child's adaptive development and plan a systematic progression of adaptive skills.

## **Chapter 5**

### **Environmental Acceptance and Expansion**

Environmental acceptance as described here involves the child feeling comfortable and happy with the people and places surrounding him/her. Feeling that the environment is safe leads to the ability to feel content and happy and become emotionally engaged with another human being. In a very real sense, the development of a healthy environmental acceptance serves as the necessary and all important foundation that allows all future learning to occur for the child with ASD. Most would agree that building anything of value on a shaky foundation is ill advised, fool hearty, and a surefire recipe for failure. Building an acceptance foundation in children with ASD is analogous to foundations in buildings. When purchasing a new house, what is the first thing a buyer makes sure is in tact? The foundation. When confronted with a foundation that is cracked and damaged the buyer runs. This is not only true for houses, schools, office buildings, and is equally true when establishing a positive learning platform in the child with ASD.

Considering the many debilitating symptoms of Autism Spectrum Disorders, building this foundation can be a formidable task. Many parents find themselves at a complete loss when trying to decide where to start. Let us examine some of the challenges one may face.

First, Children with autism often have difficulty with new environments. This difficulty may show up as unwillingness to try new foods, temper tantrums in new places or anxiety reactions when exposed to unfamiliar people. Many well meaning parents and caregivers attempt to establish environmental acceptance with the child with ASD, not

taking into consideration the necessary processes required based on the needs of the child with ASD. The first goal is to understand the child and their unique sensory issues and to adjust the environment to create comfort and security for the child. Hypo- and hypersensitivities have been documented in children with autism (Ornitz and Ritvo, 1968b). Sensory issues include auditory, visual, tactile, olfactory, gustatory, and proprioceptive/vestibular hypo and hypersensitivities.

Auditory – Many children with ASD are overly sensitive to normal everyday sounds. You may find them running away or leaving a room or just covering their ears and screaming when you flush the toilet or turn on the vacuum cleaner.

Visual – A child with visual sensitivities may hide under a table at school or the doctor's office as a result of their sensitivity to fluorescent light.

Tactile – A child with tactile sensitivities may frequently strip out of clothing in public places or may be very picky about the type of clothes they wear.

Olfactory – A child olfactory sensitivities may be preoccupied with smelling people or inedible objects.

Gustatory – A child with gustatory sensitivities may continue to mouth inedible objects when most typically developing children have moved on to exploring object mostly visually.

Proprioceptive/vestibular – A child with proprioceptive/vestibular sensitivities may spend hours alone rocking in a chair or may need to jump on a trampoline many hours of the day.

As we gain an understanding of the child's sensory issues and sensitivities, as well as strategies to soothe and calm the child, we gain information about how environmental

factors can be paired with new experiences to reduce discomfort in new situations. The child starts to develop trust and feelings of security that someone is capable of competently meeting his/her needs. This is a crucial step that will be returned to throughout therapy. The focus always has to be on providing a fun and content experience for the child roughly 90-95% of the time. The more comfortable and content the child is, the more we can use that comfort and security to progress them through their developmental challenges.

Creating a fun and exciting playful experience for the child throughout therapy will provide the therapist and parents with an initial stance from which they will be able to meaningfully impact the child's life in positive, fulfilling directions. Creating such an environment requires skill and practice but the payoff is immense once mastered. Basically what this stance does is provide the therapist and parents with a wealth of information about how to help the child control the environment and instills in the child a trust that the therapists and parents can be looked toward as allies in navigating the world. Much the same way that an infant learns trust through having needs met after crying.

After the therapist has gained trust and understanding of the child and the ability to soothe and comfort the child, they can begin to address environmental expansion. As a general strategy, sensitivities or negative reactions to environmental events should be recorded, and a plan should be developed to address the difficulties.

Throughout therapy, document any aversive reactions and follow through with a systematic plan to expose the child with autism to new people, places, objects and sensory stimuli using systematic desensitization procedures. The child should be exposed gradually to the feared situations while in the presence of people or objects that comfort

the child. The comfort from the parent, blanket, food or whatever the child is attached to will become associated with the unfamiliar situation and decrease the aversive nature of the new experience. After repeated exposure to the uncomfortable situation while in the presence of comforting people, objects or food, the new frightening situation becomes less frightening. You must be careful here not to reward fearful behavior at this point. The presence of the comfort person or item should be present at all times but should not increase after inappropriate or fearful behavior.

This sounds like a fairly simple and straightforward procedure for moving children beyond their preferences into the world of enjoying a vast amount of experiences, but actually accomplishing this task can seem unattainable for many parents. Many parents and families of children with autism gravitate to leading very restricted and patterned lives in an attempt to avoid the distress caused by new situations. Let me tell you the story of Jimmy. Jimmy had a very strong tendency to hoard objects. Any attempt to restrict the number of items Jimmy would carry would be met with extreme tantrums and aggression. In an attempt to comfort Jimmy, the parents continued to allow the hoarding behavior rather than place Jimmy through the discomfort of tantrums. After all, what is the harm in allowing Jimmy to carry around a few objects? The problem is that by not addressing the behavior, the behavior became gradually more encompassing and more debilitating to both the family and child. This particular situation ended up with the child stuffing an outfitter-sized pack full of items. When the pack became too big for Jimmy to carry himself, he expected others to carry it for him. The tantrums and aggression occurred when others refused or were unable to carry the pack. The restrictions this placed on Jimmy and the family were significant. Trips to the store, trips

to restaurants, going to school, playing outside, and countless other opportunities were lost to the all encompassing need to hoard objects.

The problem with avoiding difficult situations is that life becomes more and more controlled by random environmental events. The immediate relief of getting out of the situations and the resulting decrease in distressing behavior on the part of the child is understandable. In the long run, life becomes patterned and many activities, people, foods, and places that could have been experienced with great joy are never experienced.

In general, all people, not just children with autism, need multiple exposures to new situations before they start to enjoy and crave them. Think about how many times you have to hear a new song before you begin to like it and look forward to hearing it. Think of the experience of hearing a song on the radio that brings back good memories and finding yourself really enjoying the song only to remember later that you always hated that song. What has happened is that the good memories and experiences from the time in your life that the song was played have been associated with the song. A song that was once hated is now loved. Most people can also think of a personal example with a food they once hated but now love.

If it is a natural human process to need to be exposed to things to begin to enjoy them, why do families of children with autism gravitate away from the strategy of exposing the child to new situations? The obvious answer is that the extreme reaction many children with autism have to new experiences makes pursuing exposure extremely unrewarding for the parent. Children with autism can be very persistent with their preferences and vocal when their preferences are not followed – to the point where it

seems almost unnatural or counterproductive to expose the child to such distress, even if it is in the child's best interest.

Theories of sensory sensitivities may correctly lead parents to the conclusion that the child can't tolerate certain sensory stimulation. The only logical solution from that perspective is to decrease that sensory stimulation. As discussed earlier, there is a time and place to follow through with this strategy. The problem is that avoiding the situation leads to living a more and more restricted life. This phenomenon manifests itself in many ways. Common restrictions include avoiding restaurants, avoiding church, avoiding going to stores, avoiding family activities in the community etc. Restrictions can grow very gradually and the process is not always apparent until the restrictions have reached a very extreme state. For example, one family restricted their travel past all Wal-Mart stores when their child with ASD was in the car. This was done to avoid dealing with extreme tantrums the child demonstrated when seeing a Wal-Mart store. The tantrums originated from a very negative experience the child had at the store related to sensitivity. The part that is often missing is a plan to recognize that there is a sensitivity and then to develop a plan to desensitize the child to that experience.

Why would we want to tackle sensitivity at the cost of placing the child through discomfort resulting in tantrum? First, it is important to understand that such sensitivities can be overcome with a proper plan. The tantrums are only a temporary response when dealt with properly. Second, the payoff is enormous for both the child and the caregiver. Tackling sensitivities expands the child's life and builds more enjoyable experiences into the natural environment. Instead of moving in the direction of restriction, we move in the direction of expanding options. Instead of moving in the direction of rigidity, we are

moving the child in the direction of flexibility. If you only like Cheerios, the only option for happiness is Cheerios. If you are restricted to only Cheerios, what happens when Cheerios are not available? When you have learned to love Froot Loops, Lucky Charms, and Captain Crunch you have more options. When Cheerios are not available, you now have the option of enjoying Fruit Loops. Every time a child does not like something, you have the option to teach the child about one more thing that can be loved.

The field of Applied Behavior Analysis (ABA) provides a systematic way of approaching situations like this and removing obstacles to behavior change. Breaking problem situations down into smaller, more specific components are hallmarks of ABA. Such methods yield great benefits in children with ASD, among them is intervention planning that is manageable, efficient, and individualized to the child's specific needs. Let us examine how an ABA approach might address the issue of environmental acceptance and expansion .

The first thing to consider is that behavior change cannot occur until one is fully aware of the behavior that is occurring. So, from an ABA approach, we first need to gather objective information about what is really happening in the environment. Gathering information is accomplished by learning to observe and record the reactions of the child to the different environmental stimuli he encounters. What stimuli do we make note of? Everything is possibly important. We are scientists making objective observations, throwing out any preconceived notions. Generally speaking, environmental stimuli are anything that the child can experience through the senses. Further, environmental stimuli need to be considered at many levels. Some examples include color, size, groups of people, or rooms. As we first begin our observations, we

don't know exactly what the child is reacting to in the environment. We begin to make sense of what we are observing by recording data about the context during the aversive reaction. The observation and recording procedures will eventually allow us to identify trends and narrow down the possible causes of the aversive reaction.

For example, suppose a child with autism is in a carpeted room with yellow walls that has ten people and a dog in it with music playing. The child begins to scream at the top of her lungs and tries to leave the room. Without recording information about the room or context of the reaction, we don't know what the child is reacting to. The child could be reacting to the number of people, the dog, the color of the room, the music or type of music or the fact that the room was carpeted.

The first step is to record data (information) about the context in which the reaction occurred. After recording data for a set period of time over multiple occasions when the adverse reaction occurs, the information patterns of responding may become evident. With such patterns you now can begin to narrow down the possible causes of the adverse reaction. For instance, in the room described above, observations of the adverse reaction could be made that don't involve people in the room, dogs, carpet, or color; however, each instance always involved music. Based on this information we can hypothesize that this child's adverse reaction was related to the music playing. Taking data allows us to more objectively examine events and to specifically narrow down the environmental stimuli that the child may be sensitive to. This provides us with a very clear idea of the stimuli that needs to be targeted for desensitization.

Now that we have identified the target to work on (sound sensitivity), our attention can turn to intervention planning (in this case desensitization) that will be used

to remediate the target problem. This is where most caregivers begin to feel overwhelmed and ineffective. Where and how do you begin to change this behavior from a very uncooperative child? Our answer to that is to step back from the problem and begin to break the issue down into manageable components. In the current example, the next step in intervention development is to develop a hierarchy of similar stimuli that cause the negative reaction. Assuming that the music is being targeted for desensitization, the stimuli are ordered from music that causes no reaction to music that causes a severe reaction. This process is called probing.

We now have information on the challenging stimuli (Sensitivity to music) and a hierarchy of offending music. Now what? The next step in the intervention process is to gather information about stimuli that the child finds pleasurable and comforting. Such items can include items, foods, places, and objects. At this stage, the plan is to expose the child to the least aversive music while the child engages in pleasurable activities such as playing, snuggling, or eating a favorite food. The general principle here is that the aversive event becomes predictive of a positive event, and the good feeling related to the positive event is being transferred to the negative event. The end result is that the child becomes comfortable with the previously aversive event. You then move up the list of aversive stimuli. As the child learns to overcome their sensitivity to music, and other challenges, he or she learns to enjoy and tolerate more human experiences, and these experiences can also be used in the future to desensitize the child to other stimuli.

In learning to tolerate and enjoy a vast array of experiences, the child is also learning mastery over the environment. Not only has the child become used to the formerly aversive event, the child has also learned that he/she has the capability to

control preferences. The child has learned that, at least in this one circumstance, what was distasteful is now enjoyable. This internalized control of preference, knowing that you have a choice about how you interpret the environment, has vast ramifications for interactions with the environment in the future. You are no longer at the mercy of the environment. Free will and a sense of self develop out of learning to control and manipulate the environment. One experience will not result in this change, but thousands will. With each step the child becomes freer to experience the joys of the world and more competent in dealing with the world.

Although this is the first step in therapy, this is something that is focused on throughout the lifespan. Giving the child the strategy of facing situations that are distressing and learning how to control them as well as learning to control how he/she experiences the environment, increases the child's ability to cope in an ever-changing world. Through the process of therapy, the therapist working with the child and parents needs to be constantly vigilant. They always need to be watching for situations that can be targeted. If the child has a negative reaction to something, you have the option of developing a program of experiences to address the sensitivity or deciding that it is not a priority at this time.

On a cautionary note, we never want to overwhelm the child with too much change at any one time. We always go back to the initial stance of wanting the child to be comfortable and secure 90-95% of the time. We could spend all day long exposing children to things they fear. If this is done too extensively or in the wrong predictive direction (good-bad), the positives being paired with the negatives will lose their value. The negative situation will color the child's view of what used to be a positive experience

and undermine the child's confidence and trust in the therapist/parent. This is where priorities must be set. Not everything can be worked on at the same time, and many goals will need to be abandoned all together to maintain an experience that is positive and enjoyable 90-95% of the time. Thoughtful consideration of the value of working on an issue must always be weighed against other priorities in the therapy process.

Throughout the course of therapy, there will be times when strategies and priorities need to be reevaluated to maintain the 90-95% rule. There will be times when the therapist or parent needs to reprioritize and wait to address an issue at a later date. Although the therapeutic process of intensive therapy begins with environmental acceptance, this will be an ongoing endeavor throughout therapy and throughout life.

Brad was a bright but extremely oppositional child with Aspergers Syndrome. Brad's behaviors were a huge stressor on the family and were literally tearing the family apart. Brad's parents frequently came to us frantic with concerns about how to manage his unruly behavior. Upon observation of the behaviors and how they were being handled by the family, we found this family doing what many do in such situations. That is trying to work on a little bit of everything all at once, without a clear plan. The problem with this is that it comes across to the child as a piecemeal approach and ultimately lacks consistency. When we examined the situation further, we helped the family prioritize goals and develop consistent plans for each goal that they agreed they could follow through with. In this instance, the child was aggressive toward others and used disrespectful language. Managing aggressive behaviors became the first phase of the intervention. Many other targets existed, however, they were left for another day while all "intervention energy" went toward following the plan to reduce aggressive behavior.

Once aggression decreased and compliance increased, we could then begin to target other skills.

Of course, every child is different. As with any group of people, personalities range from very bold to very timid. Learning to observe the child's behavior provides a vast amount of information about the child. One way to address environmental acceptance is to begin the session by not initiating interaction with the child at all. Just observe them doing whatever it is they are doing in the environment. This procedure won't interfere with a child who is bold but will provide a more cautious child the time he/she needs to adapt to a new environment. As you observe the child in an environment ask yourself: Do they appear confident, bursting into the room and attacking the toys or more laid back and clinging to familiar people? If the child is interacting confidently with the room and people present, then environmental acceptance at this time is not much of an issue. If the child is anxious or uncomfortable with the room or new people they may avoid eye contact, cling to parents or sit quietly distant from the therapist. Sitting back and observing will give the child a chance to become acclimated to the room and you. With this child, continue to observe as he/she explores the room.

Once the child has had an opportunity to acclimate somewhat to the environment, we can turn our attention toward interaction. One way of initiating interaction, is to startle slightly and act slightly timid or afraid if the child should look at you. This is usually funny to children, and the action will increase their interest in you and their confidence in exploring. As they look at you, look away quickly as if you don't want the confrontation. These behaviors are designed to strengthen the child's confidence and

increase feelings of security. The worst thing that will happen from using these strategies is that the child will think you are a little odd.

These behaviors are also drawing the child into interaction where they feel in control and empowered. The child will often begin to play with the control he/she has over you and become energized and bold. If you try to approach the child, approach in a casual non-threatening way. If they seem nervous back off slowly and act timid. You can even turn this into a game where they control your behavior by glancing at you and you back off with every glance they make.

As the child becomes more comfortable, you have the opportunity to see the child in their typical state. Observe the toys the child gravitates to and the movements the child prefers. When you approach the child, do so with the intent of helping the child pursue some goal you have determined he/she has. For example, if the child is stacking blocks, help the child by handing them more blocks or by keeping the tower of blocks from falling over. It is vital that you be ever conscious of the child's reaction toward your efforts to interact because this will determine how you proceed. If the child gets anxious about your presence, step back and move more slowly. Remember that the child has no experience with you, and the child will need your presence to be predictive positive interactions and enjoyment before you will be experienced as an enjoyable part of the child's environment. As you slowly join the child's activities with the goal of providing assistance, the child will start to feel comfortable around you. When they are comfortable, you can use all of the information you have accumulated through observation to join the child in games. Your observations of the child's preferred movements may suggest to you that the child might like to swing or rock. Join with the

child's activities offering the preferred movements. Within no time, you will find that you have established yourself as a person who the child enjoys being around and the child has become comfortable with a new person and environment. Essentially you have expanded the child's options in the world.

We recently had an initial appointment with a three-year-old child. The report from his pediatrician stated that his extreme shyness made it difficult to determine if he met the full diagnostic criteria for autism. The child smiled when I met him in the lobby as he ducked behind his parent. During the beginning of the initial session I spoke to the parents as I watched him play with toys. He explored the toy box and pulled out a number of toys. He interacted with his parents, bringing the toys to them.

When I tried to interact with the child he virtually crawled behind the couch as I approached. I sat back down and I tried the above techniques to draw him into interaction. As the session continued, the child began to look at me more often. Each time he did, I looked down at my paperwork, affectively demonstrating mild fear and that I was intimidated. With these strategies the child started to become bolder. He began to get off the couch and leave his mother to get me to react. Each time, I affectively showed a fear reaction and flinched. Within fifteen minutes, the child was running over and slapping my leg to get me to flinch. By the end of the session we were chasing each other back and forth in the room, and he was able to tolerate me picking him up and swinging him around. The positive result of this example required that I apply the rules of environmental acceptance that have been detailed in this chapter:

Making objective observations; the child was fearful and not comfortable with the environment and the examiner.

Recording observations; observations of the child and his reaction to me were recorded as the session went on.

Breaking targets down into manageable components; I determined from observations that the child was fearful of the room and examiner and decided I needed to decrease his fear before I could get an accurate sample of his autistic symptoms.

Creating a plan that fits the child's current preferences and ability level; I determined as the session went on that the child enjoyed the control he had over my behavior. The child became bold and I took his lead in the chase game that we played.

Applying the plan patiently and consistently; In this case I worked on the first issue that significantly interfered with the task at hand. I needed an accurate representation of the child's behavior. His fear was interfering with my ability to get an accurate sample of his behavior. So I worked on first things first. As he got over his fear his symptoms of autism were more clearly visible.

The case described above demonstrates a very good outcome from these procedures. I have also had children that would not interact with me during the two hour screening session. Ideally what I have done, however, is build a base of confidence that can be built on in upcoming sessions.

The above description of an initial session with an anxious child with autism highlights the use of behavioral strategies to develop security with the environment and people. Once security is developed and the child views the therapist as someone fun to interact with, the therapist can use him/her self as a comforting agent when introducing a child to a new environment. The more positive, enjoyable feelings the child has toward the therapist, the more power the therapist has to positively impact the child's life.

Systematic procedures can be used to develop positive feelings and behaviors toward places, people, foods, and interactions. Again the general strategy is to help the child build positive feelings with as many people, objects, and places as possible so that these can be used to further expand the child's choices and opportunities in life.

When providing treatment to a new child, we like the major interactions to be around the establishment of environmental acceptance, helping the child to self-regulate through finding comfort in the environment and interactions, and creating as many positive and comfortable feelings as possible through emotional engagement. This should be the major focus of therapy for the first month or two as more demand-related and discrimination-related programs are added slowly. The time spent on establishing comfort and security, as well as a playful and exciting environment, will be well worth the time spent in the long run. The child will learn faster, have better attention and enjoy therapy more.

Play with a child at this level will often focus on getting the child used to the environment, toys, and people using the principals described above. We will often observe a child's play at this level and join the child in their favorite activities. The main goal is to help the child feel comfortable in the environment and comfortable with the toys and people they will be interacting with. Very minimal intrusion into the child's play will attempted at this level aside from joining the child with the goal of helping them achieve some goal you have determined they have.

## **Chapter 6**

### **Building Self-Initiation**

So far we have addressed only the very basic foundation of successful therapy and interactions with children with ASD – developing a sense of security and comfort in any given environment. We will continue to focus on increasing environmental acceptance all through the process of therapy with a child. What is the next key foundational skill? After a child has a sense of security in his/her environment we need to expand the focus of therapy. The building block of increased environmental security will continue as a primary focus throughout therapy and hopefully the child's life. As this base of security and relating is being established, we must add strategies to build self-initiation, purposeful nonverbal signaling, and an expanded ability to emotionally engage and relate to other people in the environment.

Building initiation and self-efficacy needs to be an early focus of treatment. Self initiation is seen by many within the field of autism treatment as a pivotal skill. The development of self initiation can have wide ranging effects on many behaviors and the acquisition of self initiation skills is a favorable prognostic indicator for developing more advanced skills (Koegel, Carter, and Koegel, 2003). Self-initiation places the focus on the child's ability to control the environment. How well a child does this is related to how comfortable and competent they are in navigating through a complex social world. Children with Autism often lack the necessary skills to do this. Every individual, including individuals with Autism, desire feelings of competence. When something is too confusing or too overwhelming a child will often give up and become frustrated. The level of challenge a child is presented with will have a profound effect on either building

or undermining initiation skills. For example, imagine the most difficult class you had in high-school or college. For one of us (CVD) chemistry was a subject that I did not feel confident with. Can you guess how many times I tried to initiate a classroom discussion about topics I felt incompetent with? If you guessed very few you would be correct. To take this a step further, even walking into chemistry class created a sense of anxiety. The teacher would routinely ask questions about different chemistry topics and call on students randomly. When this happened I tried to avoid eye contact because I did not feel confident that I could successfully answer the questions. Compare that response to areas where I did feel competent, for example, psychology classes. There I would love to initiate discussions and love to be called on. In fact, I would purposefully make eye contact with the professor in an effort to get him to call on me. A strategy that was reinforced occasionally by the professor.

Children with Autism are immersed in environments that make little to no sense to them. Using the above example, they are in a never-ending chemistry class. Despite their level of confusion the child with ASD is largely left to fend for themselves. Children with autism often meet with failure after failure when trying to positively impacting the world around them. Interventions need to address the issue of competence in the world by creating positive, predictable environments that allow the child to develop and expand their ability to successfully impact the environment around them.

Children have biological, psychological and social desires. Internal needs, drives, desires, and emotions lead the child to behave in the world. A child's initiation is first seen in facial expressions and eye contact between the child and his/her caregiver (Ling & Ling, 1974). Facial expressions and eye contact lead to a diffuse cry when hungry,

cold, warm, or uncomfortable, etcetera. This initiative is usually generic at first, but it works wonderfully as parents become savants at reading the cries of their child.

What we want to build in the child is their ability to flexibly use their motor and verbal abilities to fulfill their *desires (drives, needs, emotions)*. Learning is much more successful and long lasting when it is initiated by the child and personally meaningful to the child. For example, if a child is hungry and crawls across the room to a bowl of cereal, takes a handful and begins to eat, resulting in not being hungry anymore, the child has learned something that is very meaningful. He is likely to remember the steps he took to satisfy his hunger. He has increased his motor and motor planning abilities, problem solving abilities, fine motor abilities, visual-motor and visual-spatial abilities, and the experience was meaningful to him because all of the steps satisfied his hunger. Learning all of these things would be a much more complicated process if the positive outcomes were not directly tied to what is being learned. The self-initiation made the whole experience memorable, productive, and adaptive. Behaviors that work to satisfy needs are remembered and used regularly. Self-efficacy and an internal locus of control result.

Using one behavior to satisfy all desires, such as a newborn baby crying, has many drawbacks. This solution relies on someone else being in the environment that is willing and able to be responsive. The caretaker not only needs to be present and willing to respond, but they also need to be able to figure out the child's desires. As a child's motor, motor planning, vocal and sensory-perceptual systems mature, the child uses their new abilities to differentiate cries. New cries and movements are developed, and the

cries and movements become different for different needs. It is wonderfully productive to have someone give you a bottle when you are hungry instead of changing your diaper.

A child who has low muscle tone which causes difficulty moving, problems vocalizing leading to difficulty making different sounds, or problems with sensory processing leading to a decreased ability to sense bodily sensations can result in a disruption of the process of being able to convey needs and get needs satisfied. For example, a child who feels vague discomfort and does not differentiate whether it is related to hunger or a wet diaper cannot sense what the problem is himself; therefore, he will not be able to convey the problem to others in a differentiated fashion. Scenarios like this will lead to escalating frustration, and confusion, resulting in a lack of purposeful initiation, an external locus of control, and loss of feelings of self-efficacy.

Suppose the child can differentially distinguish between hunger and a wet diaper but doesn't have the motor or vocal abilities to coherently create a differentiated cue to the outside world. This child will also become frustrated and decrease self-initiated behaviors. Why? The child will shut down because self-initiation is not productive. What you see is a child who cannot connect his desires to behaviors or vocalizations. Diffuse crying is the only solution. Out of necessity, the focus very early in treatment has to be on reconnecting and expanding the child's ability to satisfy his/her *needs* in positive and adaptive ways.

Most children have the ability to expand and differentiate their ability to self-initiate. Their abilities may be minimal at first, and they may need the focused attention of a thoughtful and perceptive caregiver to help expand their ability to connect *desire* to outcome and build self-initiation. Well intentioned caregivers, in trying to expand a

child's ability to speak, will often expect too much which undermines the child's minimal ability to accomplish goals via self-initiation. For example, a child who is first learning to speak may request a ball by saying "ba." For an early learner you would not expect perfect articulation, the use of phrase speech to request the ball, or even to say please or thank you. For an early speaker, in creating self efficacy and competence in initiating, the correct thing to do would be to reward the child's request by giving him the ball when he says, "ba." (Once the child has this skill well established, more complicated skills can be systematically added later.)

The solution is to focus on building self-initiation skills. This is a difficult issue to approach. Developing a plan usually involves designing an educational or behavioral plan to address the functional problem. In this case, the problem is that the child is not connecting desires and behavior and is not self-initiating solutions. As we design a plan to remediate this problem, we have to take into account the child's perspective. The child will self-initiate on his/her own time schedule. We can set up the environment and wait for the behavior. We cannot make the behavior happen. If the child could self-initiate and connect their *desires* to behaviors that lead to attainment of the *desire*, the child would. Since he/she is having difficulty with this area, we need to be able to recognize adaptive behavior (behavior that will lead the child closer to attaining their goal) and move the child closer to their goal when the behavior occurs.

The best motivators for a child are natural things in the environment that the child desires. You can generally determine what a child desires by observing the things he seeks out and observing which things he cares about when items are removed from the environment. As the child moves around, you see purposeful, self-initiated behavior.

The next step after crying is usually to attain the desired item physically. Motor problems and motor planning problems, as well as visual-spatial problems, can significantly interfere. When a child cannot physically attain the desired object, the motor tasks involved in attaining the desired object must be broken down, and the object must be made easier to obtain. Objects that can be freely available to the child should be in places where the child can attain them independently.

This is one step above a child diffusely crying to obtain a non-specified object. Making items obtainable is a good first step for a child that can move, but cannot point or communicate. The object should be in a place that can be reached by the child easily. The accommodation should be gradually decreased until the object is in a normal location. Attaining the object becomes more and more difficult as the child's problem solving and motor abilities improve. Let me repeat: "The accommodation should be gradually decreased until the object is in a normal location." This is a step that is often missed. Most children with autism are already at this level. We often find parents who are amazed at the level of independence of their child. For example, a child who likes potato chips and knows they are easily available, will quickly figure out a way to get to them independently, bypassing any interaction with others in their efforts to get them.

However, potato chips are not always easily accessible, nor should they be. When a child is aware that the desired potato chips are available you create a learning environment where adaptive initiation skills may be developed. The next step is to require a purposeful signal to an adult for help. The first two purposeful signals have already been mentioned; crying and physically attaining the object. We want to build a higher level adaptive skill in the place of crying or physically attaining an object. The

next step would be to move the desired objects out of reach so that the child has to go through an adult to get them. We often suggest that parents have many shelves in their house so toys and many preferred items are visible but unattainable without the adult. You may see a variety of behaviors at this point, all of which could be rewarded by providing help to the child. Reaching for the object would be a more advanced skill, moving the child in the direction of pointing. Glancing at the object and then at a parents eyes would also be more advanced. Pulling the parent by the hand or finger would be another improvement over the child physically attaining the item independently. All of these responses are at a higher adaptive level because they are discriminative. They are not, global strategies that are nonspecific. As frustration builds because the desired items are not within reach, the child has to relate socially to someone in their environment to attain the item. It is important here for the caregiver to be aware of the developmental progression of adaptive behaviors and ready to respond with help when a higher adaptive response occurs.

At each step of adaptive responding the child should become very successful at using their newfound ability. Again, this can be a very difficult time for parents. They see the wonderful success the child is making and want the advances to continue. We have often observed a parent recognizing progress and then, for instance, pick the child up to help them attain the item only to stop short to try to get more from the child. The parent is waiting for a word or another gesture. The child has already communicated his/her desire, and the parent has responded. The child's communication needs to be successful at this point in order to establish the self-efficacy and competence necessary for future growth. When dealing with this new adaptive level, we will first want to make

the child very successful with the new behavior. That might mean weeks of accepting a reach or a glance as good enough. Therapeutic progress involves patience and taking progressions slowly as they come. If a child cannot make the next leap into a higher adaptive behavior, we break the next level of behavior into smaller behaviors and reward the first approximation. For example, if the child is not capable of reaching for the object, glancing at the parent, or pulling the parent, we may reward a step toward the parent after the child glances at the desired item. The point here is to be able to recognize the highest level of function the child shows and make their highest adaptive attempt successful.

In general, we are looking for diffuse non-specific crying to grow into differentiated crying, which leads to differentiated vocal sounds to specify needs. Differentiated vocal sounds become increasingly complex until they are words, sentences and explanations. Physically doing things for oneself grows into gestures to attain unattainable desired items, pushing and pulling behaviors, eye contact, facial expressions and subtle non-verbal behaviors. Our goal is to recognize where a child is and to slowly progress them along this spectrum, keeping the child successful 90-95% of the time.

As the child begins to use people in his or her environment to accomplish goals, the child has to engage with other people. Engagement and purposeful signaling become our focus as the child moves toward this adaptive level. It is important to read non-verbal behavior and exaggerate our own non-verbal behavior and affect to make these more salient to the child. Reading non-verbal behavior and affect is a skill that is instrumental in all human contacts. Within most human interaction, there are multiple levels of

communication going on simultaneously. Behavioral signaling, emotional tone of voice and verbal language all are occurring at the same time.

When relating to a preverbal child, we need to work on the signaling systems at the level that the child is capable of displaying and reading. *Behaviors and emotional tone of vocalizations are where we need to focus our attention when a child is preverbal.* Recognize and read the child's behaviors and assist the child to accomplish their goals at this level. Listen to the emotional tone of their vocalizations and respond to the emotional tones by helping the child attain their goals and mirroring vocally the emotional tone to convey empathy. This attentive stance creates an engagement in the emotional world with others and helps the child realize that relating to others is functional and productive. The child learns that it is easier to obtain desired objects through a relationship with others.

Here the child should be taught to respond to gestures. We usually like to teach gestures with no accompanying vocalizations. A child will understand and respond better to the gestures when the usual vocalizations that accompany them have been removed. This is much like the concept of keeping the things we say to a child very short and succinct. When we eliminate the complexity the child has more of a chance to understand our behavior.

As a child initiates interactions with a parent or caregiver the child is looking at the caregiver. The caregiver's facial expression, body language, tone and volume of voice will all be experienced by the child. Through classical learning the child will be making associations which result in physiological (emotional) changes in the child. Facial gestures, body movements, tone of voice and a variety of other behaviors emitted

by the caregiver will be associated with environmental events that are experienced by the child as positive and negative. The emotional tone evoked by excitatory and inhibitory learning provides the emotional intelligence to respond to situations before a child is verbal. A child learns to predict from an unhappy facial expression on mom's face that a current desire may not be fulfilled. Conversely the child learns that a happy expression often leads to the parent or caregivers helping the child attain a desired goal.

As a child builds self-initiation skills and learns to differentially signal and respond to signals from their caregiver the child is constantly encoding associations between environmental events and outcomes. Through classical learning and learning by consequences, emotions and physiological reactions are shaped, added and subtracted. When similar environmental events occur in the future the child will have a specific mixed emotional response. The emotional response is the culmination of associations elicited by environmental predictors and outcomes. The environmental events lead to an emotion. Success or failure at controlling the environment will further shape the physiological (emotional) response in the future and lead to alterations or consolidation of the response. In typical behavioral terms the physiological (emotional) correlates are unnecessary to describe what is occurring. For that reason discussions of what is happening in regard to emotions is often left out of behavioral literature.

Through preverbal, give and take, nonverbal, gestural interactions between a parent and child a child develops the beginnings of emotional (non-verbal) intelligence. Recognizing the role of the environment (the caregiver as part of the environment) and the principles of classical learning as well as learning by consequences will allow a parent, caregiver or therapist to impact the environment in meaningful ways to alter the

child's responses. Ideally the child will develop a skillful ability to accurately read the environment and the non-verbal behavior of others and respond in a productive way to the environment. This preverbal (emotional) intelligence will guide and influence verbal intelligence throughout a child's life. A child does not start to think and learn in a verbal sense until much later in development. Even when a child is encoding their experiences in language and guiding their behavior by rules they simultaneously encode information non-verbally and continue to develop their non-verbal (emotional) intelligence. When faced with a situation an adult has years of experience shaped by classical learning and learning by consequence resulting in physiological reactions to the events. These physiological reactions along with patterns of responding make up what most people call emotions. Most people will say that they did something because of an emotion. They leave out the environmental events that shaped and created the emotions. As an abbreviation "emotions" lead people to act in the world. Verbal humans have emotions shaped by experience and their verbal (rule based) knowledge (which is also shaped by classical and operant conditioning) to rely on when attempting to predict and control a situation. Emotional knowledge is direct experiential knowledge. Verbal knowledge can be direct yet symbolic or indirect and rule based. Rule based knowledge which can be acquired once a child is verbal can at times interfere with experiential knowledge.

## **Chapter 7**

### **Building Contingency Responsiveness**

At this point, we have a child that is moving toward being comfortable with the sensations coming from within, as well as into the body from the world. The child is usually comfortable and can self-soothe, and the caregiver has many strategies for calming the child when he/she is upset. The child's newfound ability to somewhat manage their sense of self-security allows the child to begin to expand their interactions with the surrounding environment in a more sophisticated manner than was possible before. For example, instead of isolating from other people, the self-secure child has allowed the caregiver/therapist to build up many positive associations related to their presence and has become aware that such people can be very enjoyable to be around. In essence, the self-secure child is now beginning to develop an emotional attachment to the caregiver/therapist..

With a greater sense of self-security, the child is more open to receiving input from and exerting output to elements in their surrounding environment. As a "little scientist," the child begins to explore and better understand the nature of the cause and effect relationship. As children master rudimentary cause and effect relationships, the child gains the skill of prediction. When I do action X, action Y usually happens. When someone does action A, they want me to do action B. The power of this predictive ability cannot be understated in one's ability to function in the world. Prediction involves a mastery of how relationships work at a base level. Some relationships become easy for the child to understand while other relationships remain too complex. However, as children feel secure and gain predictive abilities, social expansion is bound to progress in

a positive direction. Skills such as the expansion of self-initiation, becoming more competent at personally meeting his/her own needs, and purposefully signaling the caregiver/therapist with non-verbal behaviors when help is needed are growing skills in the child's repertoire.

The next step is for the child to become very aware that contingencies are present in the environment and that being aware of the contingencies will enhance the child's ability to control sensations and to satisfy *needs or desires*. This is the difference between randomly reacting to the environment versus skillfully impacting the environment in a meaningful way.

We typically begin teaching a child about contingencies by adding an unstated expectation into a pre-established chain of events. The child already has the experience of needing something and having the caregiver get the desired object for the child. This chain of events (the child's signal-parents' response-child attains item) has been well established. An unstated expectation is now added to this established chain of events. In other words, the novice predictive skills are challenged, expanding the range of options to consider, requiring more problem-solving ability, and exercising areas in the brain related to problem solving. One exercise related to the above involves having the parent hold a desired item until the child looks at their eyes whereas in the past the item would have just been handed to the child. It is important that no stated demand is introduced here. The child is given a problem to solve. As the parent holds on to the item, the usual response is for the child to pull at the object and to get mildly confused. When first challenged in this manner, a child behaves very predictably. The child is usually seen to scroll through a variety of behaviors and vocalizations that have worked in the past

(crying and pulling). Eventually the child looks up at the caregiver confused because the normal chain and strategies to finish the chain have not worked. The second the child looks into the eyes of the caregiver, the caregiver lets go of the desired item. When done frequently and intensely enough, learning has occurred. Now the child has another, more adaptive behavior added to their repertoire to gain access to desired items and to exert control over their environment.

The above example is basically a preverbal request that will teach a child a very functional and adaptive behavior. The child learns that they can control the caregiver and the world with their eyes. It is often stated that children with autism have an aversion to looking at the eyes of others. Think back to a high-school or college class where the teacher or professor called on class members to test their knowledge of the day's lesson. What happened if you did not want to be called on because you did not feel confident or competent with the material? If you were like me (CVD), feelings of anxiety developed and I avoided eye contact. The possibility of eye contact would increase the chances of engagement with the teacher which I desperately hoped to avoid. However, those who studied and felt confident and competent to engage the teacher demonstrated different behavior. They actively sought the teacher's eye contact and raised their hands to increase chances of engagement. The difference in the two was the learned contingency- one positive, one negative. If a child learns that looking at the eyes predicts positive outcomes the good feelings from the positive outcomes will transfer to the behavior of looking at others eyes. The aversion lessens as it is paired with the positive outcome of functional productivity. The child also learns that, when in doubt, s/he should scroll through successful strategies and try new behaviors until the desired outcome occurs.

Facial referencing, having been established as successful strategy, is now one more very important method he/she can utilize when solving future problems.

It is important to note that this one facial referencing exercise is only the beginning in a series of exercises that address the shaping of positive outcomes through referencing information from the faces of others. It is also important to note that in the above exercise, more is being taught than just teaching the child to look at an adult's eyes. Paramount in the above exercise is teaching that problems can sometimes be solved. The above exercise rewards the process of trying several methods in problem solving. The child is very motivated and the usual strategy did not work. What should he do? We want the child to be creative in thinking up new solutions with the end result a success. The lesson is that "I can solve problems if I exert effort."

It has been said that children with Autism lack the internal motivation to learn and do not derive much satisfaction from the learning process. This statement needs to be challenged vigorously for if we accept this at face value we are doing children with Autism and all those who care about them a great disservice. Generally, children and people in general do not like to experience repeated failure and tend to gravitate to things they are good at and get pleasure from. This is not any different for the child with Autism? When key skills to successfully navigating the world are missing, they need to be taught.

The beginnings of understanding contingencies in the environment start to emerge and the child becomes more persistent with problem solving strategies. This persistence, along with varying behavior patterns, will pay off for the child in numerous ways throughout his/her life. The child learns that when something doesn't work, try harder

and try different things. Throughout the process of encountering contingencies and solving contingencies the child develops an *internal locus of control* and feelings of *self-efficacy*. Learning self-efficacy in such a manner requires providing the child with, monitoring, and maintaining a carefully crafted set of challenges. Later in this book, we will more specifically address such challenges in a series of carefully thought out programs. However, for the purposes of this chapter, let us continue describing the development of contingency responsiveness.

Developing persistence and a pushy internal self-initiation is one main focus here. The second focus is getting the child to understand that the world is full of contingencies, and usually the contingencies present are not specified. Hence, the child has to self-initiate, problem solve and persist at trying multiple behavior strategies to attain the desired item. While striving to control the world and the desired items in the world, the child is learning that social contact and communication are the most productive behaviors.

Contingency responsiveness can continue to be taught through play. Using all that is known about the chains of events, movements, sights, and sounds the child loves, the therapist can now insert mild demands into the existing chains of fun activity. Some of the demands can be specified by a cue, such as a label; others can be non-specified. Each will add more flexibility to the child's responsiveness. An example of a time to use a specified cue and a time to leave it non-specified follows.

We recently started a five-year-old child that I'll call J.D. The senior therapist on the case was concerned that the child was not very responsive and would tantrum much of the time. I (EJL) spent the first half-hour of the workshop listening to the senior

therapist describe WEAP and the beginning programs. Most of my attention was on J.D., as I watched what he did while the adults talked. He wandered around the house almost aimlessly. He did not stop to play with toys. Periodically he stopped to stand by his mother.

As I watched him walking around, I caught a glimpse of his eye every now and then as he glanced at me. Every time he did, I made a funny face and got him to smile back at me. He started to look more and more in my direction as he continued to wander. Over the first ten minutes he became more and more fascinated with getting me to react to him. The senior therapist finished her talk and began to play in a very sedate and tentative way with J.D. She tried to push a ball back and forth with him. He wandered off as if she hadn't tried to interact with him. She made a few more attempts that he rejected by turning away.

I decided to take this opportunity to demonstrate how to use his curiosity to develop rapport. I got up and hid behind the couch. Slowly I peeked around the couch at J.D. until he caught my eye. At that time I quickly moved back behind the couch and hid. Tentatively I peeked out and withdrew again as soon as he caught my eye. As I withdrew J.D. came around the couch to catch me hiding. I withdrew further and affectively demonstrated to him that I was intimidated by his approaches. His face lit up with a smile as he began to chase me around the room. Within five minutes we were taking turns chasing each other around the room. I stopped the chasing game when he ran up to me, and I flipped him onto my shoulder, spun around and gave him what I call a "body slam". I yell "body slam" and set him gently on the couch. J.D. clamored after me to get me to do more "body slams." I gave him five or six more, pausing each time to give him

time to push me (bug me to do it again). At this point I am not cuing him at all. I just want him to force me to interact with him.

Eventually, I looked over to see that the senior therapist was going to call him over to do a program at the table. She was going to demonstrate the puzzles program with backward chaining (only removing one piece). I took the puzzle, pulled out a piece and bent down to J.D., who was trying to get me to give him a “body slam” and I motioned to him and said “do puzzle.” J.D. readily put the piece in, and I gave him a “body slam.” I next took out two pieces and had J.D. put them in for a “body slam,” then three, four and eventually all eight pieces for a “body slam.” He was doing the whole puzzle within minutes, and he wanted to complete the puzzle.

I then called him over to the table and had him do the puzzle at the table for a “body slam.” He came over willingly. Within the next ten minutes, I was able to do the rest of his beginning programs. J.D. is a child who would have struggled with listening to instructions and complying with instructions had I not used this fun approach. Within this example, I used specified cues, such as “do puzzle” and at times also didn’t specify the desired action. When I wanted him to do a specific task I used a cue. When I wanted to build self-initiation and problem solving, I did not cue the response I was looking for. When I didn’t cue him, I was looking for any behavior that I wanted to increase and when it occurred I provided a fun activity.

As previously mentioned, placing the unstated expectation of a glance up at the therapist eyes into an established chain of events, begins to teach a child how to problem solve via facial referencing. The child is also learning the beginnings of contingency responsiveness. We want the child to become very confident in his/her own ability to

recognize when contingencies are present in the environment and very productive at problem solving a solution to the contingency presented. Along with preverbal requesting via eye contact we can also systematically provide fun activities to increase following behavior, watching hand prompts and sitting where the therapist points, as well as receptive instructions.

As children become more proficient at predicting, and more responsive to contingencies during the beginning stages of therapy you will see a child who was once aimless, lacking any organized or directed behavior move to appearing very goal directed and confident. The child will be more “organized” in their actions. Confidence grows in the child as he or she starts to understand the rules governing contingencies in the environment, and the child is able to solve the contingencies at will. In the above described case example J.D. was wandering around aimlessly until he was presented problems to solve and then consequently was able to recognize and skillfully manipulate the contingencies to get what he/she wanted. When he recognized that he had control over my facial expressions his face lit up with happiness. He started to play with the control he had, looking at me more and more to get me to make a silly face. He stopped wandering aimlessly and started demonstrating purposeful action. His attention moved from an internalized focus with fleeting focus toward the environment to an external focus on me connecting his desires to behavioral outcome. As I became more the focus of his attention and behavior his behavior became much more purposeful and goal directed. The child was able to test his control over the world and the therapist and test his predictive assumptions. You got the sense from watching him that for the first time J.D. understood the world he lived in.

It is important to note the “in the moment” recognition of self-efficacy and competence of the child. None of the above would have been possible had unrealistic expectations been placed on the child. Expectations need to be well within the child’s ability and need to be adjusted according to motivation and interest. The resulting goal directed organized behavior is so much better than the alternative retreat into the world of autism.

A new child started in our program last week that demonstrated the same aimless wandering toward the beginning of his workshop. It was the first session where the new therapists are being trained to consistently perform Lovaas based programs. Mom had just decided to switch the child to a special diet which meant we couldn’t use candy or food to motivate him. The child, I’ll call him B.C., wandered around the living room only glancing at the therapists. He showed no organized plan to accomplish anything. As therapists tried to play with him he allowed them to do what they thought he would like and he often enjoyed their interactions. He would smile and laugh as he was being swung in a blanket or tickled. The problem, as I (EJL) saw it, was that when the therapist stopped the interaction B.C. just walked away. The world was acting on him and he was just a passive recipient of the good and bad things the world threw at him.

I discussed my concerns with the B.C.’s mother and asked her if she had any snacks that we could use. She took gummy bears out of the freezer and we cut them up into tiny pieces. B.C. immediately recognized that the Gummy Bears were available and he went to where they were placed on a dish and tried to take one. This was the first clear sign this day of purposeful behavior as B.C. acted upon his environment to satisfy a *desire*. Unfortunately I was in his way as I took the plate of Gummy Bears. I

immediately gave him one to encourage his attempt at satisfying his *desire* and to allow him to sample the Gummy Bear.

The next one I held on to until B.C. looked up at me. As he looked at me I let go of it without saying anything. Over the next five minutes he started to look into my eyes as a strategy to get me to release the Gummy Bear. First he tried pulling and looking away. Glancing at my eyes was easily shaped as a solution to the problem of how to get the Gummy Bear out of my hand. After this behavior (glancing at my eyes) became more predictable, I walked away and went over to the other side of the room. B.C. followed further demonstrating to me that the Gummy Bears was motivating and that B.C could persist at a goal. His attention was now focused on another human being. After I gave B.C. a few Gummy Bears for following me back and forth across the room I stopped and patted a chair at the table and waited for him to sit down. I had to overhand prompt him to sit in the chair. He did not recognize the prompt as a prompt. I then gave him verbal praise followed by a Gummy Bear. I want verbal praise to be predictive of good things so that the good feelings from the Gummy Bears transfer to the verbal praise. I then walked across the room to another chair and waited for B.C. to follow. Again, I prompted him by patting the chair and then helped guide him to sit down. I praised him and gave him another Gummy Bear.

After about four trials where I had to guide him into the chair he was able to watch my prompt of patting the chair and sit down on his own. The great thing to see was B.C.'s attention to me as he solved the contingencies that I was placing before him. Within fifteen minutes he was able to follow a point prompt to sit in the chair I pointed to

in order to get verbal praise and Gummy Bears. After I had him coming over and sitting to get the Gummy Bears I had the rest of the therapists practice guiding him.

From here we would go on to labeling the behavior we were looking for with “come here” and “sit down.” After a half hour B.C. had four strategies to try, glancing at the eyes, walking across the room, following the therapist, and sitting. When we withheld the Gummy Bears he would try each of the strategies he had learned. What is amazing to me here is that during the first part of the session B.C. appeared very aimless in how he wandered about the room. As he was exposed to contingencies and able to solve the contingencies his attention and behavior became more focused and persistent and he began to relate socially to attain desired items.

Learning how to solve contingencies at this level through the use of candy and physical activity set’s the stage for learning about contingencies in more advanced and delayed ways. In the above example, candy and physical activity can be considered motivators. However, what is motivating to a child is as infinite as the imagination allows. There is an easy way to tell if something is motivating to a child. Apply the following criteria: 1. Does the child seek it out? 2. Does he or she care if you take it away? If the answer is yes to both of these questions you more likely than not have a motivating item that can be used to teach contingencies. As a side note, EVERY child is motivated by something. We can’t tell you how many times we are presented with the argument – “he just doesn’t want anything, nothing motivates him.” Such words foster an atmosphere of excuse giving and stifle creative thinking. A preferred attitude goes something like this: “I have not yet discovered something that he consistently wants... This is what I have tried...Let’s brainstorm new ideas...”

All of the programs that we teach the child at the table and away from the table have basic contingencies that must be solved. The child moves from working on the level of trying to get candy, to trying to figure out why a friend behaved in a certain way. The world that we live in inundates us with contingencies every moment of the day. The ability to surmise the situation and come up with a plan of action is integral to successfully navigating the physical and social world.

Therapists need to constantly assess that child's ability to stay connected with and persistent at solving contingencies. Attention will be best when the child is pushing the therapist to release the valued items or behaviors. Whenever you find yourself following the child around and begging them to take what you have to offer you need to stop and assess the environment. Following the child's lead is exactly the opposite of what we want. Very little productive learning takes place in such an environment. In fact, what the child learns is this: I make a fuss and people scurry like mad to figure out what I want. A child learns that how big a fuss he/she has to make depends on other people and their tolerance levels. In such scenarios, where is the child's opportunity to expand adaptive functioning? It does not exist. Many well-intentioned people fall into this trap. However, breaking this trend is essential in the healthy development of the child with ASD. The therapist should ask themselves, "What is it about the environment that is leading to the child not want interaction and the usual desired items?" The answer to this question usually comes down to certain desired items being offered too often or being freely available. The therapist's task is then to gain control over the things in the environment that the child desires. You will know that you successfully control desired items when the child is now bugging you for interaction. How is such control gained?

By making sure the things the child wants are only available through the caregiver. When such control is established the caregiver can then control the learning opportunities by controlling contingencies and desired items. In order to attain the desired items contingencies must be solved and learning takes place.

The child becomes more connected to their environment and the good things that can be attained through a focus on teaching a child to solve contingencies. Learning that contingencies are present in the environment and all that has to be done is try what has been most successful in the past and if that doesn't work try something else that has been successful. When all else fails look to another human being for guidance.

Contingency responsiveness can involve solving contingencies to attain desired items or behaviors from others as described above or to avoid an undesired behavior or experience. For example a child that is very self-absorbed and spends much of his time flapping a stick in front of his face could be taught contingency responsiveness through a response cost procedure. M.C. was brought in for a progress review by his parents. He was making good progress as he went through the programs but when not engaged he spent most of his time flapping a stick in front of his face. M.C.'s parents were very concerned about this behavior.

As I (EJL) watched M.C. walk around the room flapping the stick I got up and took the stick from him and then gave it right back. He looked at me confused as if he was wondering why I took his stick for a second, then after the pause he began flapping the stick again. As soon as he did I got up and took it away again and gave it right back to him. You could tell by the look on his face now that he knew something was up. He didn't take his eyes off of me as he tentatively shook the stick which got the expected

reaction of me moving toward him to take his stick. He smiled as I came this time. M.C. began to play with different movements to see which movements elicited my behavior of taking his stick.

What I like most about this interaction is that it is an interaction. M.C. is no longer in his own little world oblivious to what others in the room are doing. He is referencing me and goading me with alternative behaviors to see my reaction. He has a sense of power in being able to control my behavior. I may be trying to shape away the behavior of flapping the stick but he is playing with his ability to control me and he is learning to understand the world at the same time.

I was able with this simple procedure to shape away the flapping of the stick while in the progress review. It would be a very difficult and time consuming task to shape away a self-stimulatory or what I refer to as a self-soothing behavior in all aspect of the child's life. Our general strategy is to put time and location requirements on the self-soothing behaviors and shape the behaviors into socially acceptable behaviors. For example the behavior of flapping a stick in front of the face could be changed into drumming. Exposure to very clear shaping exercises teaches a child to be aware of the environment and the social contingencies in the environment. These programs set the stage for more advanced shaping experiences while learning to differentiate auditory, motor, and visual sensations in upcoming programs.

## **Chapter 8**

### **Making Environmental Discriminations**

Here we will teach the child to relate and respond to objects, sounds and movements. Objects are taught through puzzles, matching, block design, sorting, patterning, and ordering by size. Sounds are taught through contagion, labeling, affect matching, animal sounds, preschool songs and environmental exposure. The child is taught to relate and respond to movements through motor imitation. The first three basic categories of programs are Auditory/Verbal Discrimination, Motor Imitation, and Visual/Spatial Discrimination. Auditory/Verbal discrimination leads to verbal responsiveness. Motor imitation leads to vocal imitation, and visual/spatial discrimination leads to receptive labels. Verbal responsiveness and vocal imitation lead to Requesting. Receptive labels and Verbal Responsiveness lead to Expressive Labels.

#### **Auditory/Verbal Discrimination**

To begin to teach a child to discriminate verbal and auditory sensory signals, we begin by using contagion. We repeat the child's vocalizations back to him/her. In repeating the child's vocalizations, we are calling attention to the vocalizations. A nice added benefit of starting with contagion is that you are demonstrating empathetic understanding to the child as you demonstrate that you can recognize and repeat their soothing vocalizations. Contagion should not be done with distress alerting vocalizations. Contagion exercises should be done in a face to face position while playing a physical interaction game that the child likes. I don't believe that the child will benefit much from contagion that is done as you follow the child around and are not face to face or if a child is engaged in something other than the person doing the contagion

exercise. As we repeat their vocalizations, we call attention to the vocalizations, demonstrating empathy and helping the child to distinguish between the vocalizations. The child has the opportunity to hear their vocalization and compare it to our echo. Here we are teaching the child that some things are the same and some things are different. As we do this, the focus is on creating a playful, engaged interaction. What begins as an echo of the child's vocalizations turns into a give and take vocal exchange similar to a playful conversation. This conversation is lacking meaning in the verbal sense but can be full of meaning from an emotional or affective sense.

As contagion becomes an affective interaction conveying emotional tone, the therapist can experiment and match the tones to facial expressions to give the child an understanding of coordination between vocal tones and facial expressions. The goal here is to eventually have an affective conversation with the child as you play and interact. The more this can become a game for the child, the more the child will be comfortable with experimenting with vocal tone and facial expressions to convey meaning. In essence, we are giving the child the ability to communicate vocally before verbal ability has emerged. During this time, the therapist should focus on conveying meaning to the child with voice tones and inflections, as well as facial expressions. This should be a continuous focus throughout therapy and throughout the child's life.

At the same time that we are focusing on contagion, we focus on labeling the child's environment. As you follow the child's lead and play with the child you should label objects, actions, and emotions in simple terms. As the child smiles at you say, "I'm happy"; as he throws down a toy say, "I'm mad"; as he reaches for a cookie, say "cookie." Labeling the child's world, actions, and emotions will give the child the

experience of equivalence between the words and the objects, actions, and emotions that they are paired with. It is also important to match, mirror back, and label the child's affect. This creates the experience of equivalence between the child's affects and yours, and between their affects and the labels you provide.

We can also expose the child to animal sounds and begin to echo and repeat the animal sounds as we pair the sound of the animal with their name or picture. This can also be done with preschool songs. General environmental exposure, along with labeling will also help the child experience the connection between sounds in the world and your vocal labels. The overall goal with these programs is to help the child discriminate between auditory sounds. Discrimination basically means that the child is learning what is and is not the same. They are learning that some sounds are the same and some are distinctly different. The ability to recognize that some sounds are the same and some are different will lead to the ability to respond to different sounds in different ways. Children will also gain the ability to generalize some sounds and respond more flexibly to sounds that have not been directly taught.

### **Motor Imitation/Discriminations**

As we work with children to increase their ability to discriminate auditory/verbal information, we simultaneously work to increase motor imitation. This is often referred to as non-verbal imitation. This is one of the most important basic skills that a child needs to learn. Built-in and inseparable from non-verbal imitation is attention to another human being. Imitation is thought to be a core human ability that leads to sharing emotional states and instrumental learning (Travathen, Kokkinaki, & Fiamenghi, 1999). Imitation of body movements provides a child with the shared experience of interpersonal

connection which leads to imitation of facial expression leading to emotional expressions (Gopnik and Meltzoff, 1994). Earlier work on building emotional engagement and purposeful signaling sets the stage for a child's ability to mimic the behavior of others. Successful non-verbal imitation sets the child up for improved observational learning skills. One of the things that sets children with autism apart from their peers and significantly interferes with their ability to learn is a lack of observational learning. Most typically developing children learn almost everything important to them through observational learning. Children with autism often lack these skills. A focus on non-verbal imitation helps to build emotional engagement, purposeful signaling and leads to improved observational learning.

When teaching non-verbal imitation, our focus is on increasing the child's abilities related to attending to, discriminating between, and imitating the behavior of others. We start by increasing the child's ability to attend as we did earlier when building initiation. As the child looks at the therapist, the therapist becomes active and engages the child in the soothing and enjoyable experiences they developed together during the environmental acceptance exercises and play. Again, we are going to look at the chains of events that we have established. The child comes to you and demands a body slam, cookie, or swing. The chain continues with you providing the wanted behavior. Within this chain of established activities, you insert a request for a behavior before the fun activity. Where the chain used to be request-response, now we have request-demand-behavior-response/reward. Here the request is "body slam;" the contingency cue is, "do this" as you touch your nose. Because of earlier work teaching the child about contingencies, the child has experience with contingencies and behavioral strategies to

solve the contingency begin. The child then needs to touch their nose (we will often prompt the child at this point by taking their hand and touching their nose). When the child touches their nose, the therapist provides an enjoyable activity such as a “body slam.” We then fade the prompt of helping them to touch their nose. The end result is the child watching the therapist intently. The child attends to the therapist for verbal and visual cues and responds based on the cues to the therapist’s actions. Here we have everything we need for observational learning. Through teaching multiple single behaviors, the child learns that it is enjoyable and functionally productive to attend to and mimic the actions of the therapist.

We usually start with object cued non-verbal imitation, such as putting a block in a bucket. We have a bucket with two blocks. When we have the child’s attention and motivation, we take one block and place it in the bucket as we say, “Do this.” After we say “Do this,” we very quickly place a second block in the child’s hand. If the child does not immediately place the block in the bucket, we overhand prompt the child to place the block in the bucket. We overhand prompt quickly to keep the child successful, which avoids distress and confusion. We slowly fade our overhand prompt so the child is imitating our actions without prompts.

After object cued non-verbal imitation, we move on to non-object cued non-verbal imitation such as imitation of clapping, touching the table, patting the head, and waving. From here we move on to chaining non-verbal imitations together, doing facial non-verbal imitations and games like follow the leader. Eventually we change the cue of “do this” to “do this to me” as we move into reciprocal actions. The child is doing a non-

verbal imitation in a mirrored fashion dealing with another person. Here the child is learning the beginnings of concepts such as self and other.

We use simple one or two word requests as cues at first to keep the language as simple as possible. In doing so, the child learns one cue: “do this,” which applies to many behaviors. The child need only focus on the behavior he/she needs to imitate and is not distracted by varied or confusing language. Remember, at this stage the child is still preverbal. After teaching 20-30 non-verbal imitations this program moves nicely into a verbal responsiveness program (receptive instructions) by going back over all of the learned non-verbal imitations and changing the cue (do this) to the request (touch your nose). This program also moves nicely into vocal, and then verbal imitation.

### **Visual/Spatial Discrimination**

We need to teach a child that objects in the world are discrete separate items distinct from other objects, and the objects can be related to each other and the self in certain ways. The most basic way to teach this is by teaching the concept of sameness and difference. We usually start with wooden peg puzzles. The child inserts the puzzle piece into an indentation on the puzzle board that matches the shape of the piece. What we are teaching here is the concept of sameness in the form of visual/spatial objects. We usually start to teach puzzles with the process of backward chaining. First we remove one piece and only have the child place one piece. We then remove two pieces and so on until the child is doing the whole puzzle. We will use hand over hand prompting to help the child be successful if the child does not put the puzzle piece in independently.

At the same time, we work on nesting (matching) 3-D items. We will use items from the child’s environment that can be matched and nested. A small plastic bowl is

given to the child with an identical plastic bowl on the table and the child is told to match and is prompted to nest the bowl within the bowl on the table. This will be done with as many objects as the child needs to move on to 3-D object matching. Usually four to five nested objects is sufficient.

Next, we will move to identical matching of 3-D objects. It is important to use objects that the child will be exposed to every day so that the objects are personally meaningful to the child. Objects such as familiar toys, utensils, dishes, foods, and clothing are appropriate. We want the objects to be available and meaningful to the child. Here we are focusing on teaching the child to pick the distinguishing characteristics in the objects that determine sameness and difference. Initially we use objects that are as exact as possible. This leads into using objects that are not exact but very similar. For example, two cars that are exactly the same but different in some way, such as color, may be taught next.

In teaching sameness, we want the child to be able to abstract sameness from the main features of the object. We are rewarding the response of responding to the salient features that make the item a car. At the same time, the child has to disregard the unimportant variation (color). Through multiple trials (multiple exemplar training), the child learns to focus on the socially important aspects of the objects to be successful. I say social because the child has to respond in a way that has been determined by the therapist. In essence, the child is trying to figure out what characteristics the therapist has determined are important. The child is learning to abstract meaning based on a socially derived consequence, to problem solve, and to respond in a prescribed way.

From 3-D matching we move to 3-D to 2-D matching, to 2-D to 2-D matching and finally picture to word matching. Again, we start with pictures of objects that are as identical as possible. We then move to non-identical matching. When we move to non-identical matching, the child again has to solve a problem. We make this problem easy at first by having the objects very similar. Eventually the child has to respond to items that are very different. For example, it would be fairly easy to match one picture of a bear with another. It would be more difficult to match a snake with an elephant. Both are animals. The child is again abstracting from the contingencies socially prescribed meaning. The child learns to attend to the features that the therapist has decided are important. In doing so, the child is learning to perceive the world based on others perceptions and what others think is socially relevant.

In teaching visual/spatial discrimination we also teach block design, which takes the concepts of same and different a bit further. Now the child imitates block patterns that the therapist sets up. First we will start with just one block. We next move to the child copying our block design one at a time as we place blocks, and eventually the child can copy a block structure that has been built before the child begins their structure. The final step is to have a child copy a block pattern from a 2-D picture.

Here the child has to recognize sameness and distinction in picking the proper blocks and arranging them to match a pattern. The child is also learning about visual/spatial organization and that larger patterns are made up of smaller patterns. Block design, sorting, patterning, and order by size give the child their first systematic exposure to comparison, spatial, and hierarchical relations among objects. The child is learning to compare the preformed block design with the one they are making. The child is learning

to coordinate the blocks spatially, and they are learning that each block makes up a larger pattern.

Within each of these programs, the child has to figure out what the salient characteristics in the objects or group of objects are in order to make a response. What the child is figuring out is what the therapist cares about today. We are teaching general ways of perceiving and organizing objects in the world based on social ideas. A car is not a car because it is black. Why is a car a car? The child learns tires are important. Windows may be important. The child is forming an understanding of cars based on social contingencies. A car to the child will then (since the child's understanding is based on social contingencies) be approximately the same thing a car is to other people. These programs, at a very basic level, are teaching a child how other people perceive and categorize the world. This is all being done before a child can even respond to a request such as "give car." If a child has no understanding of what a car is, the child will not be able to behave in relation to the car. This first step is to understand and incorporate society's perception of discrete objects. Once the child learns what a car is, the child can do something with the car.

### **Summary**

At this point I have outlined the initial programs. Beginning programs are used with pre-verbal children and children who need extra help distinguishing and manipulating objects in their environment. These basic programs build the relationship between therapist and child and set the tone for all of the following programs. We want to make sure that our focus through these programs is to build a quality relationship with the child. You will know that you have been successful building a quality relationship

with the child if the child is happy and smiling throughout most of the session, the child looks to you for fun, the child's eyes are bright with anticipation of what you might be able to do for them next, the child is pushing you to interact, and the child is trying new strategies when old strategies aren't working to activate you. Next we will be moving on to programs that focus on increasing response to words (verbal responsiveness), vocal and verbal imitation, and receptively responding to labels. The next programs up the expectation for levels in interaction, and that will only be stable if the child is solid with beginning programs.

## **Chapter 9**

### **Responding to Environmental Discriminations**

#### **Verbal Responsiveness**

At this point the child has had a lot of exposure to auditory/verbal stimuli, experience with motor imitation, and experience discriminating visual/spatial objects. The next step involves teaching the child to be responsive to verbalizations. The child in this stage is rewarded for attending to, discriminating between and responding to verbal requests. We begin by teaching the child to orient to a speaker when the child's name is called. In beginning programs the therapist learned how to make the child happy.

Once the therapist knows many things that the child enjoys the therapist uses those experiences to increase behaviors that occur more rarely. In other words high frequency behaviors can be used to increase the occurrence of low frequency behaviors. In this case the child looking at someone calling their name is a low frequency behavior because it doesn't occur very often. A behavior such as jumping on a trampoline occurs a lot. If we limit access to the trampoline, then we can allow access to the trampoline to increase the child's ability to respond when someone calls their name. First the therapist calls the child's name in a normal energetic tone. When the child looks at the therapist the therapist picks the child up and places them on the trampoline. If the child does not look up nothing is done. You move on to another try a few minutes later. If the child gets to do fun activities every time s/he orients to the speaker after hearing their name the response of orienting to their name will increase. The child has learned a very valuable skill. Orienting to that specific sound leads to having fun. Providing fun activities for a child every time they orient to their name can be done easily in a play format. When

playing the interaction games that the child loves the most place into the existing chain of events an extra demand (the child's name). When the child looks at you continue the game. If the child doesn't look at you stop the game for a few seconds until eye contact is made. The important thing here is not the eye contact for eye contact sake. The important aspect of this interaction is the child orienting to their name. We are looking for increased interactive responsiveness and an affective connection to the therapist. This can be accomplished most successfully while engaging in an activity that the child loves. Down the road as these behaviors become ingrained they can be moved to less thrilling activities.

Although we want to establish an orienting response to the child's name we will not be calling the child to the table using their name. We want to make sure that we can quickly provide fun exciting activities every time the child orients to their name. If we use their name when calling them to the table it will be much more difficult to control the immediate consequence of orienting. The demands associated with coming to the table may undermine the process of orienting to the child's name.

The next receptive instruction that we want to establish with the child is a response to come here. We usually want to build this response through play. We do a physical activity that the child loves and that they would request if they could. After swinging the child around, for example we would stop the game and walk away. The first thing you want to see is the child following you around the room to get you to continue the activity. When this is happening and you are 99% confident that the child will follow you can say the words "come here" as you walk away. The child comes naturally because you have established that pattern. The child also hears the verbal

prompt of “come here” before their behavior. Children usually want to beat a prompt and they use every sensory experience in their environment to predict what will happen next. If the word is the first cue and the word is distinguishable from other words the child will start to respond after the word. This game can be continued during play.

It’s important to make the child’s time with the therapist as fun as possible and also to make the things, especially words, the child learns productive for them. What will be meaningful to a child is anything that helps them accomplish their goals at the level or one step above where they are developmentally.

Once the child consistently comes to the words “come here” we want to consolidate the teaching of “come here” with physical prompts. Coming when a parent or therapist asks is a life saving skill for the child. Imagine a child walking toward a road and not responding to an inhibitory command. Not being able to respond to inhibitory commands places a child’s life in danger. For this reason come here, wait, and stop are taught through positive social interactions and then consolidated as very consistent responses through physical prompting. In the case of “come here”, after the child is consistently coming over we will call the child when they are not engaged and then go get them by the hand and bring them over. After we do this consistently for as long as necessary the response of coming when called becomes almost automatic. Over-learning this response could be life saving.

Next we want to over-learn coming to the point that the child will leave a very attractive activity when the parent calls them. Suppose the child loves dogs and sees a dog on the other side of a busy street. No matter how much the child loves dogs we want listening to parents and coming when asked to be stronger than any external motivating

environmental event the child may be faced with in the world. Learning to wait in the same playful fashion and learning to stop can also be life saving. Each of these responses to verbal requests will strengthen the others. In other words, learning other inhibitory behaviors will make each inhibitory behavior more solid.

As the response of coming over when called is becoming strong we can chain to that request the request of sitting at the table. As the child comes, pat the chair, and pause until the child sits. The child can be prompted to sit if he/she doesn't do so naturally. As soon as the child sits, praise the child, and engage in a very rewarding behavior with the child, such as swinging them around. After the energetic reward, continue playing with the child, trying to maintain normal emotional attachment and gesturing. The key here during the downtime play is to increase the number of back and forth interactions between therapist and child. These interactions may be looks back and forth, gestures, or words. As long as the child is reacting to your actions and verbalizations the interaction should continue. After about five minutes of play go back over to the table and call the child again. Continue alternating interactive play with requests to come over to the table.

When the child is running over to the table and eagerly awaiting your playful interaction, you can start to introduce the wait. When the child comes and sits down, delay the energetic play for five seconds and then reward with play. You need to be able to read the child at this point. Starting to delay from 3-5 seconds is usually possible. The goal is to work up to a delay of about 10-15 seconds. This may take a few weeks. It is important to go slow and not rush extending the wait time. Here the child is learning about delayed gratification. All we are trying to accomplish here is for the child to learn the concept of wait. After the child is consistently waiting for 15 seconds, you add the

receptive instruction of wait when the child comes and sits down. You only add the instruction when you are 99% confident that the behavior will occur without the instruction. Once the instruction is added you will want to physically prompt the child to wait if they try to leave the chair before you tell them they can go. Once you have the child waiting for fifteen seconds in response to the instruction practice a fifteen second wait over the next few months in many situations at the table and around the house. Responding consistently to wait in as many environments, as the therapist is creative enough to come up with, will teach the child that what is learned at the table has practical implications in the real world. What the child learns is that he/she has control over contingencies in the world. They are learning how to recognize and respond to contingencies. In other words the child is learning how to learn and problem solve.

At this point the child can respond to the request to come and wait consistently in many environments. We will also, at this time, want to start playing a stop game. This can be done in many ways. The most basic way to teach stop is to play an interactive chase game with the child. While running and playing with the child freeze your movements. Wait for the child to freeze. As soon as the child stops moving energetically pick the child up and swing them around (or do any other behavior that will be very reinforcing to the child). After swinging the child around start the chase game again and freeze your movements. Wait for the child to freeze and then engage the child with either swinging them or continuing the chase game. Here we are targeting the freezing behavior and selectively increasing that behavior by providing continued activity. I've (EJL) been asked when explaining this process "what do I do if the child doesn't freeze". My answer to that is that the child will freeze. There will be some time when the child stops their

movement. It might be slight. The therapist needs to recognize the slightest stop in movement and reward with continuing the chase game or some other energetic fun activity.

At this point we should mention that we often use lively interactive play to motivate children. You do have to take into account the child's preferences and some children may need a less energetic strategy to remain optimally engaged. Once the response of freezing occurs the therapist must use the already learned wait response without requesting it to delay a few seconds at a time before continuing the enjoyable activity. The goal is to get the child to stop and then increase the time before the enjoyable active continues. Since the child already has experience with wait they should wait as a strategy to evoke continuance of the play activity. After the therapist has the child stopping and waiting for 10-15 seconds at a time the word stop can be introduced before the behavior. This game should be played on a daily basis. This can be changed into the socially appropriate preschool games of red light/green light, freeze tag and statue. Again these games should be practiced in many environments. You will want to make this stop behavior very consistent through continued practice. Ideally it can be paired with come and wait to make the response even more consistent. For example if the child is moving toward a road. Being able to say stop and having the child stop is a life saving response. If you can add come here or wait you have more learned behaviors to rely on in protecting the child.

While we are working on strengthening the receptive instructions of come, wait and stop we can also start to work on object cued receptive instructions. We will have an item on the table such as a block and the therapist will hold out their hand and say "give

block.” If the child does not reach for the block and hand it to the therapist the child will be physically prompted to pick up the block and hand it to the therapist. We rely on physical prompting to keep the child successful and guide physically to help the child understand the verbal request. We always try to use the least invasive prompt. For example if all the child needs is for the therapist to point to the block, pointing to the block is all that the therapist would do. The other extreme would be a full overhand prompt where the therapist takes the child’s hand and places it on the block and then moves the child’s hand to the therapist’s hand and takes the block. With object cued prompting we can teach give x, pick up x, open door, close door, turn on light, turn off light and the position cued responses of sit down, and stand up.

Next we move to gesture cued receptive instructions such as “give me five”, where the therapist holds out a hand, palm up, and the child slaps the therapist’s hand. This can also be physically prompted originally to teach the child what is expected with the cues. We can continue to work on come here by holding out the arms and a second after saying come. At this point all of the non-verbal imitation items can be revisited with a verbal request occurring a second before the gesture prompt. In essence we replace the “do this” request in the NVI program with the receptive instruction. In doing receptive instructions in this way we take advantage of the child’s prior learning which demonstrates to the child the value of what was previously learned. We are also taking advantage of the behavioral principle of a discriminative stimulus predicting the presence of contingencies which will lead to desired outcomes. The child learns to predict that the gesture will occur from the receptive instruction. The gesture cue can then be eliminated and the child is responding to receptive instructions.

As we teach the child receptive instructions many of which were already learned in the non-verbal imitation program we also teach the child a variant of come, wait and stop in teaching a child to stay near. Here the child is taught to stay near a stationary object and then to stay near a moving person and to reference their location in relation to a moving person. To teach the stay here to a child we rely on past learning of wait and stop. We start by teaching the child to stay near a certain object such as the car. This can be done by bringing the child near a car and saying wait. Eventually we will bring the child near the car and say, “stay here” – “wait”. Then we will eventually remove the wait. Once the child is very good at staying at a location we start to vary the locations so the child can be told to stay here in reference to many places.

The next step is to teach the child to stay near. Here they have to reference the parent or therapist and follow them. This can be taught in a game format building on the previous wait and stop programs. Within the game of running and chasing and playing statue the therapist yells out stop as the child moves more than five feet away from the therapist. The therapist then says go while moving away. Once the pattern is established, of the child following the therapist and responding to stop the therapist can start to say “stay near” before the stop request to establish prediction in the child of what will come next. The process of moving in the game and controlling the child’s position with stop statements within the game will transfer over to the stay near request. Stay here and stay near should continue to be a focus in therapy through games. “Stay near” and “stay here” are two additional inhibitory games that when acquired strengthen the other inhibitory requests.

From here we move on to multiple word requests. We can chain previously learned receptive instructions such as touch nose and clap hands. We want the child to be able to listen to a chain of instructions and then to complete the requested actions. Some examples would be touch chair, go give mom a hug and then jump up and down three times. This program can be fun and the main thing the therapist is looking for here is that the child is listening to multiple instructions and completing the multiple instructions. This program builds on the child's ability to listen to instructions and then to plan the motor actions and follow through with the motor actions to complete the instruction. Delayed gratification, motor sequencing and planning, focused and shifting attention are all being targeted simultaneously. Here the therapist should be moving to more natural and varied requests. We will often make a list of possible ways to give the request so the therapist is focused on varying the way the request is made.

After children are able to chain receptive instructions with good consistency we move on to teaching a child to respond to deictic instructions. Here the child is taught to respond to right and left receptive instructions.

Once they can respond to right and left receptive instructions we move on to negated instruction. Saying the receptive instruction with a "don't" before the instruction. For example "don't touch your nose". We alternate negated and normal receptive instructions so that the child is listening to each part of the instruction. Here the child is being taught that little differences in language can be very significant. This can be made into a game like playing Captain May I.

We next want to focus on time related instructions and teach the concepts of first-next-last, before-after, etc. The child is given the chained receptive instructions with

modifiers. Some examples are, before you knock on the door give mom a kiss, after you touch your head touch your tummy. We want the child to become flexible with listening to the instructions and paying particular attention to the modifiers. Having a focus on time related concepts creates a more fluid attentive focus which will help the child negotiate the complex verbal interactions of their peers.

We also want to focus on the child learning to respond to implied receptive instructions. When focusing on implied instructions the therapist makes comments such as “it’s too bright in here,” leading to the child shutting off the lights. Other implied instructions could include, I’m cold, I’m thirsty etc. Implied instructions teach the child to listen for unspoken meaning behind what is said.

While teaching negated, time related and implied instruction you will likely see some confusion and a regression in some of the responses to receptive instructions. We want to go back to single instructions and teach the child to flexibly respond to deictic, negated, and then time related instructions as we move back into chaining the receptive instructions. Finally working on implied instructions will open the door to flexible social communication. The programs of verbal responsiveness will continue throughout therapy.

### **Vocal Imitation**

After the child has mastered motor imitation and has started the verbal responsiveness programs we can move into vocal imitation programs. Here we are rewarding the child for attending to, discriminating between and imitating verbal behavior.

We begin by vocal priming. Here we teach familiar animal sounds in a song or statement completion format such as the cow says moo. The emphasis is on making the experience as fun as possible and the sounds as enjoyable as possible for the child. We can also start a phrase completion program where we say a phrase and pause before saying the last word or sound. In these programs the child is primed for a response by repeatedly hearing the phrase. When the child can say the last word of the phrase we use backward chaining so the child says more and more of the phrase.

At this time we also focus on repeating the sounds the child makes and trying to gain some control over the child making the sound. This is an extension of the auditory/verbal discrimination programs and motor imitation programs already discussed. We start with the sounds the child can make and interaction games to get the child responding back to our vocalization. As we get the child making the sound in reaction to the therapist making the sound we gain what ABA calls SD control over the behavior. From here we can start to work on teaching phonics and the use of Kaufman cards to shape language. The Kaufman cards help shape sounds into words along a normal developmental progression. Words are then chained to make sentences with a focus on personal meaning for the child.

Verbal imitation can be further expanded with the help of programs involving imitation of song lyrics and lines from movies. Words are chained into multiple words which are chained into sentences and multiple sentences.

## **Receptive Labels**

With receptive labels we are rewarding the child for attending to the discriminative features of stimuli and matching them to verbalizations. This program builds on and is an extension of the verbal responsiveness and visual discrimination programs. In the receptive labels program the child learns to relate an object to its verbal label. More importantly we are shaping the child's perception of the world based on socially derived significance. One 3-D object is placed in front of the child and the therapist says give X (give ball with a ball placed in front of the child). The correct response is for the child to hand the ball to the therapist. Here the child is learning when the therapist says give ball the correct response is to pick up the ball and hand it to the therapist. The child is praised for a correct response and given a neutral no or "try again" statement for an incorrect response. We make the response easy by only having one object out in front of the child at first. This is called a mass trial. Mass trial teaches the concept of sameness between the object and its corresponding verbal label. The only option is for the child to hand or not hand the ball to the therapist. After the child consistently hands that ball to the therapist we introduce a second object. The child is taught the second object in mass trial format. Once the child has mastered giving the second object (let's say a car) to the therapist when the therapist says give X (Car) the two learned objects can be put into random rotation. Both objects are placed before the child and one object is requested by the therapist. Here the child is learning to distinguish one object from another. The child learns that one response is correct (handing the ball when the therapist says ball) and one response is incorrect (handing the car when the therapist says ball). The child has to abstract from this process information about what is expected and figure out what stimulus characteristics define the verbal

label. The ball may have been blue and the car red. The child may believe that give ball means give blue. For this reason we have to use multiple exemplar training. In other words we teach a number of cars in the same fashion as described above. From multiple trials the child abstracts what stimulus qualities are important to the social abstract world and associated with a particular label which is conveyed through contingencies provided by the therapist. Teaching that multiple cars are all cars also begins to teach the child categories. A car is a car based on certain features common to all and not based on the features that are not present in all cars. The child is learning to rely on social contingencies to abstract what is important about the world he/she sees.

As we go through all of the receptive labels the child begins to understand that different verbal labels are associated with discrete objects. When building an item list we want to be very careful to include enough examples of each label with particular attention to including items that appear to be an exception to the rule. For example if we are teaching the label “bird”, we may want to have a robin, ostrich, pelican, hummingbird and any other bird that doesn’t necessarily look like a bird. We want to be as economical as possible with the item list yet at the same time have items that will define the label adequately. There would be no reason to have a robin, blue jay, sparrow and a martin in an item list. All of these birds are so similar that teaching each one separately would be redundant and boring for most children. The items on the item list should each have core attributes that distinguish the item as belonging to the category but also contain attributes that more specifically define the category. The child should master enough items from the item list to be able to label a novel item in the category without being taught the new item. When the child can label items that s/he has not been taught the label of “Bird” in

this case is considered to be established in a basic sense. The child has the concept of a bird and can make relational responses to the concept.

We usually begin by teaching 3-D or real world objects. When using 3-D objects the child is given as much information as possible to abstract the relevant characteristics. As we move to body parts, familiar people, shapes and letters each of these can also be real world 3-D objects. When we move on to shapes the stimuli are beginning to pull for certain responses. Here what the child has to recognize is that the only thing that is being rewarded is the shape. In other words we are specifically teaching a child that shape is an important characteristic that should be attended to when labeling objects. In going from real objects and body parts to shapes the child goes from being able to rely on many characteristics of the object to cue them for the label to only being able to respond to one characteristic to have the correct response. In moving from objects and body parts to shapes we are teaching a child that society finds shape important and responding to items in part based on their shape will yield success.

From shapes we move on to letters which are more difficult shapes. Here we are teaching a child that society finds these particular shapes (letters) especially important. After teaching shapes the child is often taught colors. This is usually more difficult. The child has to release the strategy of responding based on shape and move on to disregarding the shape and responding based on color. Here again the child is learning that disregarding shape and responding to color is rewarded by the social community. The child learns that shapes are different from each other and that each shape has a corresponding label. They then learn that shapes can be more and more complex and there can be only subtle differences between the shapes that lead to discrete

corresponding labels. Finally the child learns that shape is one characteristic of an object and color is a different characteristic. Each should be relied upon at different times when interacting with the verbal community. The child will also learn to use both color and shape at times when labeling the world. Basically the child has moved from being allowed to personally abstract qualities of an object to having to relate to the qualities that the social community will reward.

After 3-D objects we move on to 2-D objects. When using 2-D objects (pictures of objects) the child has even less information to rely upon as they relate the picture to a verbal label. The child must relate an abstraction of the object (picture) to a verbal label. Here the image represents the object and then the label further represents the picture of the object and the object. Here the child is learning that objects can be represented in many forms. Here the object, image of the object and social label for the object are all linked relationally. The child learns to understand differences between objects on each level, from the object, to an image of the object, to the socially defined vocalization for the object.

When teaching 2-D objects we use the same instruction “give” with the picture of the object such as “give dog” with a picture of a dog on the table. Each label will usually be taught in a mass trial format. After the first two labels have been learned in a mass trial format they can then be randomly rotated. First we teach give dog with only a picture of a dog on the table. The child can either hand us the picture of the dog or not hand us the picture. Handing us the picture is confirmation of success. Then we teach give cat with only a picture of a cat on the table. Once both cat and dog are learned we can

have the picture of the cat and the dog on the table and say “give cat” or “give dog” and provide information about success for correct responses.

With 2-D labels we can teach many labels that would be very difficult to teach using 3-D objects. Give elephant would be a little awkward unless we used a picture. With 2-D labels we usually start with objects and then move to shapes, letters, cartoon characters, places, and then colors. We can also work on hierarchies in that we can have multiple dogs out and say “give dogs”.

After the more concrete 2-D labels have been mastered we move on to more abstract 2-D labels. Here we teach more abstract social behaviors through pictures such as occupations, actions, activities, and emotions. We will follow the same procedure and have a picture of a doctor on the table and say “give doctor” or have a picture of someone throwing a ball and say “give throwing”. When the child can flexibly respond receptively to 15-30 pictures of objects, shapes, letters, familiar people, cartoon characters, places, colors, occupations, actions, activities, and emotions and they are starting to verbally imitate sounds they are ready to move on to expressive labels.

## **Chapter 10**

### **Expressing Environmental Discriminations**

Up to this point we have focused largely on discrimination abilities between objects and sounds in the world and receptive language ability. The child has also started to imitate verbal sounds. As the child's verbal ability grows we can start to work more on expressive language abilities. While the child is beginning to use language through requesting and expressive labels, his/her desire for objects and actions continues to be a major motivating force to help us increase the behavior of requesting and expressive labeling. When a child is requesting an item the item they are requesting is desired. If you give the item requested to the child after the request the child will request the item more often in the future. When teaching expressive labels or commenting the child often does not desire the object they are labeling or commenting on so you can't give them the labeled item to strengthen the verbal response. You have to give the child something else that they desire unrelated to the label. For example, the therapist swings the child and then shows the child a picture of the child's mom and says "who is it." When the child says mama the therapist swings the child. Here we are teaching the child to label a picture of the child's mother as mama and rewarding the child by swinging the child. When we say "Who is it" we are providing an SD to let the child know that swinging is available if they answer the question. "Who is it" also becomes a prompt as the child learns more and more familiar people. All the child has to do is recognize what the prompt (SD) is requesting, incorporate the visual cue of the photograph and then expressively respond incorporating the question and environmental cues into a response.

At this point a child still does not understand rules so providing a lot of excess information to the child will only confuse him/her. When a child relies on rules they are relying on information that has been provided to them instead of just reacting to consequences and environmental cues. As behavior moves toward being controlled by rules it becomes more loosely tied to immediate contingencies. As a child moves from behavior controlled through solving immediate contingencies to behavior controlled by rules and information provided to them there is a fundamental, almost qualitative difference, in the child's ability to control their own behavior. The child can now respond to delayed or remote contingencies. The child is more ready for token systems and a focus on working toward getting what they want in a delayed fashion. I mention this shift here because the building of receptive and expressive language ability comes from the ability to respond to information provided in the form of social rules.

Most requesting and labeling will still rely on solving immediate contingencies but we will want to be aware of information provided throughout this time and provide information to the child on a limited basis as the child indicates they will benefit from the information. Before a child is ready for rules and information it is largely just one more distraction. I often see parents bombarding their child with information the child can not understand. This is an attempt at providing information before the child can benefit from the information. The best case scenario when this occurs is that the child can disregard the information. The worst case scenario is that the child becomes overwhelmed and can't learn from present immediate contingencies because they are being overwhelmed with too much sensory stimulation in the form of information provided to them.

## **Requesting**

Here we are teaching the child to attend to, discriminating between and make verbal requests. The most successful way to elicit verbal requests is through manipulation of the environment and delayed responding. When a child is requesting something all you have to do is provide the requested item and the child will request more often. The therapist is the conduit through which the desired item is attained. At this point the child has learned to discriminate between different vocalizations and to be responsive to verbalizations. They have learned to imitate motor movement as well as vocal and verbal sounds. The child has further developed visual/spatial discrimination skills and the ability to respond to receptive labels.

We begin building on the programs presented earlier of withholding a desired item until the child initiates release of the item through eye contact. Once eye contact is consistently used to control the world and the child has attained all of the skills just describe they are usually ready to begin one word requests. We begin by having an item or activity the child desires available. The therapist controls the desired item or activity and then offers the item or activity freely to build desire. The therapist then stops providing the item or activity freely and adds contingencies to the existing chain of events. The child must first glance at the therapist to get the desired item or activity. Next the child must make eye contact and make a vocalization for the desired item or activity. The vocalizations are then slowly shaped to approximations of the verbal label for the item or activity. It is important to be able to recognize the child's ability level at this point. The therapist has to be able to carefully gauge the child's verbal ability and

provide the item or activity when the child's request is slightly more advanced than their typical request.

The child can learn to request food, favorite objects, actions, familiar people, places and/or activities. For example the child could ask for a "baba" for bottle, "zwee" for swing, and dada for dad. Each of these vocalizations could bring the desired object, activity or person. When the child can very clearly and consistently say "baba" for bottle we would want to stop providing the bottle for the "baba" request and wait for a closer approximation like "bada." We would then offer the bottle for "bada" until that form of response becomes strong. Then we may hold out for "badal" and so on until the full verbalization of bottle is attained.

Once we get 20-30 solid single word verbal requests we will often add the word want before the requested item. For example the child would need to say "want cookie". Eventually we would want the child to say "I want cookie", "I want a cookie", "I would like a cookie", and eventually "I would like a cookie please" or "can I please have a cookie". My point here is that the more complex request is built out of simpler requests. Expressive abilities are mainly taught through requesting and extended requesting programs where as receptive language ability is the focus during the receptive and expressive labels programs.

### **Expressive Labels**

A child is ready for expressive labels when they can do receptive labels and word length verbal imitations. Here we are providing the child success for attending to objects or pictures in the environment (discriminative stimuli) and verbally labeling objects. While we are working on receptive labels the child will often start to spontaneously

expressively label the items when he/she hands the appropriate picture to the therapist. As the child's spontaneous verbalizations increase we can start to consider moving on to doing the labels program expressively. We want to be cautious at this point however because as soon as we move on to doing the programs expressively we seriously limit our ability to prompt the child. The child also may not be ready for the pressure of doing the programs expressively. This is a good time to go slowly and cautiously. We will often continue to do the programs receptively but add an expressive component to the receptive programs. For example you may say "give dog" as the child hands you the picture then you may show the picture to the child and say "good job that's a dog". Eventually you may say "give dog" and when the child hands you the picture of the dog you may turn the picture to the child and say "what is it?" and then prompt the child to say "dog".

We usually want to start with already mastered items from the receptive object labels program. We go over objects, body parts, familiar people, shapes, letters, cartoon characters, places, occupations, actions, activities and affects the child has previously learned receptively. We can also focus on expressive categories, plurals, pronouns, and irregular plurals.

The first major focus when teaching a child to expressively label is for the child to label the objects he/she interacts with in the world. The second focus for the therapist during receptive and expressive labels programs is to carefully expand the verbal requests made by the therapist from the use of a single word such as, "match" to using multiple words such as, "give cup" or eventually, "where does a farmer work." The focus with these programs is two fold, teach labels and expand the child's receptive language ability. First the child is taught the discrete labels. The child learns the names for objects, actions,

subjects and qualifiers and is eventually prepared to integrate and combine the labels descriptively and make receptive conditional discriminations between the stimuli.

After we have taught the child 30-40 object labels (e.g. dog, cow, car, house etc.), multiple action labels (e.g. run, sit, walk, climb, hop etc.), subjects or familiar people (e.g. dad, mom, sister etc), and qualifiers (e.g. green, big, small, fast etc.) the child is ready to begin responding to requests that combine what has been learned. Give mom the big train or give dad the little blue train and mom the big red car. Here the child has to know each of the labels and how they fit together into a complete idea in order to be able to respond. Expressively the child could ask for chocolate milk in a big glass.

Since the focus is two fold we are expanding the child's ability to label the world at the same time that we are expanding the child's ability to understand complex language in a mode that is easy to prompt. As we move on from receptive labels to expressive labels we should always be ready to do the programs receptively. It is important for the child to gain breadth of knowledge. The focus with each of these programs is on building receptive language ability even when we are doing an expressive labels program. It is more important for the child to know the label for the object than for the child to be able to verbally label the object at this point. Building expressive ability and verbalizations is the focus during requesting and expanded requesting programs.

## **Chapter 11**

### **Increasing the Complexity of Expressive and Receptive Language**

Up to this point the child has learned to comfort him/herself. He/she has learned how to signal others and problem solve behavioral contingencies. The child can differentiate objects in his/her environment and has learned to respond to labels and verbal requests and to imitate motor action and verbalizations. The child has also learned to expressively label their world and to request objects, people and activities. As the child learns to recognize contingencies and persist at varying their behavior as they try to solve the contingencies in their environment the child is learning about the society in which they live. Society and the people that make up society have certain shared understandings. For example the English speaking society has decided to label a certain color red. What is red is determined by each individual as they are faced with the contingencies in their environment which define the concept of red. As a child navigates through social contingencies they have to extract or infer the social meaning from the contingencies they solve and don't solve. At this point in therapy the child is able to rely on physical characteristics of the stimuli involved when solving the socially derived contingencies. As language becomes more abstract the child has to respond to stimuli that have been assigned value by the verbal community and solve the social contingency by manipulating the arbitrarily assigned concepts.

At this point there is a dual focus in therapy. Expressive language is built upon through maintaining a close relationship with desires and behavioral outcome. Expressive language can be taught through sentence completion by teaching a child to finish a common phrase where some part of the phrase is missing and expressive labels

but after acquiring multiple statements, comments, and information in this format the information has to be made meaningful to the child through requesting. As we are working on expanding the complexity and structure of requesting we can also work on receptive language by expanding and integrating our requests (SD) of the child.

### **Extended Requesting**

At this point the child can request in a short sentence such as “give me a cookie please.” When the short sentence request is strong and occurs often the therapist then attempts to expand the request by offering options. The options should integrate previously learned labels. When the child requests, “give me a cookie please,” the therapist has a variety of options. The therapist could not respond, leading the child to request again and possibly alter the request. The therapist could offer options such as “should I get it or should you get it?” or the therapist could ask a question such as “where are they?” Who, what, when, where, why, and how questions can lead to more complex and lengthy requesting. The therapist can offer obstacle statements such as no, not right now, or maybe later to expand the child’s requesting. The child could also be asked questions about past events like “didn’t you just have one?” or about the future such as “won’t that spoil your dinner?” The point here is to have the child come up with better arguments for their desired items.

The focus should be on making functional all of the statements the child has learned through phrase completion and expressive labels. Much of the expressive labels were taught in a format that is not functional to the child. Often the child is taught multiple labels and given access to some desired item or action after the say the label. To consolidate the expressive labels the child has learned, the labels must become functional.

There must be a reason to remember the labels. Using all of the labels to expand requesting will tie the previously learned labels to the child's desires and make them functional.

Therapists at this point have to be very careful to decrease prompting. Up until this point prompting has been used extensively and parents and therapists tend to prompt way too often. After the child has been prompted 20-30 times, the prompt should be faded and eventually the child has to be left to figure out the solution on his or her own. At this point we are not looking for one correct response. We are aware of the child's developmental level and typical requesting ability. What we are looking for is anything that is more complex than the child's typical request.

B. T. is a four-and-a-half year old. He has been in the program for a year and a half. He has made great progress moving through typical Lovaas programs at the table. He has the ability to request items but doesn't self initiate a lot of requests. His parents and therapist are often prompted by his simple requests like "truck" to prompt him back by saying "I want truck". After this prompt he easily says back to the therapist "I want truck". The problem is, he is prompting the therapist to prompt him before he says the request in a more complex form. He is starting to get more and more restless and inattentive at the table. A decision was made after a consultation between Senior Therapist, Supervisor, Clinic Director and Supervising Doctor that he was getting board at the table and was starting to learn more like a typically developing child. We decided to move programs away from the table and teach his programs in a more natural fashion integrated into games. We also had his mother and father remove most of the toys from ground level and place them on shelves around the room.

Therapists and parents were taught not to continue prompting higher level verbal requests but instead to wait patiently until the more advanced request was made without prompting. The environment was set up to elicit many opportunities for requests of games and toys. The changes energized the therapy experience for B.T. He began to request more objects and interact with therapists and his parents more often. His ability to self-initiate and direct others increased. He started to move much more quickly through his programs and integrate the language and skills he learned in his programs more naturally in conversation.

Making these changes requires a shift in how programs are done. The same documenting and data keeping procedures have to continue with changes to accommodate the changed structure. Changes like these in programming also involve much more overlap by the Senior Therapist to ensure quality control in programming. When you move to a more natural learning style away from the table there is always the risk that programming will deteriorate. It takes careful micromanagement of the therapist's interaction with the child and high levels of supervision, at first, to ensure quality of treatment doesn't suffer.

In the case of B.T. he began to make significant gains away from the table. Eventually some programs will be moved back to the table to work on school readiness, listening to instructions from a distance and independence skills. Flexibly adjusting programs to accommodate the changing needs of each child has to be a continual process throughout the child's therapy. The Lovaas based program allowed B.T. to get to the point where he could understand and interact with the world much more like a typically developing child. We see the integration of programs away from the table and

generalization of programs learned at the table as just the logical extension of a quality Lovaas based approach. A functional analysis of the environmental conditions that are leading to slowed progress will lead therapists in the direction of changing programs on a regular basis to maximize the child's gains from therapy.

### **Sentence Completion:**

At the same time that we are focusing on expanding the child's requesting ability we continue with programs to teach language by way of cued responses such as sentence and phrase completion, conversation questions, statement-response, statement-statement, question-statement-question, statement-statement-question, statement multiple questions and W/H questions. We will briefly describe each of these cued response programs.

Statement-Response starts with the therapist asking a question such as what is your name or what is your mother's name? The child then responds with the correct response. At the beginning of these programs we will often ask the child the question followed immediately with the correct response as a prompt. For example we may say "what is your name" and then without hesitation say "Billy" to prompt the correct response. Prompting would then be delayed and stopped all together as the child was able to answer. Statement-Response will also involve the therapist saying common general statements and prompting the child to respond such as, the therapist may sneeze and prompt the child to say "Bless you" or the therapist may say ouch and pretend to get hurt as they prompt the child to say "Are you ok?"

In the Statement-Statement program the therapist makes any simple statement and prompts the child to respond to the statement. For example the therapist may say, "My shirt is red" and prompt the child to say "my shirt is yellow" assuming the child's shirt is

yellow. Or the therapist may say “my mom’s name is Dee Dee” and prompt the child to say “My mom’s name is Beth.”

In Question-Statement-Question the child is asked any simple question. The child then answers the question and repeats the question back to the therapist. For example, the therapist may ask “what is your name?” The child would respond by saying “Billy, what is your name?” Or the therapist might ask “Do you like pizza?” and the child would respond with “Yes, do you like hot dogs?”

Statement-Statement-Question would involve the therapist making a statement such as “I like pizza.” The child would say the statement back changing one aspect of the statement and ask a question back to the therapist. The child would respond to the statement of I like pizza with, “I like cake, do you like cake?”

In statement multiple questions the therapist makes a statement and the child responds asking multiple questions about the statement. The therapist says “I went out to eat last night.’ The child responds with “where did you go?” and “what did you have to eat?”

WH questions involve the therapist asking who, what, when, where, why and how questions to the child. After the child has learned colors, familiar people, actions etc. the therapist could touch the child’s mom on the shoulder and say “who is this,” or “what color is mom’s shirt?” When mom goes into the kitchen the therapist could say, “where did mom go?”

Stock phrases and conversations can be taught to provide the raw material for more flexible and creative conversations and comments when the child is capable of more advance language ability. Just as typically developing children often use echolalia

and movie talk as the raw material for future flexible language, developmentally delayed children benefit from a wide range of statements that can slowly be used more naturally as the child's language ability grows.

All of these programs focus on teaching the child certain stock responses and statements that are cued by the verbal behavior of others. We also start to work on open ended responding with programs like tell me about/describe, what happened, comprehension questions (what is a), predicting outcomes and problem solving. These programs start to address generative language cued by the language of others.

In the describe program the therapist could make many different requests based on what is being targeted. Some examples are, "tell me about a chair (object), tell me about a picture (photograph or drawing), tell me what he is doing (action), tell me about the zoo (place), tell me about math (topic), tell me about sadness (emotion or feeling) or tell me about honesty (idea). If the child is doing an object we will want the child to make three descriptive statements about the object including the category the object belongs to, describe what parts make up the object and describe the function of the object. For example the therapist says "Tell me about a car." The child may be prompted to say, "A car is a vehicle, it has four wheels, and you can ride in it." We usually begin with an object the child can see and naturally interacts with on a daily basis and eventually move to objects out of sight and not experienced on a daily basis.

In tell me about a picture we will show the child a picture and say "tell me about the picture". The child then describes what is happening in the picture. We would want the child to comment on the participants, actions, colors, emotions and possible consequences. For example we may show the child a picture of an elephant with a

monkey riding on its back and ask “tell me about the picture.” The child would then be expected or prompted to say there is a big grey elephant with a monkey riding on his back. We may ask questions at this point to help prompt the child to describe more about the picture. We could ask “Where do you think they are?”

For topics we would ask “tell me about the beach, “We would want the child to be able to describe about 5 things about the beach including its category, actions that occur there, and salient features of the beach. For example the child could say, “a beach is land, it is near the water, it is made up of sand, people lay out to get a tan, and it is often very hot.”

For actions we would give a child a picture of some action and say “tell me what is happening.” For example we could show a picture of a man throwing a ball and ask “tell me what is happening.” The child would then be expected to say “this is a man throwing a ball.”

For emotions we would show a picture of a person with obvious emotions and ask “what do you think this person is feeling.” We could then go on to ask questions such as “why do you think he feels that way?”

The main point with all of these programs is that we are expanding the child’s expressive language abilities and giving them opportunities to use the information they have learned in the labels programs. The child combines their labels of objects, actions, colors, shapes, places, occupations, emotions, prepositions while describing. As a child gets good at describing we want them to use their ability to describe to describe themselves and others. We also want the child to be able to describe patterns of behavior in themselves and others and to describe their emotions and how their emotions affect

their behavior. We also want the child to be able to describe physical sensations in their body.

We continue to teach common useful statements to the child through sentence completion. The statements should be based on the child's environment and geared toward providing the information and statements needed while requesting. Statements can be taught that provide information about the world such as; "A window is made of \_\_\_\_\_", the child is prompted to say glass. Information about the world and statements the child may use can be taught in a very low demand fashion with this approach. Conversation statements can be taught in the same manner. Giving the child the beginning statement; "How are you doing this morning \_\_\_\_\_," as the therapist hold up a picture of the child's mother and prompts, "Mom".

Lead in statements, popular language, telephone statements, topical information and statements, self statements, and other statements can also be taught in the sentence completion format. For example, for lead in statements the child could be cued with the statement "would you like to play on the\_\_\_\_\_." The child could be prompted to say swings. We could then use backward chaining to get the child saying the whole sentence. For popular language the child could to make statements that other children would be saying using the terms that are popular at the time with same aged peers.

These programs focus on providing information and statements to the child that can be used in requesting to consolidate the usefulness of the information learned. While making item lists for these programs the therapist should be focused on the child's environment and the communication style of the family. Statements can be taught about everything the child comes in contact with on a daily basis.

Once the child has multiple statements that can be made to verbal and environmental cues, the child can also be given sentences on note cards mixed up and the therapist can read them to the child saying, “Dad doing are morning this you how” and then saying “that doesn’t make any sense can you fix it” and have the child rearrange the cards to say, “How are you doing this morning dad.” You will often find that a child who naturally says sentences in unusual order or omits words can learn to order sentences and will learn to correctly order their statements through ongoing use of these programs. Providing information, comments and statements in the sentence completion and mixed up word order format makes learning this information fun and easy for most children.

### **Extended and Integrated Expressive Label’s:**

One main focus while extending expressive labels is on expanding the receptive language or ability to understand language in the child. The therapist should focus on moving from a two term SD (give ball or throw ball) to a nine term SD (bring the big, shinny, red truck to the kitchen and put it on the table). The therapist can also integrate all previously learned labels in the natural environment by commenting on and asking the child to respond to questions and requests.

The second major focus related to expressive labels is to build relational networks between the expressive labels. How do all the labels relate to one another? A child may know the label for a ball and be able to say ball when one is presented. When is a ball not a ball? Is the sun a ball? Is a watermelon a ball? The child needs to learn what is and is not a ball and why. What is bigger and smaller than a ball. What category does a ball fit into. How is a ball similar and distinct from other object labels. So the focus here

is to use the labels the child has learned and focus on labels that will be meaningful to the child and then build up an understanding of how the labels all relate to one-and-other.

This can be done through many programs that focus on how everything relates to one another. Relations are largely based on the society's ideas of how things relate to one another. Similarity based programs which ask the child to determine how two things are alike can be implemented. In what way are a dog and a frog alike? There are multiple correct answers and multiple incorrect answers. Answers such as they are animals, they have legs, they move, are all correct. Society may value, "they are animals" as a higher level response. Answers such as they are both green, they are plants, they are bigger than a horse are all incorrect. The child should be taught multiple relations among labels, correct and incorrect and also how society values each response.

At this point a child has many labels and we want to give the child experience using the labels and comparing and contrasting the labels. Each of the labels they have learned should be compared to the others and similarities and differences should be addressed. Programs such as these can be very fun as you explore how the labels are the same and different.

Games that encourage generic extension of the labels to similar but inaccurate objects will also increase the flexibility of language. Laying on the grass and looking up to the clouds and pointing out perceived objects will increase the flexibility of the object labels and encourage generic extension. Other games can also be played that encourage metaphorical extensions of labels. That goat looks like an old man with a beard.

Walking through the zoo (or any where else) and practicing metaphorical extensions is a

good way to consolidate previously learned labels and expand their use beyond the concrete use.

## **Chapter 12**

### **Increasing Abstract Language**

#### **Referential Requesting**

Referential requesting involves expanding the child's ability to make self/other referential statements as well as discuss self/other distinctions and use self/other referencing while requesting.

#### **Self-Referential Requesting**

As requesting expands into a give and take flow of answering questions, directing others and fluidly answering WH questions the focus should move to more personally based arguments. Here the child should be able to describe themselves and their personal likes and dislikes as well as patterns of behavior and integrate that information into their arguments and requesting. This step moves from directing the environment based on pure statements to tying the statements to personal desire, motivation, interests and activities. We want to move beyond the "I want x" to a description of the self and how the desire is based on personal interests. An example of a typical expanded requesting sequence before this point would be: Child, "I would like a cookie please" (Basic request). Parent, "No, dinner will be ready soon" (obstacle statement), Child, "Can I please have a cookie." Parent, "Can you wait until after dinner? (Time referenced obstacle)" Child, "No, I want one now." Here the child is basically making statements. What we are looking for here is for the child to move beyond I want to arguments which support the "I want" statement.

An example of a requesting sequence that we would want to reward would be: Child "Can I have a cookie please" (basic request). Parent, "No, dinner will be ready

soon” (obstacle statement). Child, “But I’m really hungry and I can’t wait.” Here the child made an argument that supports the basic “I want” with a reason why. We would want to give the child a cookie at this time because their basic level of requesting has increase to be more sophisticated. The child was able to support the “I want” with a reason why that referenced their hunger and inability to delay.” Here the child may use likes and dislikes, preferences, identifying characteristics, personal goals to support arguments.

It should be noted that the parent will change from saying no to saying yes based on the level of sophistication of the child’s argument. This will lead to a child that persists and argues their point longer. The goal here is to build fluid verbal behavior and to do that the child needs to become more of a behavior problem. If the parent continues a focus and desire to have a child that is very well behaved and does not talk back, these strategies interfere with their goals. This strategy is designed to increase language. A parent may have to accept the idea that a child will become more out of control for a short period of time to increase language. Once the language has moved to a more advanced level the parent can always return to a focus on behavioral control.

### **Other-Referential Requests**

The next step is for the child to integrate information relevant to another person’s motivation. He moves on to requesting sequences which reference the requested individual’s preferences, identifying characteristics and personal goals. The child moves from an extended request such as “But I’m really hungry and I can’t wait,” which is a self referenced request to further their argument to a statement such as “But your cookie’s are so great that I can’t wait that long.” Here the child is referencing the other a person’s

ability to make great cookies. Or the child may say, “But, you didn’t make me any lunch and I am starving and can’t wait.” This is also a higher level request that references the requested person and should be rewarded at this level.

### **Integration of Self/Other Referencing into Requesting**

Here the child is rewarded for integrating self/other referencing in the form of me/you, here/there, now/then, if/then reasoning and perspective taking into the extended request. As an ice cream truck comes down the road and the child requests: “Can I have some money for ice cream?” (Basic request) and the parent says “No, that will spoil your dinner” (obstacle statement), the child could respond, “I’ll get you an ice cream bar if you give me the money.” Here the child is integrating me/you and if/then arguments into the request. The goal at this point is to reward more complex combinations of arguments to support the request. Ideally the extension of the request will involve a conversation where the child references their own desires and supports their desires with an argument and also takes into consideration the motivation of the other person involved in the requesting process. As requesting becomes more sophisticated the child moves from a focus on the self and personal desires to a focus on understanding others and their desires and motivations.

### **Abstraction of Expressive Label’s**

Here the child is taught the abstraction of expressive label’s and expressive statements. Ideally these programs are taught during natural skill building play with the child. The focus is on taking the expressive label’s and extended expressive label’s and working with the child to use the expressive label’s and integrate the label’s in a more abstract way. First we focus on expanding the natural quality of the child’s language

through shifting topics, politeness, and interviewing and assertiveness programs. The child is taught how to shift between topics by practicing standard shifting statements. Shifting statements and polite statements can be taught in the same sentence completion or word order formats described above. We teach the child interviewing skills or basic questions that can be asked of others to gain information about them and assertive statements as opposed to aggressive or passive statements. The therapist's main concern when doing these programs is to increase the natural flow of language.

Next we move on to directly learning to abstract the expressive labels and statements through teaching idioms, synonyms, antonyms, metaphors, and analogies. The child is taught that one word can mean multiple things, different words can stand for the same thing and different words can have opposite meanings. The child learns to compare similarities between real world objects and their abstract labels and to use the labels of similar but not exact real world objects to give labels to an object for which they do not know the label. The child learns how abstract labels can be similar and distinct from one and other. With these programs the child learns how the verbal community deals with and manipulates abstract labels in a generative fashion. The child also learns society's opinions about issues such as real and pretend, fact vs. opinion, and self directed and other directed dialogs. These programs focus on helping the child to organize their thought's in a way that will be consistent with society.

Problem solving skills are taught with programs such as problem/solution. The child is taught critical thinking skills. The majority of these programs follow a standard Lovaas training procedure. The programs should focus on information that is most practically useful to the child and should be done when possible in the child's natural

environment and through fun oriented play activities. Therapist's can become very creative at this point making up games to teach these concepts. These programs provide the raw material for the child to use during extended and referential requesting. The child can be taught to use language in an abstract way through these programs but they will take on personal significance for the child when they can use their ability to abstract from concrete expressive label's to accomplish their goals and get what they want in the world.

We also focus on teaching the child to label and discuss non-verbal communication such as tone of voice and body language and how to show interest in the behavior of others. The child is taught about subtle language usage through programs that focus on humor and sarcasm. We also teach emotional themes as the issues come up. If the issues don't naturally come up the therapist should arrange the environmental experience of the child to elicit the themes. The child is taught that discussion and contemplation of these and other emotional themes leads to desired goals.

### **Emotional Requesting**

After a child has been taught to extend their requests into a natural give and take conversation, integrate abstract statements, comments learned through sentence completion and expressive label's within requesting, and can reference their own and others interest and motivation to extend and support a request they are ready for emotional requesting. Here the child is successful when integrating emotional arguments related to self and others interests into requests. The child has been introduced to the emotional themes in the expressive label's programs. The purpose of learning emotional themes is to be able to use them to accomplish goals when relating to people. This is not the ultimate goal but at this stage the use of emotional themes in this way will consolidate

the themes into the child's life and the child will see that they are useful in a practical way.

As the extended requests moves from being a fairly concrete request, to a request supported by arguments which define self and other's interests and demonstrate an understanding of other's motivations, we start looking for the child to use the emotional arguments they have learned within their extended requests. What we are looking for here is for the child to make supporting arguments during a requesting sequence which pull in the emotional themes. For example the child says, "Can we go to the beach today?" and the parent responds, "I have too much work to do honey," and the child responds, "We haven't had much time together and I miss you."

As we look for more sophisticated arguments you can see that the arguments become more productive. "I miss spending time with you" is going to work much better than, "I want to," "I haven't been to the beach lately," or "I'll give you five dollars to take me." The overall concern while expanding requesting and developmentally advancing the quality of the argument is to make productive certain forms of verbal behavior, so that the child will be more competent at relating to others and more capable of connecting emotion and desires with behavioral outcomes.

At this level a child is taught to integrate emotional themes into their give and take verbal interactions. The questions that we ask a child and our responses to the child's requests can be very powerful when teaching a child to integrate emotional themes. It is best to target teaching emotions embedded within verbal interaction around requesting. Ideally we want a child to become comfortable discussing emotional issues. To bring out these themes we want to be listening to the child's arguments while

requesting and to provide what the child is asking for when they use emotional information in their arguments.

Suppose a child is asking to stay outside a bit longer. The parent says it is time to come in and get ready for bed (obstacle statement) if the child were to say “I am angry with Johnny and I need some time to cool down before bed” the parent should recognize that this is a higher order argument that integrates emotional themes and allow the child to play a bit longer.

Next we move on to teaching and discussing multilayered communication through discussions within requesting which draw the child into recognizing and discussing motivation at multiple levels including surface motivation, hidden motivations, paradoxical motivation and Irony.

### **Understanding Boundaries**

The final elaboration of expressive labels relates to understanding boundaries and relations between expressive labels. Here the child is taught about relationship boundaries and how to flexibly navigate these boundary issues. We have already expanded expressive labels into extended request's or statements. Those statements are used within requesting and the child can reframe and abstract the concrete expressive labels and statements they have learned. When the child comes up against unfamiliar objects and situations s/he can use language that is an extrapolation from what he/she has been taught. The child is integrating emotional themes with comments, statements, and requesting. The child now discusses emotional themes in relation to boundaries based on person. There are physical and verbal boundaries that society expects when dealing with different people. Family, friends, teachers, authority figures, and strangers all have

different socially defined boundaries. Recognition of the boundaries leads to friendships, jobs, social status, and safety. Not recognizing the socially defined boundaries based on person leads to isolation, difficulty in social situation and the worst case scenario death.

Next the child needs to be able to alter his/her understanding of social boundaries based on what they are told. Someone saying, “I’m getting angry we should drop the topic,” needs to be understood as boundary defining information or content. People need to be able to recognize how boundaries may change via the content of interactions.

The child not only needs to understand that boundaries can be based on person and content but that boundaries can also vary based on the process of behavior and verbal behavior within an interaction. Boundaries may need to be altered based on the feedback the child receives from others. For example as a friend starts to escalate and become angry increasing social distance and or changing your personal verbal style may become useful to maintaining the friendship.

Finally boundaries may change base on the context. We behave differently at church than we do at a football game. The child needs to recognize the context of what is said, where they are, who they are with and alter boundaries accordingly.

## **Chapter 13**

### **Attention Issues**

A child's patterns of attending often make the process of learning difficult. Models of attentional processing are extensive but often difficult to put into practical clinical application. I will describe a model of attention, to use as a heuristic, for clinicians while working with a child with autism to help guide them in dealing with attention issues.

The way that I look at attention is to imagine a ping pong ball that travels from the child (perceiver) to the outside world (perceived) and back again. In order to perceive something in the outside world the attention must be directed at, or pulled by, an object and the ping pong ball must return to the perceiver. When attention is envisioned in this way it has limits in regard to space and time. In order to attend to two different environmental events the ping pong ball must travel from the child to the first object and then back to the child before it travels out to the world again to the second object and back to the child. As a child attends to more objects in the world, attentional resources are stretched until the child has no more attentional resources to allocate. Attention can also be directed inward to think about experiences.

Attention is intimately tied to a hierarchy of needs. The most basic needs are biological needs which aim to keep the organism alive. When these needs are not satiated attention will be focused on attaining biological safety/security related needs. Some examples of biological needs are food, water, sleep, movement as it relates to fight or flight, comfort, temperature. The main point to remember here is that attention will be pulled by stimuli in the environment that may lead to the fulfillment of these basic needs.

Only after the basic needs are satisfied will a child turn their attention to other objects in the world. *Biological safety needs provide the greatest control over attention.* After these needs are met attention is much more under the control of a child's individual physical and sensory preferences. The usual progression is to move from biological safety needs, to aesthetic sensory-motor needs, and finally to needs for social affiliation and interaction.

One of the major deficits, in autism spectrum disorders, is a deficit of social relating. Children with autism do not reference other people as often as typically developing children and they are not as influenced by the desires of others. After basic biological safety needs have been met the child with autism moves into fulfilling basic sensory-motor needs. Many children with autism get stuck at this level of need fulfillment and never move into valuing social affiliation and interaction. This occurs because of the complexity inherent in social relations. If something is too difficult to understand it will be ignored by the child. Because of this halt in development the typical way of controlling and directing attention by society through social influence is not very effective with children who have autism.

For many children with autism attention is mainly pulled by, novelty (related to needs for safety) and sensory/motor stimulation. Many children are described as having attention deficit symptoms. This is somewhat of a misnomer, because the children usually do not have a deficit of attention resources. The problem is usually related to the child's attention not being under the control of social influence and the child's difficulty with shifting attention. It is common for a child to be able to focus attention on a video game or television show (which provides sensory stimulation) to the point that their

attention is not easily redirected away from the activity. In regard to the heuristic model described above the ping pong ball is vacillating virulently between the child and the video game and it does not break out of its path when a parent calls the child's name. What we want to happen is for the child to direct a few ping pong balls at the parent to be able to perceive the parents request.

If we envision this ping pong ball beginning at the perceiver (sense of I) it must travel out through the various senses to the object of interest and back again. If the senses of touch, hearing, or sight, provide interference along the path of attention, attention will be distorted and disrupted through that particular sensory path and it will be more likely that the child will rely on an alternative sensory/perceptual pathway when attending.

Many children with autism have a disturbance in their auditory sensory/perceptual pathway. When this is the case it is more difficult for the child to attend to information that is traveling through the auditory pathway and the child may place up barriers along that pathway further blocking attention along that path as they mainly rely on an alternative route. Some very forceful and salient signals may be able to grab some attention now and then but for the most part it is a blocked path.

Children with autism, because of their sensory issues, as described earlier, tend to stick with what they know and tend to repeat experiences with which they are familiar. This is in part a strategy to decrease the sensory stimulation coming in. Or said another way, this is a strategy to decrease the variety of sensory experience that can influence and pull their attention. This is a strategy for self-soothing.

When a behavior is first learned, or a new experience is encountered, attentional resources must be used to learn the new behavior or to process the new experience. After the behavior has been learned, less attention is needed to perform the behavior. Eventually, no attention is needed to perform the behavior. The behavior becomes automatic much like a reflex. The same happens with new experiences. At first a lot of attentional resources are needed to process the new experience. Eventually most of the experience can be ignored and attention resources are freed up. Many people find the process of purposefully directing attention difficult, almost painful in a mental sense. As behavior becomes automatic a soothing feeling accompanies the performance of the behavior. Comfortable environments are usually familiar environments because very little is pulling the attention.

A state of attention free awareness is a very comfortable feeling that many typically developing people strive for through exercise, self-hypnosis, yoga, and Zen training. Many children with autism have this feeling most of the time. The problem with living in this attention free world becomes apparent to the child when biological safety needs are no longer satiated. At that time they must direct attention to all the behaviors necessary to satisfy the physiological need. This usually means socially relating to someone who is able and willing to help satisfy the needs. This is often one of the few times when a parent of a child with autism can see socially directed attention. This is also a good time to build socially directed attention, problem solving abilities, and adaptive skills as described above.

By observing a child's attention and the objects the child attends to, the therapist can gain insight into objects and activities that the child finds enjoyable and important.

Recognize the items and the activities the child attends to and join with the child. If the therapist can place themselves into the activity (existing chain of events), the therapist can teach the child the value of socially relating and help the child to improve social communication.

Attention is very responsive to shaping procedures. As a child tries to get his or her needs met in their environment, attention is directed toward objects, people, movements and sensations. At the moment that the child receives the desired item or interaction their attentional state is rewarded. If the child is looking off in the distance when the parent or therapist hands them the desired item, to the child staring into space caused the item to appear. In other words we have just increased the behavior of attending to perceptual experiences coming from staring off into the distance. If a child is flapping his/her hands in the air when they receive the desired item flapping their hands is what caused the item to appear. When the child wants the item again the child will start to flap his/her hands. My main point here is that parents and therapists have to be extremely aware of the child's attention and only provide desired items and activities when attention is socially appropriate and functional.

Typically developing children naturally look at the face and find the subtle nuances of the face intriguing. As a result of being naturally drawn to looking at the face and facial expressions they learn that subtle facial expressions predict vocal and physical behaviors. Since subtle facial expressions predict verbal and physical behavior, facial expressions become valuable in-and-of-themselves, because they predict positive and negative verbal and physical behavior on the part of the caregiver. Typically developing children learn that they can predict and control their environment and solve immediate

contingencies present in the immediate environment, by learning to read nonverbal communication. The child gains control over the uncontrollable. Through reading nonverbal subtle behaviors they learn to alter their own behavior in response to the nonverbal behavior of others. In doing so they learn to say and do what others require to achieve desired goals.

Children with autism are not naturally drawn to looking at the face and hence miss out on many of the social cues that the face provides. Selectively teaching the child the value of referencing and attending to the face sets the stage for the child with autism to be able to predict the presence of contingencies and solutions to obtain desired outcomes. For this reason selectively setting up the environment and systematically making facial referencing productive for the child is a very valuable first step in training attention. Facial expression should also be purposefully exaggerated when first teaching a child with autism to reference the face. Sensory and perceptual organization difficulties may make the more subtle changes in facial expressions too subtle to be noticed by a child with autism. Exaggerating facial expression and tying them very clearly to outcomes will help a child with autism to cue in to the value of facial referencing.

Once a child's attention has been conditioned to reference the face, the face can be used as a cue to other nonverbal behaviors. For example, once a child's attention is drawn to the face because of the vast amount of information it provides, the face can be used to convey yes, no, maybe, danger, impending reward, confusion, fear, joy, anxiety etc.

The face and eyes can also direct the child's attention to the hands which can further gesture to the child. The face can show anticipation as the eyes and the head look

down to the hand, and as the child looks down to the hand, the hand can open with a desired item. As the child's eyes go down to the hand and the hand opens we have purposeful joint attention. From here when the hand opens, the index finger can come out turning into a point toward an up-side-down cup at the end of the finger. As the child's eyes reference the hand, the novelty of the finger coming out will draw the attention, as the child's attention is focused the therapist picks up the cup offering a desired item. This procedure can be done in many situations moving the point farther away from the object as attention becomes more focused and is used to follow the therapist's social cues.

Teaching a child to attend to and reference the face and then to attend to a variety of facial and physical gestures provides the child with autism with the tools necessary to be able to navigate social interactions. In early stages of therapy attention towards other people will be extremely valuable. Attention is captured by the environment through the value of achieving desired outcomes. As attention is captured for longer and longer periods of time, the ability to sustain attention grows and the value of sustained attention becomes apparent. Sustained attention can then be used on tasks society finds valuable like reading, writing, math and the acquisition of knowledge about society and the world.

Therapists also have to be careful to watch for the percent of attention that is engaged at the time the child receives a desired item or activity. Many people, including children with autism, only provide as much attention as is necessary to accomplish a given task. This may have to do with the painful nature of purposeful attention. Imagine a man watching a football game and his wife coming in and asking what she should make for dinner. Most likely she is going to get an answer that was born out of

very little attentional resources. Why? At the time the wife asked the question the man's attention was engrossed in a winning touchdown. Said another way, the football game was strongly pulling his attention and was fulfilling his immediate sensory/motor needs. His physiological and safety needs were satiated because he is eating peanuts and drinking beer and is not very hungry. Of the pool of full attention (100 % of the man's attention) 98% of his attention remained tied to the unsatiated sensory/motor needs of watching the football game. He threw 2 ping pong balls at his wife. One to perceive the question and one to answer "what ever you want, honey." With so little attentional resources directed at this social interaction it is very likely that the man will not even remember the conversation.

What can change in this situation which would result in his wife having more of his attention? She could shut off the TV and invoke an angry almost frantic response. Here 60% of his attention will be directed at the game and what he is missing, with the other 30% directed at thoughts about how unfair his wife is. The wife may at this point have 10% of his attention. Had she planned ahead and asked him at a time when there wasn't a football game on and when he was hungry and wondering what's for dinner, she would have had his undivided attention. The point here is that the environment and timing issues have to be managed exactly to provide periods of undivided attention. There is a saying that practice makes perfect. I believe that perfect practice makes perfect. In other words children need to practice socially directed sustained attention and achieve desire goals for full attentional effort. After full sustained attention has been practiced in a distraction free environment with optimal desires driving the child's

attention, sustained attentional processing can be slowly generalized to include distractions and decreased incentives.

A key element in building attention is to focus on building attention first and tying sustained attention to social contingencies. Socially directed attention is much more difficult to develop after a child has been randomly successful with inattentive behavior. Therapists should always be aware that lower levels of attention are often successful to varying degrees regardless of whether they are aware of it or not. If the therapist is not aware of the child's state of attentional awareness it is very likely that they are inadvertently increasing inattentive behavior by not focusing on providing desired items only for attentive behaviors. If a child is not paying attention it is because they have been taught from the beginning to not pay attention.

Children with autism just like children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) have the key attention deficit of not attending to what society wants them to attend to. I would like to reiterate that they do not have global attention deficits. They have attention deficits to information society deems important. Another key feature of ADHD is impulsivity. Impulsivity is basically choosing immediate rewards over delayed rewards. The final symptom of ADHD usually involves some form of hyperactivity. Attention problems, hyperactivity, and impulsiveness all are very interrelated. Hyperactivity leads to impulsiveness and inattention. Inattention leads to impulsiveness. The solution with children with ADHD and autism is to teach and reward delayed gratification over immediate gratification and to systematically reward attention to objects and information society values. Saying that someone has attention deficit is an explanatory fiction. ADHD means nothing more than the person does not

value what we want them to value and the person usually overvalues immediate rewards over long term rewards.

Therapy should systematically teach delayed gratification and increase the value of objects and information society values. Delayed gratification can be taught easily by presenting a choice of rewards to a child after successful completion of a task. This should be a focus that runs through all programs. When a child is at the level where they can understand token systems or make a choice between two objects they can be offered a choice. Would you like one E&M now or 5 after you stand up? A little later the question might be would you like to swing for 10 seconds right now or five minutes after this next program? A child's ability to delay rewards and to choose rewards that they have to wait for and work for can be systematically increased. This can be integrated into a token economy system. If we have control over desired items we are expanding the child's ability to attend for longer and longer periods of time and also to delay gratification.

At the same time we work on attention by changing the stimulus qualities of the objects in their environment. If we want a child to pay attention to letters or numbers the letters and numbers have to predict natural rewards or enjoyable activities. Natural pairing of the non-preferred objects with preferred objects in such a way that the non-preferred object predicts the appearance and attainment of the preferred objects will lead to improved attention for the non-preferred object. The same should be done for social interactions. First exciting social interactions can lead to preferred items eventually boring uninteresting social interactions lead to preferred items. We develop systematic plans for children to move them from attending to what they want to attending to what

society values. Hopefully attending to what society values will lead to increase rewards for the child in the future.

## Chapter 14

### Self-Soothing Repetitive Behavior

Self-soothing repetitive behavior is often referred to as self-stimulatory behavior or stimming. We use the term self-soothing repetitive behavior to more directly describe what the child is doing. The first task that a child must overcome in this world is to be comfortable with the sensory stimulation coming in to the brain, from the world, and from his/her own body. The child learns to self-regulate or become comfortable with the sensory stimulation coming in. Feelings of tension in the body (Akathisia) can be relieved by movement; hence we often see hyperactivity and repetition of movements of the arms and legs in attempts to self-soothe. Self-soothing behavior comes in many forms. Some are remnants of species typical behaviors that are usually masked by cerebral function in typically developing children. Some have aspects of a decerebrate rigidity such as toe walking and hand flapping. The form and type of self-soothing behaviors will vary depending on individual cerebral function, learning history, sensory sensitivities, and chance.

Self-soothing repetitive behaviors are mainly caused by three variables; behaviors aimed at reducing akathisia, behaviors aimed at shutting out sensory stimulation, and behaviors that occur because of motor control issues such as motor planning difficulties and low muscle tone. Akathisia (muscle restlessness) can be relieved by ballistic gross motor movements, repetitive hand flapping, pacing, or shaking of objects. Most repetitive gross motor movements will temporarily remove feelings of akathisia. Sensory stimulation can be reduced by familiar environments, familiar activities, symmetry, or anything that decreases the demand for attention. Finally, children will often gravitate to

behaviors that can be performed easily when they are incapable of more complex movements.

Our general strategy for dealing with self-soothing repetitive behaviors is to help the child become more productive at self-soothing, to shape the self-soothing behavior to become more socially appropriate and to teach behaviors that are more complex that will be more enjoyable and productive for the child. Self-soothing repetitive behaviors can also be used to increase the frequency of low frequency behaviors. Combining all of these strategies to shape minimally productive, odd, or ritualistic behaviors toward socially appropriate more productive behaviors is usually the best strategy. For example one young child who pushed a small toy lawn mower for hours out of the day was by the age of 8 to cut lawns with a real lawnmower and since the age of 10 he had been cutting laws for neighbors and making more money than all of his friends. Another who flapped spoons all day was directed toward playing the drums.

Inappropriate, socially odd, or unproductive self-soothing behaviors can be shaped easily through a process of adding a response cost. One five year old girl who had a number of sensory sensitivities would lie on the floor and rub her pelvis into the floor often throughout the day. This self-soothing repetitive behavior was very distressing to the family. Since she didn't like to have her hair brushed we decided to brush her hair for 5 seconds every time she began to rub her pelvis into floor. The response cost was that we were desensitizing her to having her hair brushed. Rubbing her pelvis on the floor became predictive of hair brushing, the sensory qualities associated with hair brushing transferred on to rubbing her pelvis on the floor and the behavior stopped. The end result was that she no longer rubbed her pelvis into the floor and she

became comfortable with people brushing her hair. The goal is usually not to make the self-soothing repetitive behavior go away. The goal is to shape the inappropriate behavior into a behavior that is less inappropriate. We may provide an alternative behavior to substitute or we may just start the procedure and watch as the child tries alternatives to see if the alternative also evokes the response cost. As we watch the child try alternative behaviors, behaviors that are not as inappropriate do not bring the response cost and hence the behavior is shaped toward a more appropriate behavior.

Another way to deal with an inappropriate self-soothing repetitive behavior is to place a demand into the preexisting chain of events. For example, a child likes to line up toys. This is a self-soothing repetitive behavior that takes advantage of repetition and symmetry to decrease attentional demands. When the child is doing this he/she is escaping from the social world of relating to another human being. If we join with the child in the activity by handing the toys to the child, assisting in the behavior of lining up toys, the child has to relate socially to continue the self-soothing repetitive behavior. By using intrinsically gratifying self-soothing repetitive behavior to increase low frequency behaviors and inserting ourselves into the existing chain of events we can begin to teach the child the values of social interaction.

We could also use the proactive approach described earlier. In the example of the child rubbing her pelvis into the floor many times throughout the day. Rubbing her pelvis into the floor is an excessive behavior. We would identify the incompatible deficit behavior and reward that behavior on a variable interval schedule. We could also combine strategies. We could reward and incompatible behavior when the child is not

actively pursuing the inappropriate behavior and provide a response cost when the child engages in the inappropriate behavior.

We also work on gross and fine motor abilities and teaching a child adaptive skills, sports activities, preschool games, and toy play to give the child a wider behavioral repertoire. We will specifically try to teach skills that will take advantage of the self-soothing repetitive behavior with the goal of giving the child a higher level option to self-soothe. Self-soothing behavior is observed and recorded and a plan is then designed to help the child self-soothe in a more productive, socially appropriate way.

Some parents ask, why not allow the child to continue the self-soothing repetitive behaviors as they are? Problematic self-soothing repetitive behavior is behavior that will not lead to social integration and acceptance. If the self-soothing repetitive behavior will increase the social gap between the child and his or her peers or interfere with independent self-sufficient functioning then it is a behavior that we target and develop a plan to move the behavior toward behavior that will help the child be accepted by their peers and/or help them live more productive self-sufficient life. All of these strategies are based on the premise that social interaction and affiliation is productive for the child.

## Chapter 15

### Implications of Diffuse Neurological Dysfunction

Autism is considered to be one of the most severe forms of childhood neuropsychiatric disorders. Autistic disorders involve impairment in social reciprocity & communication, often together with cognitive deficits (Cook and Leventhal, 1992).

Neuropsychological profiles of children with cognitive mental retardation differ from those of children with autism. Children with autism often show strengths in visual-spatial processing ability and remote memory with more significant problems in the area of verbal comprehension. Children with cognitive mental retardation usually show fairly consistent delays in all areas of cognitive performance (Dawson & Castelloe, 1995).

Neurological deficits that have been associated with autism include, abnormal cell density and reduced dendritic growth (Raymond, Bauman, & Kemper, 1989), abnormalities of the cerebellum (Courchesne, 1989), differences in sensorimotor, temporal, and Broca's regions (Chiron, et al., 1993), dysfunction in the reticular activating system (Rimland, 1964), abnormalities of the amygdala (Brothers, 1989;1985; Fotheringham, 1991), irregularities of limbic involvement (Boucher, & Warrington, 1976), left and right asymmetry abnormalities (Prior & Bradshaw, 1979), ventricular enlargement (Bigler, 1989a; Hauser, Delong, & Rosman, 1975), abnormalities in thalamic nuclei (Coleman, 1979), cortical atrophy (Bigler, 1989a) and abnormalities of the hippocampus (Minshew & Goldstein, 1993).

In most individuals the two hemispheres of the brain are specialized for different functions. The dominant hemisphere usually governs language function. Visual, auditory, tactile, vestibular and kinesthetic sensations are integrated with emotional and

intellectual input in the dominant hemisphere to enable the expression of thoughts and emotions through language. Receptive and expressive language, along with reading, writing and the use of written symbols to communicate are all processed by the perisylvian language arc in the dominant cerebral hemisphere. Deficits in one area involved in the language arc are often associated with deficits in other areas of language functioning.

The non-dominant hemisphere is thought to provide a mixture of inflection and rhythm providing an affective component to speech. Dominance in one hemisphere is usually accompanied by control of fine rapid hand movements on the opposite side of the body. Vision and hearing, are also thought to be mildly effected by dominance. This normal asymmetry of the temporal lobe's superior surface is sometimes lacking or reversed in individuals with autism (Kaufman, 2001).

Language development can be affected by central nervous system deficits, decreased hemisphere specialization, disordered vocal structures, and an impaired auditory system (Rosenblith & Sims-Knight, 1985). Impulses conveying speech travel from the ears along the acoustic nerves into the brainstem and travel through the thalamus. They then travel crossed and uncrossed to the primary auditory cortex. Language impulses travel to Wernicke's area in the dominant temporal lobe. They circle toward the back of the head through the temporal lobe and then back forward toward the front of the head through the parietal lobe to Broca's area which is toward the bottom of the motor strip located just above the temporal lobe. Broca's area receives processed and integrated language information from the primary auditory cortex in the temporal lobe and is involved in the production of and articulation of speech.

The perisylvian language arc starts with Wernicke's areas travels through the Angular Gyrus and the Arcuate Fasciculus and ends in Broca's area. This area perceives and integrates language with other cerebral activities and results in the articulate expression of language. Imitation of phrases requires an intact perisylvian arc. If there is a problem anywhere along the way vocal imitation will not occur. If this arc is intact, but not integrated with the surrounding cerebral cortex, verbal imitation can occur but initiation of conversation will not occur (Kaufman, 2001).

Impulses from the visual system cross at the optic chiasm and then travel through the optic nerve to the thalamus. From the thalamus they travel to the right and left visual cortex in the occipital lobe. The impulses from the left visual field travel to the right occipital cortex where they must pass through the posterior corpus callosum to reach the left dominant hemisphere. From here right and left signals integrate and travel through the Arcuate Fasciculus to Broca's area for articulation. Reading aloud would involve visual perception leading to articulation (Kaufman, 2001). Problems located near Broca's area may cause the nonfluent production of speech often seen in children with autism which includes the use of single words with preference for basic nouns and verbs, a slow rate, and telegraphic speech. Problems emanating from this area are often associated with oral apraxia resulting in poor articulation as a result of problems producing voluntary movements of the tongue, lips and face.

As noted earlier depression is significantly correlated with autism (Lainhart & Folstein, 1994). Depression is also associated with dysfunction near Broca's area as are problems with movement, emotions and non-responsiveness also know as abulia. The neurological explanation for why depression, apathy and lack of responsiveness often co-

occur with speech problems is that Broca's area is located in the frontal cortex where these problems often occur (Kaufman, 2001).

Fluent aphasia occurs as a result of dysfunction of Wernicke's area or the pathways leading to Broca's area (arcuate fasciculus). Signs of fluent aphasia include word finding difficulties and word substitutions including nonsense words (neologisms), rhyming words, and tangential diversions. Anomia is a common fluent aphasia which involves the inability to name objects. Another form of fluent aphasia (transcortical or isolation aphasia) involves the dysfunction of the cortical area surrounding the perisylvian language arc (Kaufman, 2001).

People with isolation aphasia can usually repeat whatever they hear but they cannot name objects, follow requests, or participate in a conversation. In the case of isolation aphasia the language arc is not communicating with the rest of the cerebral cortex. Individuals with isolation aphasia can repeat long lines of sentences involuntarily and compulsively (movie talk) and can echo the words of others (echolalia). Isolation aphasia can be divided into sensory and motor isolation aphasias. Both involve the preservation of repetition but motor isolation aphasia would also include low verbal output. Conduction aphasia occurs when Wernicke's area is separated from Broca's area along the arcuate fasciculus and results in good comprehension with the inability to repeat phrases or short sentences (Kaufman, 2001).

Alexia (inability to read) and agraphia (inability to write) often go along with aphasia. Apraxia involves the inability to execute motor acts despite normal motor strength, sensation, coordination and comprehension. It usually involves disruption of the motor areas and or a disconnection from language centers. Ideo-motor apraxia

theoretically involves the separation of language areas from motor areas and results in the inability to convert thought into action. Ideational apraxia involves the inability to sequence steps requiring self-monitoring and following a simple plan and usually involves frontal lobe dysfunction (Kaufman, 2001).

Dysfunction of the non-dominant hemisphere can result in constructional apraxia which involves a visual-spatial perceptual impairment. This results in difficulty organizing visual information and integrating visual information with motor skills. Non-dominant hemisphere dysfunction results in aprosody. Aprosody involves the inability to understand the emotional or affective qualities of speech or the inability to convey emotion or affect while speaking. Aprosody is often accompanied by difficulty understanding or conveying nonverbal communication. The non-dominant hemisphere is often considered to be involved in the expression and perception of emotions and complex non-verbal behaviors (Kaufman, 2001).

The frontal lobes are considered to be the main site of personality, emotions, executive decision making, and inhibitory control of behavior. Problems with frontal lobe functioning may result in lack of initiative and indifference to the environment, as well as slowed and impoverished thoughts and emotions. People with problems in the frontal cortex may have difficulty not attending to new stimuli and are often very stimulus bound. They may show rigidity and obsessive compulsive symptoms. Initiation of movements may be impaired and perseveration of movements is often seen (Kaufman, 2001).

Viewing the symptoms of autism within the context of the way the brain processes information provides helpful guidance for treatment planning and intervention.

Deficits can occur anywhere along the information processing pathways from sensory input to motor or vocal output. From this perspective, any neurological deficit along the information processing path will affect output. The diverse neurological deficits that have been documented in autism lead to the heterogeneous symptoms of autism.

Neurological deficits earlier along the path of information processing lead to a wider array of symptoms. For example, thalamic dysfunction with all of its reciprocal connections to the cerebellum, amygdala, and hippocampus can lead to difficulty forming perceptions within the primary visual and auditory cortexes. This dysfunction may be small resulting in minor problems setting sensory thresholds resulting in a child being sensitive to normal everyday sound. Conversely the thalamic problems may be severe leading to the inability to form perceptions.

Analysis of each individual child will yield evidence of varying neurological deficits that should lead to diverse treatment strategies to remediate those deficits. Deficits earlier along the information processing chain should lead the therapist to consider classical learning methods to remediate the deficits. Classical learning as described earlier involves one environmental event predicting another. Classical learning is used to directly affect physiology such as the altering of sensory thresholds. A child that has significant sensory threshold issues will have a difficult time accepting the environment and hence, will not learn from experience.

The thalamus relays sensory information. It also helps to coordinate integration of the senses through its reciprocal connections to the cerebellum. The amygdala imbues sensory information with emotion as the hippocampus imbues historical perspective through respective reciprocal connections with the thalamus and cortical structures.

Emotional meaning can be changed via classical learning (Kingsley, 2000). As stimulating events in the environment become predictive of other incompatible emotions they change the historical perspective. Events take on the qualities of the events they predict and change underlying physiology accordingly.

From the thalamus auditory sensory information travel to the primary auditory cortex. Visual sensations travel from the thalamus to the primary visual cortex. In both of these areas information is broken down and analyzed by feature detecting cells. These primary areas of sensory/perceptual processing continue to be influenced by reciprocal connections to the thalamus, amygdala, hippocampus, and cerebellum (Kingsley, 2000).

Children who have problems forming perception will not be able demonstrate their ability to match identical objects or sounds. A significant problem in both primary perception areas will result in very chaotic behavior as the child will have a very difficult time forming accurate perceptions of the world. Usually children with autism have strengths in visual processing. A child that can not do visual 1:1 matching is likely having a problem with primary visual perception. The solution is to break the visual perception down to basic units and to teach 1:1 matching. Through repeated trials the child learns to perceive the world in a systematic fashion.

From the primary visual and auditory areas the sensations now called perceptions travel through the primary association areas of the parietal and temporal lobes. Here multiple senses are compared and senses are compared across senses. Information is integrated and associated. Meaning is attached to symbols and objects (Kingsley, 2000). Connections from the association areas to the frontal and orbital frontal lobes occur through the arcuate fasciculus. The frontal and orbital frontal cortexes influence

perception in the association areas and imbue sensory information within social context and provide inhibitory control over motor and verbal output (Kingsley, 2000). Problems organizing perceptions for motor or verbal output will occur here. If a problem occurs in the primary association areas a child will not have very good cause and effect associations or abstraction abilities. If the problem occurs in the frontal or orbital frontal cortex social context, emotional understanding of sensory images and impulse control will be lacking.

Finally the integrated and associated neural impulses travel to the primary motor strip and Broca's area. Problems in the primary motor strip and Broca's area will result in motor production problems. A child will have difficulty talking and moving.

Admittedly this is a very gross estimate of neurological information processing but it provides a framework or heuristic understanding to guide treatment strategies. An understanding of neurological dysfunction, apraxia and aphasia make individual symptom complexes of autism understandable. The goal is to understand areas of strength and to work on using a child's information processing strengths to remediate and circumvent difficulties. At the same time information has to be broken down to the level where information processing can begin in areas of deficit. Information that is too complex will be ignored. As we decrease complexity of sensory input, making sensory input predictive, and behaviors predictive, of control over the environment development progresses through assimilation and accommodation.

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