

DEVELOPMENT OF ASSESSMENT TOOL FOR DIFFERENTIAL  
DIAGNOSIS OF AUTISM SPECTRUM DISORDER

PROJECT UNDER AIISH RESEARCH FUND (ARI)  
(2006-07)

Principal Investigator

*Dr. K.C. Shyamala*  
*Professor & HOD, Speech-Language Pathology*

Co-investigators

*Mrs. Vijayashree*  
*Clinical Assistant*

*Mrs. Sujatha V. Shastty*  
*Clinical Assistant*

*Mr. K. Rajkumar*  
*Project Assistant*

Department of Speech-Language Pathology  
All India Institute of Speech & Hearing  
Manasagangothri, Mysore-570 006

## CONTENTS

1.	Introduction	1 -4
2.	Review	5-34
3.	Method	35-40
4.	Results & Discussion	41-50
5.	Summary and Conclusion	51-53
6.	References	54-58
7.	Appendix	59-86

# **TITLE: DEVELOPMENT OF ASSESSMENT TOOL FOR DIFFERENTIAL DIAGNOSIS OF AUTISM SPECTRUM DISORDER**

## **INTRODUCTION**

There is no enigma like the mind. The normal mind functions at the speed of light, in a multitude of directions, and yet, there are certain shadows that are never dissolved by light, and remain a deep mystery, as when presented by a disordered human mind.

Autism and other pervasive developmental disorders (PDDs) are a phenomenological related set of neuropsychiatric disorders, which is still a field of mystery in the areas of diagnosis, differential diagnosis, assessment and treatment/intervention. The condition received little attention until Leo Kanner (1943) a psychiatrist who noted that 11 of his patients who showed remarkably similar symptoms labeled "early infantile autism". These conditions are characterized by patterns of both delay and deviance in multiple areas of development; typically their onset is in the first months of life. In fact, it is widely assumed that there are most likely multiple causes, each of which may be manifested in different forms, or subtypes, of autism. The knowledge base and understanding of autism continues to expand as research progresses; there is yet much to learn.

Pervasive developmental disorder (PDD) is a term used in the diagnostics and statistical manual of mental disorder (DSM III) (1980) to describe a group of severe early developmental disorders, characterized by delay and distortion in multiple areas of development, including social skills, cognition, and communication.

Wing (1981) used the term autistic spectrum continuum and later in 1988 she used the label autistic spectrum disorders to emphasize the wide range of social and communication difficulties. The solitary withdrawn child with little emotional expression is at the one end of the continuum, the passive child who does not resist social interaction

lies in the middle, and at the other extreme end of the continuum is the child who interacts actively but in an odd way without relating to needs or concerns of the person approached:

The category of PDD outlined in the DSM-IV published in 1994 includes autistic disorders, asperger syndrome, pervasive developmental disorder - not otherwise specified (PDD NOS).

Childhood autism is the prototypic disorder in the spectrum of autistic disorders (DSM-IV, APA, 1994; ICD-10, WHO, 1993). All the disorders within the autistic spectrum are characterized by:

1. Qualitative impairment in social interaction
2. Qualitative impairment in social communication
3. A restricted repertoire of interests, behaviours and activities.

According to the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-RT, 2000) classification system of ASD can be sub grouped into 5 types.

1. Autism.
2. Childhood disintegration disorders.
3. Retts syndrome
4. Asperger syndrome
5. Pervasive developmental disorder not otherwise specified - [PDD-NOS].

Considering the heterogeneity of characteristics associated with autism spectrum disorders, it is not surprising that questions often arose about how best to evaluate children with this diagnosis. Though assessment depends on information gathered through a variety of methods and relies on the collaboration of many individuals including, professionals, family members, and special educators, diagnosis of the autism spectrum disorders (ASD) or pervasive developmental disorders (PDDs) is challenging to

the professionals. The diagnostic confusion increases problem not only in the diagnosis but also increases individual and family burden and causes families to seek unhelpful therapies or join the wrong support groups.

Many tests are available in the West. To name a few: 1. Checklist for autism in toddlers (CHAT) - Wheelwright (1980). 2. The autism behavior composite checklist and profile (ABCCP)-Riley (1984). 3. Modified checklist for autism in toddlers (MCHAT)-Robins et al. (1999). 4. Autism treatment evaluation checklist (ATEC)-Rimland and Edelson (2000). 5. Autism continuum-Aaron and Gitten (1987). These tests however do not have the focus of differential diagnosis and they are mainly used for identification description and profiling. Specially, we have been using tools like MCHAT and ABCCP for assessment and intervention purposes with certain modifications.

Western studies focusing on differential diagnosis of autism spectrum disorders are very few. One of those kinds is 1 .The Differential Assessment of Autism and Other Developmental Disorders (DAADD) by Richard & Calvert (2003) for the three different age ranges (2-4 years, 4-6 years & 6-8 years). However it does not cover all the categories of autism spectrum disorders. Another tool is Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, 2000-Modified version of DSM III - 1980,DSM-III-R- 1987,DSM-IV-1994 & The ICD10 (WHO, 1996), which has been standardized on western population covering only the major triad areas like social, communication & restricted activities & interest.

On Indian front,

Chakravarti's (2001) study was to construct a diagnostic scale for autistic spectrum disorders for SLPs. It allows us to find out whether the client has autistic spectrum disorder or not and the severity but it does not help in differential diagnosis *of* these subgroups of autism spectrum disorders.

Rani's (2004) study was mainly to explore the clinical utility of the diagnostic scale for autism spectrum disorders constructed by Aditi (2001), which has been developed for use in Indian context. It only allows for quantifying the severity of the disorder and for the purpose of profiling but it does not help in differential diagnosis of ASDs subgroups

So far, identification of the autistic disorders/traits/features only have been the main focus of clinical assessment in our setup following the trend in most centers in India and abroad. Only recently the need for differential diagnosis is strongly felt, for a deeper understanding of ASDs

Coming to the area of differential diagnosis on Indian front an attempt has been made by Anita (2007) to differentially diagnose ASD based on DSM-IV-TR criteria but in this particular study only few features are covered/included as well as features covered were overlapping which made the differential diagnosis task even more difficult.

As mentioned/listed above, there are few tools available for diagnosis and differential diagnosis of autism spectrum disorders. Hence, there was a need to develop a differential diagnosis tool/checklist which would enable us to overcome these difficulties and the results of which is present study. Hence an attempt is made to develop a differential diagnosis assessment tool/checklist.

## REVIEW

Autism, a disorder first accounted in the mid-20<sup>th</sup> century (Kanner, 1943,cited in Volkmar, 1998) was initially speculated to be a result of a disordered mind. The term has now, with extensive and intensive research, acquired myriad dimensions (the mind being only one of them) and belongs to genre of disorders of which it is considered the most cardinal member

Autism is a developmental disorder that originates prior to birth or in early infancy. Although there are many reasons to believe that autism is a neurobiological disorder with a strong genetic component, a biological marker has not yet been found. Therefore the syndrome must be defined on the basis of observed or described behaviours. Autism, like many other conditions or disorders, can affect people in a variety of ways, but it is a lifelong developmental disability. Children with autism may be referred to as 'aloof or 'withdrawn' as they appear disinterested in the world around them.

### DEVELOPMENT OF THE CONCEPT OF AUTISM

#### **Kanner's account of the syndrome**

In Kanner's (1943.cited in Volkmar, 1998) first account of autism, he stated that the condition he described "differs markedly and uniquely from anything reported so far". In this paper, he did not attempt to specify strictly defined diagnostic criteria, but presented detailed case histories of eight boys and three girls, noting the following characteristic features.

1. Inability to relate to people, including members of own family, from the beginning of life.
2. Failure to develop speech, or abnormal/largely non-communicative use of language in those who did speak. Pronoun reversal was observed in all

children who could speak (eight cases), and echolalia. obsessive questioning and-ritualistic use of language in several of them

3. Abnormal responses to environmental objects and events, such as food, loud noises moving objects. Kanner viewed the child's behavior as governed by an anxiously obsessive desire for the maintenance of sameness, which led to a limitation in the variety of spontaneous activity.
4. Normal physical status. Several children were clumsy in gait but all had good fine-muscle coordination.

Many psychiatrists found that the clinical picture described by Kanner fitted puzzling cases they had observed in their own clinics, but progress in documenting and understanding autism did not follow smoothly. Kanner (1965) (cited in Bishop, 1989) complained of two related trends in child psychiatry. Some child psychiatrists did not accept that autism was a distinctive syndrome, and suggested it was fruitless to draw sharp dividing boundaries between autism and other types of atypical development. Others accepted that autism was a syndrome, but applied this fashionable diagnosis far too widely. Wing (1976) noted that yet others interpreted Kanner's summary of the features of his syndrome far too narrowly, so that autism would not be diagnosed unless the child showed no sign of awareness of other people, despite the fact that none of Kanner's own cases was this severely impaired.

**ASD includes the following diagnoses and classifications:**

- (1) Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), which refers to a collection of features that resemble autism but may not be as severe or extensive;
- (2) Rett's syndrome, which affects girls and is a genetic disorder with hard neurological signs, including seizures, that become more apparent with age;
- (3) Asperger syndrome, which refers to individuals with autistic characteristics but relatively intact language abilities, and;



(4) Childhood Disintegrative Disorder, which refers to children whose development, appears normal for the first few years, but then regresses with the loss of speech and other skills until the characteristics of autism are conspicuous. Although the classical form of autism can be readily distinguished from other forms of ASD, the terms autism and ASD are often used interchangeably.

Individuals with autism and ASD vary widely in ability and personality. Individuals can exhibit severe mental retardation or be extremely gifted in their intellectual and academic accomplishments. While many individuals prefer isolation and tend to withdraw from social contact, others show high levels of affection and enjoyment in social situations. Some people with autism appear lethargic and slow to respond, but others are very active and seem to interact constantly with preferred aspects of their environment

### **Subgroups of ASD and Clinical Features**

#### **AUTISTIC DISORDERS:**

Kanner (1943) described 11 cases of what he called as 'autistic disturbances of affective control'. Later in 1950 he used the term 'autism' to suggest the notion of child living in his own world.

Kanner saw the defining features of the syndrome being as follows:

- Profound autistic withdrawal
- An obsessive desire for the preservation of sameness
- A good rote memory
- An intelligent and pensive memory
- Mutism or language without real communicative intent
- Over sensitivity to stimuli
- A skillful relationship to objects

## **CHILDHOOD DISINTEGRATIVE DISORDERS:**

Heller (1908,1930/1969) proposed the term dementia inlanlilies or what now would be termed as childhood disintegrative disorder, to account for children who develop normally for some period prior to profound developmental regression and the development of many autistic like features. The pattern of onset is a dramatic developmental deterioration and the onset of various autistic like features in previously apparently normal child is highly distinctive. The outcome appears to be worse than in autism (Volkmar et al.1988). There is an increased rate of elctroencephalographic abnormalities and seizure similar to that in autism but specific medical conditions, which might account for the regression, are not usually identified.

## **RETTS SYNDROME**

Adreas Rett in 1996 described the Retts syndrome. He reported this unusual syndrome, observed only in girls, where a very brief period of normal development is followed by decelerated head growth, loss of purposeful hand movements and development of severe psychomotor retardation. The course of this condition is quite characteristic. Various unusual behaviors (breath holding, air swallowing) and ^motor problems (ataxia, apraxia) are observed, the individual becomes severely or profoundly mentally retarded (Tsai, 1992).

## **ASPERGER SYNDROME**

At the same time that Kanner was identifying a new syndrome, an Austrian physician Hans Asperger was also identifying similar group. He suggested the concept of autistic psychopathy in 1994, which is now known as the Asperger syndrome. Asperger suggested that the condition he observed was seen only in males in the face of relatively strong language and cognition skills and tended to be run in families. Unusual, idiosyncratic interests are common.Kanner suggested that in autism the condition was congenital whereas Asperger thought that the syndrome he identified came to attention

only after 3 or 4 years of age. Studies have suggested that different IQ profile characterize the two conditions. Asperger syndrome is often associated with much higher verbal IQ whereas in autism verbal IQ is low or roughly on par with non-verbal IQ (Volkmar et al.1993).

The main features of Asperger syndrome

- Speech-pedantic, stereotyped, aprosodic
- Impaired non verbal communication
- Social interaction-peculiar, lacks empathy
- Circumscribed interests-repetitive activities or savant skills
- Movements-clumsy or stereotyped

#### **PDD-NOT OTHERWISE SPECIFIED:**

There are another set of children who have marked impairment in social interaction, communication impairment and stereotyped behavior patterns or interest suggestive of autistic disorder but do not meet the criteria for any of the formally defined disorders in that class, these children are labeled as having developmental disorders-not otherwise specified.

#### **Emergence of different diagnostic criterias or the classification system**

A substantial body of research has established the validity of autism as a diagnostic concept. On the basis of its characteristics, clinical features and course (Volkmar, 1998).

Recent attention has focused on mechanisms in Autism as well as on the spectrum of conditions which share some similarities with autism and which are now included in the category of pervasive developmental disorders (PDD)/autism spectrum disorders (ASD). Interest in what are now recognized as ASD can be traced back to the middle of the nineteenth century with the first descriptions of childhood "psychosis". This interest stemmed from an increasing awareness of the importance of the factors of both

experience and endowment on child development. Early descriptions of childhood "insanity" were followed by descriptions of childhood schizophrenia (DeSanctis, 1906, cited in Volkmar, 1998).

The latter term became synonymous with all forms of severe mental disorder in children (Volkmar, 1998). The particular genius of Leo Kanner was reflected in his description in 1943 of the syndrome of infantile autism, which he initially believed to be quite different from forms of "psychosis" then recognized in children. In the subsequent decades autism has been the focus of considerable interest from clinicians and researchers alike. Some of the conditions included in the PDD category, such as Asperger's and Rett's syndromes, were proposed after Kanner's classic description of autism, whereas others, notably childhood disintegrative disorder were proposed many years before Kanner's work (Volkmar, 1998).

## Specification of diagnostic criteria

Rutter (1978a) (cited in Bishop, 1989) documented the chaos that reigned for some years after Kanner's early report, with a wealth of terminology being applied inconsistently to children who had some or all of the clinical features of Kanner's early cases. Rutter discussed the question of how far autism could be regarded as a syndrome and how it related to other conditions. In order to avoid ambiguity, investigators should adopt the following criteria in relation to behavior before 5 years of age to define childhood autism:

- 1) Onset before the age of 30 months.
- 2) Impaired social development, which has a number of special characteristics and is out of keeping with the child's intellectual development.
- 3) Delayed and deviant language development, which also has certain defined features, which is out of keeping with the child's intellectual level.
- 4) Insistence on sameness, as shown by stereotyped play patterns, abnormal preoccupations or resistance to change.

- 5) Good cognitive potential with excellent rote memory and normal performance on the non-verbal Seguin form board test.

Rutter noted that these diagnostic criteria left many unresolved issues, in particular the question of whether there were distinct subtypes of autism, and how to classify children who showed some but not all of the features of autism.

## Variability In The Interpretation Of Diagnostic Criteria

The clarification of diagnostic criteria was widely welcomed as a step forward in enabling researchers to select children with common characteristics and to communicate with one another with some confidence that the same conditions was being referred to nevertheless, points of difficulty remained when trying to apply them. The first was that the language used to describe symptoms requires subjective interpretation. To achieve greater consistency in diagnosis, it is crucial that we distinguish between abnormalities that must be present for a diagnosis of autism to be made, and behaviors that are characteristics, but not invariable features of autism.

Also, quite apart from problems in deciding what behavior constitute necessary and sufficient diagnostic features, disagreements may arise when there is a failure to appreciate how the clinical picture may change with age.

A number of studies have emphasized the variability of symptoms in children with autism (Chengappa & Indu, 1991, Volkmar & Lord, 1998, cited in Volkmar, 1998). This is a central factor of consideration in this study, as the efficacy of any diagnostic system for autism spectrum disorders rests on to what extent it can account the range of symptoms encountered.

## **THE BORDERLANDS OF AUTISM**

A major result of the revolutionary, of the appearance of different sets of diagnostic criteria, and of different motives of diagnosis (research, clinical, etc.), is that the diagnosis was not applied in a consistent manner. This has resulted in a tremendously heterogeneous population of autistic children, which is probably why we today view "them" as autism spectrum disorders (Schreibman, 1988).

Three reasons for lack of agreement over the diagnosis of autism have been considered: use of different diagnostic criteria, subjectivity of the symptoms used as diagnostic criteria and changes in the clinical picture with age (Bishop, 1989). Recognition of these difficulties and attempts to overcome them have undoubtedly led to much greater consensus in how the diagnostic label is applied. However, although specifications of clear-cut diagnostic criteria has made it easier for different observers to agree on which children are autistic, we are left with the problem of how to classify the child who is clearly abnormal, has some autistic characteristics, yet does not meet the criteria for autism or any other disorder. There is no doubt that such children exist. Virtually every symptom characteristic of autism can be observed in children who do not fit this diagnostic category (Bishop, 1989).

It has, hence, been argued that rather than thinking in terms of rigid diagnostic categories, we should recognize that the core syndrome of autism shades into milder forms of disorder in which language or non-verbal behavior may be disproportionately impaired (as discussed in the previous chapter).

Of the various labels that have been suggested, the one that is most comprehensive and one-controversial is ("Autistic spectrum disorder" (Rimland, 1993). This term was first suggested by Wing and Gould in 1979. The advantages of this term is obvious. For one, it acknowledges that there is a range of problems and of subtypes, and it does not pretentiously claim to be based on knowledge that is not yet available to us (Rimland, 1993).

## **CATEGORICAL DEFINITION OF AUTISM**

### **Diagnostic and Stastical Manual of Mental Disorders**

In DSM-III (American psychiatric Association, 1980), autism was accorded diagnostic status for the first time. This inclusion reflected the body of work on autism which had accumulated over the previous decade. In DSM-III, the condition, termed infantile autism, was included in a new class of disorders, the pervasive developmental disorders (PDD). Several other conditions, including a separate category for childhood onset pervasive developmental disorder and another category, termed "residual autism" were included in this class as well. Although the term PDD was rather cumbersome, it achieved relatively wide acceptance. The DSM-III definition of infantile autism was much influenced by Rutter's earlier work and emphasized the early onset of serious disturbances in social and communicative development and unusual patterns of environmental responsiveness, as was the availability of an officially recognized definition of the condition.

In/DSM -III-R, the term pervasive developmental disorders, was retained to describe the overarching diagnostic class to which autism was assigned. The problematic diagnostic concepts, e.g. childhood onset PDD and residual autism, were eliminated. The DSM-III-R definition was specifically designed to be more developmentally oriented and to be appropriate to the entire range of syndrome expression over both age and developmental level. This was reflected in the new name "Autistic Disorders" rather than the DSM -III term "Infantile Autism". DSM-III-R included more criteria and a polythetic definition; because of various concerns, age of onset could be specified. Criteria in DSM-III-R were arranged developmentally and grouped into three broad categories relating to: 1) social development, 2) communication and play, and 3) restricted activities and interests. This last category reflects the earlier concept of 'insistence on sameness' included in previous diagnostic schemes, e.g. Rutter (1978). For a diagnosis of autism, an individual was required to exhibit at least eight of the sixteen criteria, with at least two from the social and one from each of the two remaining groups. In DSM-III-R, only autism and the sub threshold category PDD-NOS were included in the PDD class.

As a result of concerns about the DSM-III-R. definition of autism and an awareness of the categories and criteria, a large multi-site field trial was undertaken for DSM-IV. This field trial (Volkmar et al., 1993) included ratings of nearly 1000 cases by over 100 clinicians of varying backgrounds and experience. Although DSM-IV primarily focused on the definition of autism the results of the field trial also provided support for the inclusion of Rett's syndrome, Childhood disintegrative disorder (Heller's syndrome) and Asperger's syndrome in the PDD class in DSM-IV.

**According to Statistical manual for mental disorders, (DSM-IV-TR) (APA, 1994) classification system ASD can be sub grouped into 5 types**

### **Autistic Disorder**

A. A total of six (or more) items from (1), (2) and (3), with at least two from (1), and one each from (2) and (3).

#### **1. Qualitative impairments in social interaction, as manifested by at least two of the following:**

- Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction
- Failure to develop peer relationships appropriate to developmental level
- A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest)
- Lack of social or emotional reciprocity.



**2. Qualitative impairments in communication as manifested by at least one of the following**

Delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime) in individuals with adequate speech, marked impairment in the ability to initiate or sustain conversation with others.

- Stereotyped and repetitive use of language or idiosyncratic language
- Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

**3. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:**

- Encompassing preoccupation with one or more stereotyped and restricted patterns of interests that is abnormal either in intensity and focus
- Apparently inflexible adherence to specific, nonfunctional routines or rituals stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body, movement of ornaments or furniture in the family home.)
- Persistent preoccupation with parts of objects

B. Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: 1) Social interaction, 2) Language as used in social communication, or 3) Symbolic or imaginative play.

C. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder

## **Asperger disorder**

### **A. Qualitative impairments in social interaction, as manifested by at least two of the following:**

- Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction
- Failure to develop peer relationships appropriate to developmental level
- A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest)
- Lack of social or emotional reciprocity.

### **B. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:**

- Encompassing preoccupation with one or more stereotyped and restricted patterns of interests that is abnormal either in intensity and focus
- Apparently inflexible adherence to specific, nonfunctional routines or rituals
- Stereotyped repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movement, movement of ornaments or furniture in the family home.)
- Persistent preoccupation with parts of objects

C. The disturbance causes clinically significant impairment in social, occupational, or other important areas of functioning.

D. There is no clinically significant general delay in language (e.g., single words used by the age 2 years, communicative phrases used by age 3 years)

E. There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behavior (other than in social interaction), and curiosity about the environment in childhood.

F. Criteria are not met for other specific development disorders or schizophrenia.

### **Rett's Disorder**

A. All of the following:

- Apparently normal prenatal and perinatal development
- Apparently normal psychomotor development through the first 5 months after birth
- Normal head circumference at birth, with the onset between 7 and 24 months

B. Onset of all the following after the period of normal development

- Deceleration of head growth between ages 5 and 48 months and loss of acquired fine motor maladaptive skills
- Complete or partial loss of previously acquired purposeful hand skills between 5 and 30 months with the subsequent development of stereotyped hand movements (e.g., hand wringing or hand washing)
- Loss of social engagement early in the course (although often social interaction develops later)
- Appearance of poorly coordinated gait or trunk movements
- Severely impaired expressive and receptive language development with severe psychomotor retardation

### **Childhood Disintegrative Disorder**

A. Apparently normal development for at least the first 2 years after birth as manifested by the presence of age-appropriate verbal and nonverbal communication, social relationships, play, and adaptive behavior

B. Clinically significant loss of previously acquired skills (before age 10 years) in the following areas

- > Expressive or receptive language
- > Social skills or adaptive behavior
- > Bowel or bladder control
- > Play
- > Motor skills

C. Abnormalities of functioning in at least two of the following areas:

- Qualitative impairment in social interaction (e.g., impairment in nonverbal behaviors, failure to develop peer relationships, lack of social or emotional reciprocity)
- Qualitative impairment in communication (e.g., delay or lack of spoken language, inability to initiate or sustain conversation, stereotyped and repetitive use of language, lack of varied make believe play)
- Restricted, repetitive, and stereotyped patterns of behavior, interests, and activities, including motor stereotyped and mannerisms

D. The disturbance is not better accounted for by another specific pervasive developmental disorders or by schizophrenia

### **The International Classification of Diseases**

The ICD-10 research definitions of autism and other pervasive developmental disorders are thus: For a diagnosis of autism. A total of at least six criteria (from impairments in social interaction, communication, and restricted interests and activities is required, with at least two social impairment criteria present. By definition, the condition must have its onset before age 3 years and not be due to either Rett's syndrome or childhood disintegrative disorder.

The ICD-10 system provided separate clinical descriptions and research criteria. Major differences in both criteria for autism and disorders from previous diagnostic systems were noteworthy. The draft ICD-10 research definition included age of onset as

an essential diagnostic feature and included more detailed and numerous criteria for autism. In addition, other disorders in the PDDs class included Roll's syndrome, Asperger's syndrome, childhood disintegrative disorder (Heller's syndrome) and atypical autism, as well as the sub threshold PDD-NOS category (Rutter and Schopler, 1992).

## **ICD-10 Research Diagnostic criteria**

### **PERVASIVE DEVELOPMENTAL DISORDERS**

#### **Childhood Autism**

A. Abnormal or impaired development is evident before the age of 3 years in at least one of the following areas:

- 1) Receptive or expressive language as used in social communication,
- 2) The development of selective social attachments or of reciprocal social interaction,
- 3) Functional or symbolic play.

B. A total of at least six symptoms from (1), (2) and (3) must be present, with at least two from each.

1) Qualitative impairment in social interaction are manifest in at least two of the following areas:

- > Failure adequately to use eye-to-eye gaze, facial expression, body postures and gestures to regulate social interaction
- > Failure to develop (in a manner appropriate to mental age, and despite ample opportunities) peer relationships that involve a mutual sharing of interests, activities and emotions
- > Lack of socioemotional reciprocity as shown by an impaired or deviant response to other people's emotions; or lack of modulation of behavior according to social context; or a weak integration of social, emotional, and communicative behaviours.
- > Lack of spontaneous seeking to share enjoyment, interests or achievements with other people (e.g. a lack of showing, bringing or pointing out to other objects of interest to the individual).

2) Qualitative abnormalities in communication as manifest in at least one of the following areas:

- > Delay in or total lack of, development of spoken language that is not accompanied by/an attempt to compensate through the use of gestures or mime as an alternative mode of communication (often preceded by a lack of communicative babbling);
- > Relative failure to initiate or sustain conversational interchange (at whatever level of language skill is present), in which there is reciprocal responsiveness to the communications of the other person;
- > Stereotyped and repetitive use of language or idiosyncratic use of words or phrases;
- > Lack of varied spontaneous make-believe play or (when young) social imitative play.

3) Restricted, repetitive, and stereotyped patterns of behaviour, interests and activities are manifested in at least one of the following:

- > Encompassing preoccupation with one or more stereotyped and restricted patterns of interests that is abnormal either in intensity and focus; or one or more interests that are abnormal in their intensity and circumscribed nature though not in their content or focus;
- > Apparently compulsive adherence to specific, nonfunctional routines or rituals;
- > Stereotyped and repetitive motor mannerisms that involve either hand or finger flapping or twisting or complex whole body movements;
- > Preoccupation with parts of objects or non-functional elements of play materials (such as their odour, the feel of their surface, or the noise or vibration they generate)

### **Rett's syndrome**

- A. There is an apparently normal prenatal and perinatal period and apparently normal psychomotor development through the first 5 months and normal head circumference at birth.

- B. There is deceleration of head growth between 5 months and 4 years and loss of acquired purposeful hand skills between 5 and 30 months of age that is associated with concurrent communication dysfunction and impaired social interactions and the appearance of poorly coordinated/unstable gait and/or trunk movements.
- C. There is severe impairment of expressive and receptive language, together with severe psychomotor retardation.
- D. There are stereotyped midline hand movements (such as hand wringing or hand washing') with an onset at or after the time when purposeful hand movements are lost.

### **Childhood Disintegrative Disorder**

A. Development is apparently normal up to the age of at least 2 years. The presence of normal age-appropriate skills in communication, social relationships, play and adaptive behaviour at age 2 years or later is required for diagnosis.

B. There is a definite loss of previously acquired skills at about the time of onset of the disorder. The diagnosis requires a clinically significant loss of skills (not just a failure to use them in certain situations) in at least two of the following areas:

1. Expressive or receptive language;
2. Play;
3. Social skills or adaptive behaviour;
4. Bowel or bladder control;
5. Motor skills;

C. Qualitatively abnormal social functioning is manifest in at least two of the following:

- 1) Qualitative abnormalities in reciprocal social interaction (of the type defined for autism);
- 2) Qualitative abnormalities in communication (of the type defined for autism);

## **Asperger's syndrome**

A. There is no clinically significant general delay in spoken or receptive language or cognitive development. Diagnosis requires that single words should have developed by 2 years of age or earlier and that communicative phrases be used by 3 years of age or earlier. Self-help skills, adaptive behaviour and curiosity about the environment during the first 3 years should be at a level consistent with normal intellectual development. However, motor milestones may be somewhat delayed and motor clumsiness is usual (although not a necessary diagnostic feature). Isolated special skills, often related to abnormal preoccupation are common, but are not required for the diagnosis.

B. There is qualitative abnormalities in reciprocal social interaction (criteria as for autism)

C. The individual exhibits an unusual intense, circumscribed interest or restricted, repetitive and stereotyped patterns of behaviour interests and activities (criteria as for autism, however it would be less usual for these to include either motor mannerisms or preoccupations with part-objects or nonfunctional elements of play materials).

D. The disorder is not attributable to other varieties of pervasive developmental disorder; simple schizophrenia schizotypal disorder; obsessive-compulsive disorder; anankastic personality disorder; reactive and diminished and disinhibited attachment disorders of childhood.

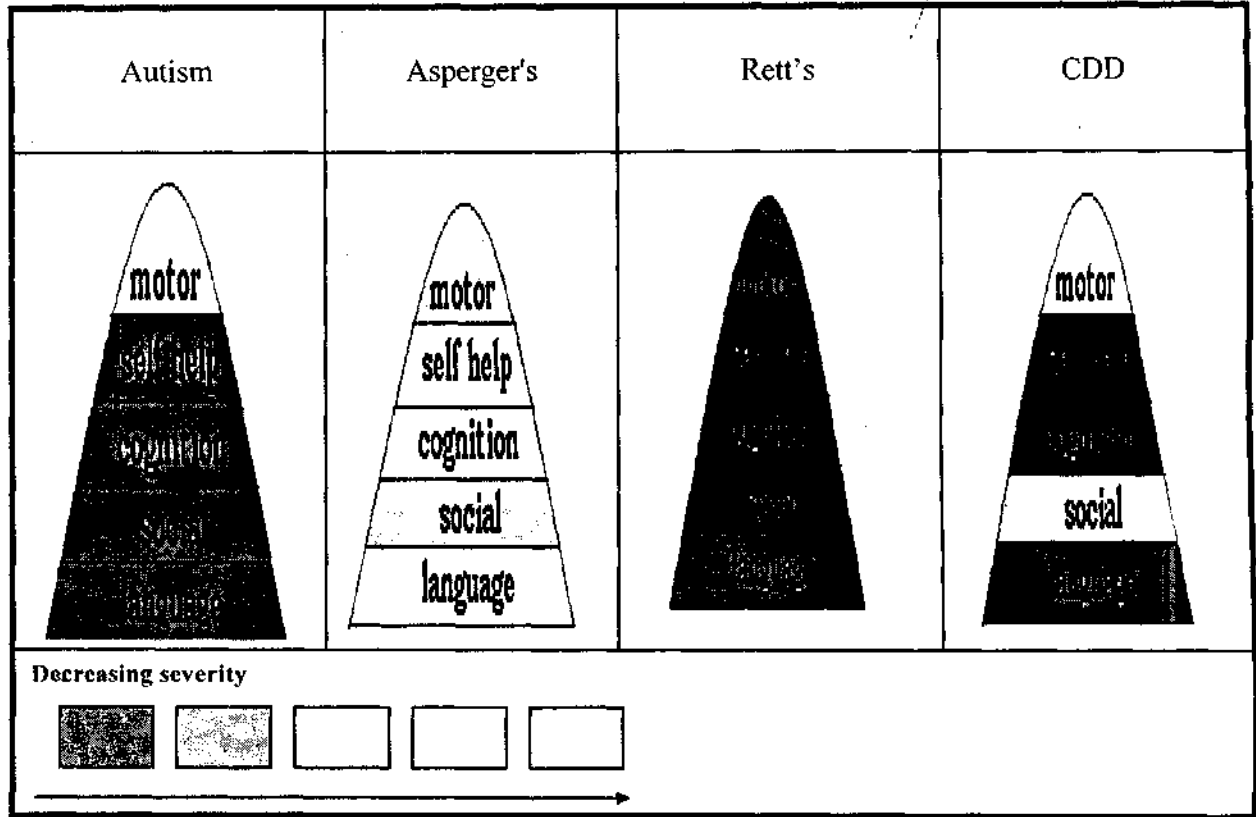


**CRITERIA FOR DIFFERENTIAL DIAGNOSIS (Wetherby & Prizant, 2001)**

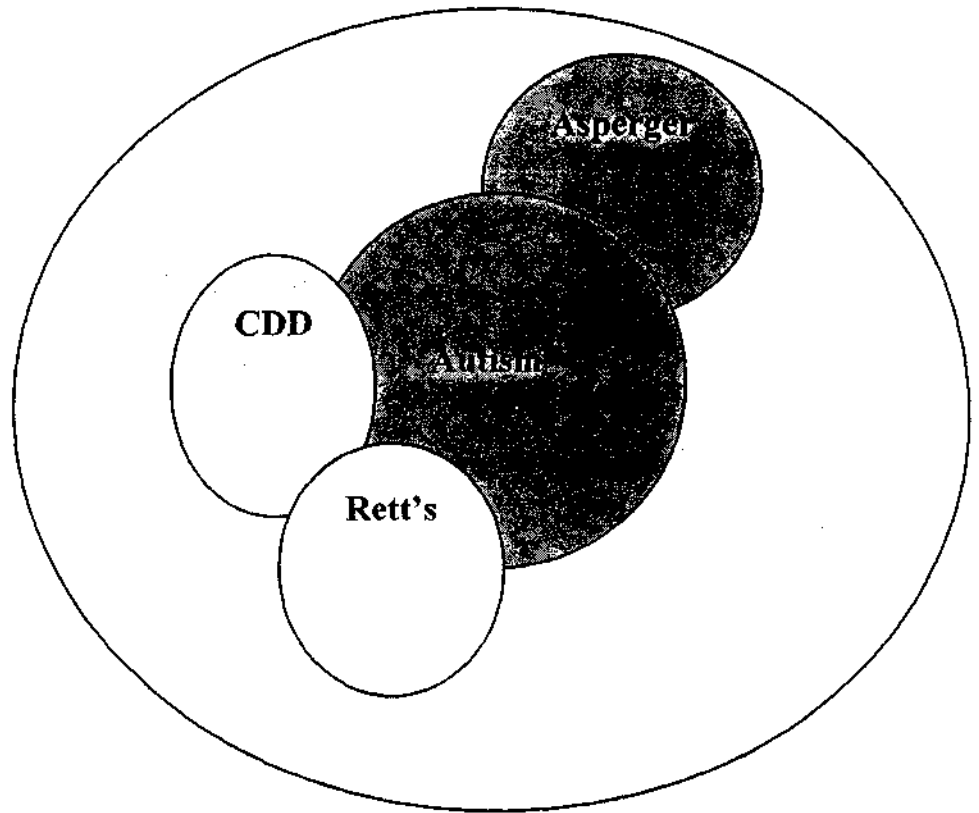
	Autism	Asperger's	Rett's	CDD	PDD-NOS /Atypical Autism
<i>Onset/ Course</i>	Prior to 3 yrs	Onset may be before or after 3 yrs *	Onset prior to 3 yrs. Normal development till 6-18 months **	Onset after 3 - 4 yrs of normal development **	May fail to meet autistic criteria
<i>Delay</i>	May or may not be associated with general delays	No general delay in cognition and language. Motor clumsiness may be present **	Usually associated with mental retardation *	Usually associated with mental retardation*	May or may not be associated with developmental delays

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Severity</i>	Exceed standard threshold of a number of features	Most exceed threshold in social area *	Exceed standard threshold of a number of features	Exceed standard threshold of a number of features	May fall below threshold in 1 or more areas *
<i>Domains affected</i>	<ul style="list-style-type: none"> <li>• Social</li> <li>• Communication</li> <li>• Repetitive behaviors</li> </ul>	<ul style="list-style-type: none"> <li>• Social</li> <li>• Circumscribed interests *</li> </ul>	<ul style="list-style-type: none"> <li>• Social</li> <li>• Communication</li> <li>• Repetitive behaviors (lesser than autism) *</li> </ul>	2/3 domains of autism <ul style="list-style-type: none"> <li>• Social</li> <li>• Communication</li> </ul>	<ul style="list-style-type: none"> <li>• Social</li> <li>• Communication and/or</li> <li>• Repetitive behaviors</li> <li>• •</li> </ul>

\* - May differ from Autism, \*\* - Always differs from Autism



(Wetherby & Prizant 2001)



(Wetherby & Prizant 2001)

**Comparison of the disorders under ASD**

<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<ul style="list-style-type: none"> <li>•Developmental disorder</li> <li>• Significant social impairment</li> <li>• Communication problems,</li> <li>• Repetitive, stereotypic and restricted interests.</li> </ul>	<ul style="list-style-type: none"> <li>•Developmental disorder</li> <li>• Severe impairment in social interaction</li> <li>• Restricted, repetitive patterns of behavior, interests and activities</li> </ul>	<ul style="list-style-type: none"> <li>•Progressive developmental disorder</li> <li>•Initial normal development (till 6-18 months) followed by a deterioration of skills</li> </ul>	<ul style="list-style-type: none"> <li>•Regressive developmental disorder</li> <li>•Prolonged period of normal development (till 3-4 yrs) followed by deterioration across all domains.</li> </ul>	<ul style="list-style-type: none"> <li>•Broader term used when criteria are not met for any of the PDD's.</li> <li>• Much milder than autism.</li> </ul>

Scheenbrodt, 2004

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Prevalence</i>	10-20 in 10,000 live births (Mayo Clinic. 2001)	20 - 25 in 10,000 live births (Bauer, 2001)	1 in 10-23,000 live female births (IRSA, 2006)	1 in 1,00,000 live births. (Fred R. Volkmar 2005)	Not Known
<i>Sex Ratio</i>	M>F	M » F Significantly predominant in males	F Only seen in females	M>F	M>F
<i>Speech - Language skills</i>	Failure or delay in developing speech - language skills	Appropriate acquisition of speech - language skills. Good verbal ability.	Regression in language after 6 - 18 months of normal development	Regression in language after 3 - 4 yrs of normal development	May or may not have delay in speech-language skills

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Cognition</i>	Deficits in attention, reasoning, imagination, creativity, & curiosity. Verbal and Non- verbal IQ scores are low	Good verbal ability and poor non- verbal ability. Overall IQ is found to be normal or superior.	Cognition is affected. Mental retardation present	Cognition is affected. Mental retardation present	Deficits may/ may not be present
<i>Self- help skills</i>	Poor	Adequate	Regression occurs	Deterioration occurs, especially in bowel and bladder control	Deficits may/ may not be present

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Motor skills</i>	No delay or deviancy reported	Mild clumsiness and poor body awareness. May have odd posture or gait.	Motor impairment (ataxia & apraxia). Progressive loss of hand use - development of stereotypic hand movements	Deterioration may occur	Deficits may/ may not be present

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Socio-emotional skills</i>	<ul style="list-style-type: none"> <li>• Unaware of people in the environment</li> <li>• Disinterested in communication patterns.</li> <li>• Not attached to family members.</li> <li>• Affective development and emotional perception affected.</li> </ul>	<ul style="list-style-type: none"> <li>• Aware of people in the environment</li> <li>• Fewer symptoms</li> <li>• Attached to family members.</li> <li>• Emotional relatedness affected.</li> </ul>	<ul style="list-style-type: none"> <li>• Eye contact present and intense</li> <li>• Socialization absent</li> </ul>	<ul style="list-style-type: none"> <li>• Deterioration occurs</li> </ul>	<ul style="list-style-type: none"> <li>• Deficits may/ may not be present</li> </ul>

	<b>Autism</b>	<b>Asperger's</b>	<b>Rett's</b>	<b>CDD</b>	<b>PDD-NOS /Atypical Autism</b>
<i>Play skills</i>	<ul style="list-style-type: none"> <li>• Symbolic/ pretend play absent</li> <li>• Generally non- functional play present</li> </ul>	<ul style="list-style-type: none"> <li>• Symbolic/ pretend play poor or absent</li> </ul>	Deterioration occurs	Deterioration occurs	Deficits may/ may not be present
<i>Prognosis</i>	Poor	Better	Poor	Poor	Hotter

## Diagnostic instruments

For nearly three decades now, the autism field has been fortunate to have several standardized screening and diagnostic instruments. These may be used as an alternative, and/or as a complement to categorical diagnosis/profiles (e.g. DSM-IV, ICD-10). The ability to quantify the severity of autism would be helpful both for research and clinical purposes (Lord 1991). However, such estimates become very complex because of the developmental nature of autism. As individuals with autism are rarely amenable to direct interview, dimensional assessment instruments usually rely either on behavioral observation (in structured or unstructured situations) or on parent/caregiver report.

Most notable among these instruments has been

**The Childhood Autism Rating Scale (CARS) (Schopler, Reichler & Renner, 1988)** is the most widely used behavioural rating. It includes 15 scales measuring domains such as resistance to environmental change and verbal and nonverbal communication. Each scale is scored on a seven-point rating scale, ranging from normal to severely abnormal based on observations of behaviour in the home, clinic, or school. The total CARS score has a possible range from 15 to 60. Estimates of the reliability presented in the CARS manual are high. The CARS offers reliable ratings highly associated with autism. It can be used by clinicians and teachers through direct observation or in a parent interview (Lord, 1995). The CARS was designed before DSM-III-R OR DSM-IV/ICD-10 criteria, and it does not reflect the current frameworks of DSM-IV and ICD-10 that weigh the social deficits as most significant in autism. Intellectual skills, language delay and certain nonspecific behavior problems are also included within the scoring. Because of its relative brevity and high sensitivity, the CARS may particularly be helpful as a screening instrument (Dilalla & Rogers, 1994).

**The checklist for autism in toddlers (CHAT) (Baron-Cohen, Allen & Gillberg, 1992)** is a very brief screening instrument that encourages physicians and

nurses to observe specific aspects of behavior in an attempt to identify autism. It was designed to prospectively identify autism at 18 months of age. The CHAT assesses pretend play, productive pointing, and gaze monitoring, by parental report and health practitioner observation through direct testing. According to the authors, "we stress that the CHAT should not be used as a diagnostic instrument, but it can alert the primary health care professional to the need for an expert" (Baron-Cohen et al, 1992).

M-CHAT is a modified version of the CHAT that relies on parents' reports of behaviour instead of health care provider's observations of behavior. The M-CHAT is being tested among children 24 months of age. It is observed that it has got better sensitivity than CHAT.

**The autism behavior checklist (ABC) (Kurg, Arick & Almond, 1980)** provides rating that discriminate autism from other disorders, when mental retardation and language level are not controlled. Because many of the items describe behaviors that reflect general impairment, it has been suggested that the ABC may be used as a general measure of behavior difficulties and perhaps in treatment outcome studies. (Volkmar, Cohen, Hoshino & Rende, 1998).

**The E-1 and E-2 scales by Rimland (1968,1971)** were some of the first to direct observers to look specifically at behaviors associated with autism. The form E-2 was designed for completion by parents, and asks questions about the child's early development, and about language and behavior through age five and a half. The form-E2 is not a diagnostic tool, its purpose is to build a large detailed database on autism related symptoms and behaviors. The total score is used to provide an indication of the likelihood that the person exhibits autism (Rimland, 1971). There has been concern that the questionnaire results in diagnoses that are not equivalent to standard criteria or other measures, but it was an important first step in the creation of standardized instruments in autism (Parks, 1983).



### **Autistic Behavior Composite Checklist and Profile (Anita Marcot & Riley, 1985)**

This inventory of the interfering behaviors may be used to establish and support a diagnosis of autism. It also may be used to follow a student's behavioral change over a period of time, and to provide aid in prioritizing problem areas as a basis for establishing a behavior intervention plan. The profile provides a graph that enables the clinician or teacher to gain an overview of the students interfering behavior through a visual display.

**The behavior rating instrument of autistic and atypical children (BRIAAC) (Ruttenberg, 1977, cited in Volkmar, 1998)** was based on observations of children with autism enrolled in a day treatment programme. Scales in this instrument are behaviorally defined and examine various domains of functioning e.g., relationship to adult, communication, drive for mastery, vocalization and expressive speech, sound and speech perception, social responsiveness, body movement and psychobiological development. Scores on each scale range from normal to severely autistic. BRIAAC scores appear to be related to some important aspects of clinical diagnosis (Cohen, Caparulo, Gold, Waldo, Shaywitz, Ruttenberg & Rimland, 1978) but are not directly comparable to current diagnostic framework.

**The behavior observation scale for autism (BOS) (Freeman, Schroth, Ritvo, Guthrie & Wake, 1980)** has been used for behavioral assessment and monitoring response to intervention. A series of behaviors are evaluated during a structured period of observation.

**The autism-screening instrument for educational planning (2<sup>nd</sup> Ed.) (ASIEP-2) (Krug, Arick, & Almond, 1993)** is a major revision of one of the most popular individual assessment instruments available for evaluating and planning for subjects with autistic behavior characteristics. Standardized and researched in diagnostic centers ASIEP-2 uses five components to provide data on five unique aspects of behavior with individuals from eighteen months through adult-hood. The components of the ASIEP examine behavior in five areas: sensory, relating body concept, language, and social self-

help. The ASIEP-2 samples vocal behavior, assesses interactions and communication, and determines learning rate. In combination ASIEP-2 subtests provide a profile of abilities in spontaneous verbal behavior, social interaction, educational level, and learning characteristics. Percentiles and standard scores are provided for the five subtests.

**The Gilliam autism rating scale (GARS) (Gilliam, 1995).** Designed for use by teachers, parents, and professionals, it helps to identify and diagnose autism in individuals age three through twenty-two years and to estimate the severity of the problem. Items on the GARS are based on the definitions of autism adopted by the DSM-IV. The items are grouped into four subtests: stereotyped behaviors, communication, social interaction, and developmental disturbances. The GARS has three core subtests that describe specific and measurable behaviors. An optional subtest (developmental disturbances) allows parents to contribute data about their child's development during the first three years of life. Validity and reliability of the instrument are high. The entire scale can be completed in five to ten minutes by persons who have knowledge of the child's behavior or the greatest opportunity to observe him or her. Standard scores and percentiles are provided.

**The pervasive developmental disorders screening test (PDDST) (Siegel, 1996)** is designed to be administered in settings where concerns about possible autistic spectrum disorders arise. Different "stages" of the PDDST correspond to representative populations in (a) primary care clinics: b) developmental clinics: and c) autism clinics. The PDDST is designed as a screening test and is a parent report measure. As such, it does not constitute a full clinical description of early signs of autism but does reflect those early signs that have been found to be reportable by parents and correlated with later clinical diagnosis.

**The Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & LeCouter, 1994)** offers the possibility of quantifying severity within specific domains. Separate scores are provided for social reciprocity, communication, and restricted and

repetitive behaviors, as are other scores concerning behavior difficulties not specific to autism. This approach reduces the possibility of individuals receiving diagnosis of autism because of severe deficits in only one or two areas. The ADI-R is considered by some professionals in the field a measure of high diagnosis accuracy. It takes several hours to administer and score. The ADI-R is recognized as one of the better-standardized instruments currently available for establishing a diagnosis of autism. It is a semi-structured interview administered to subjects' caregivers which determines whether or not an individual meets the diagnostic and statistical manual of mental disorders (3<sup>rd</sup> ed., revised) criteria for autism.

**The Differential Assessment of Autism and Other Developmental Disorders (DAADD) (Gail J. Richard & Lynn K. Calvert, 2003)** was developed to identify pertinent behaviors that can be used to discriminate among specific developmental disorders. It is designed to help professional differentiate among developmental disabilities in children by providing age sensitive information in order to identify the child's primary disability. It covers the three different age ranges (2-4yrs, 4-6 yrs & 6-8 yrs) It helps to obtain an overview of a child in the following developmental areas 1) Language, 2) pragmatic/Social, 3) Sensory, 4) motor (Gross/Fine), 4) Medical/Physical, 5) behavior. The DAADD is now considered to be a differential diagnostic assessment tool, which includes all the other autistic subgroups except CDD.

On Indian front,

Chakravarti's (2001) study was to construct a diagnostic scale for autistic spectrum disorders for SLPs. It allows to find out whether the child has autistic spectrum disorder or not and also helps in the severity rating.

Ram's (2004) study was mainly to explore the efficacy and clinical utility of the diagnostic scale for autism spectrum disorders, which has been developed for use in Indian context. It only allows for quantifying the severity of the disorder and for the purpose of profiling.

Anita (2007) study was mainly based on DSM-IV-TR, 2000 criteria. The purpose of study was to validate DSM- IV TR criteria for differential diagnostic purposes in Indian set-up.

/

## **Method**

The main objective of present study was to develop a checklist for differential diagnosis by pooling (booting) information regarding the differentiating features or characteristics of ASD from the available sources like textbooks, journals and internet. An attempt was also made to standardize the same.

The method of the study included 4 phases:

### **Phase I: DEVELOPMENT OF CHECKLIST FOR ASSESSMENT**

#### **Development of checklist proceeded with the following steps**

##### **1. Selection of items for the checklist**

- An intensive search as well as pooling of features exhibited by ASD was carried out from the various resources like textbooks, journals, internet, existing western and Indian tests/ tools / checklist / protocol and classification system such as for screening and diagnosis of ASD.
- Diagnostic and Statistical Manual of Mental Disorders (Fourth edition-Text Revision-2000) (DSM-IV-TR)
- The ICD-10 Classification of Mental and Behavioural disorders (1992)
- Efficacy and clinical utility of the diagnostic scale for Autism Spectrum Disorders (DSASD) (Ram, P. 2004)
- Autism Spectrum Disorders: Construction of a diagnostic scale for SLPs. (Chakravarthi, 2002)
- Differential Diagnosis of Autism Spectrum Disorders-Validation of DSM IV Criteria (Anita, T. 2007)

## 2. Preparation of checklist

- Exhaustive list of features has been prepared under each subgroups of ASD.
- Features listed were classified under different domains such as age of onset, motor, behaviour, physical/medical, sensory, intelligence, social and speech & language.
- The extensive list of items was subjected to scrutiny by 5-speech language pathologists. The checklist so collected was subjected further to pilot investigation before final selection of items

## 3. Development of necessary research forms:

- Checklist:** The checklist was prepared which consisted of items for demographic information and features of PDD categorized „iinder the main domains. The main domains were motor, behaviour, physical/medical, sensory, intelligence, social and speech and language. These domains were considered because the predominant features of PDD were exhibited in these particular domains. Hence these domains were given more importance for differential diagnosis of Autism Spectrum Disorders (ASD).
- Score sheet:** The score sheet was prepared in order to note down the responses of the client consisting of the same domains as in the checklist. Profiling was done for the purpose of diagnosis.
- Instruction sheet for the examiner:** Instruction sheet was prepared for the purpose of administration, profiling and diagnosing.

## 4. Description of checklist format:

An exhaustive checklist was developed by pooling the features of the ASD subgroups from the available resources and classifying them under different

domains/areas for the purpose of differential diagnosis. No. of items/questions ranged from minimum being in the area of intelligence and maximum in the area of speech and language. The items /questions were pertaining to subgroups of ASD. Items/questions were represented in the following order-autism (au), Asperger (as), Retts (rs) and Childhood Disintegrative Disorder (CDD) and represented against each question. The responses were noted in the binary mode-either present or absent. Under each domain the clinician had to shade the subgroup of ASD to which the client falls in the respective column provided. Same procedure was to be repeated for all the domains. After the completion of all the domains/areas clinician had to indicate the subgroups of ASD identified in each domain in the table provided for profiling and finally diagnosed under the subgroup of ASD under which maximum no of responses are obtained. If the distribution is scattered the child was diagnosed under PDD-NOS. Score sheet had been provided *{see appendix...for more details on the assessment checklist and score sheet}*

**a) Pilot study:**

The pilot study was conducted on a small group of children (n=5), in order to finalize the assessment checklist developed. Suitable modifications were incorporated in the checklist on the basis of pilot study results. The pilot data was collected from children attending speech and language therapy in the ASD unit at All India Institute of Speech and Hearing. The checklist was administered to these children by interviewing the parents/caretaker along with clinician's observation of the client's behaviour.

After the pilot study, a few stages of modifications has been made in the checklist since the checklist was very exhaustive, time consuming and the items in the checklist were overlapping between the subgroups. Hence there was difficulty in differentially diagnosing the subgroups of ASD. Therefore the checklist had undergone 3stages of modification.

In stage I - due to the problems encountered in the pilot study the modifications done were, 1) no of items under each domain were reduced, 2) considered only the

commonly occurring features and items related to overlapping features among subgroups of ASD were deleted, 3) critical items were given more importance, 4) reframed the ambiguous items/questions and parallelly modifications were incorporated in the scorshcet also. The modified checklist was administered to (n=5) children. The Problems encountered during administration of the checklist after stage one modifications were 1) still it was exhaustive 2) Since there were scattered responses observed which made task difficult to classify the clients under any one particular subgroup of ASD, 3) few items remained ambiguous, 4) whether required or not the clinician had to probe in-depth of all the categories of ASD but still the differentiation would have been made in the preliminary question (Age of Onset) itself since there are similarities between the two subgroups - autism/asperger and retts/edd in the areas affected as well as age of onset.

In stage II - to over come the problems faced in administering the checklist after under going stage-I modifications, the following changes were incorporated considering the responses obtained under the sections- (Areas affected and Age of onset). Similarities were observed among autism and asperger at one end and retts/edd at the other end. So the checklist was divided into part A and part B section, part A comprising of questions pertaining to autism and asperger, where as part B of retts/edd with development, areas affected, age of onset and nature of onset, common to both. The modifications carried out in the pattern of profiling also, part A comprised of subgroups autism, asperger and PDD-NOS, where as part B comprised of retts and cdd. This stage II modified checklist has been administered to (n=5) children. The Problems encountered during administration of the checklist after stage two modifications were 1) there was significant difference in the pattern of response obtained prior to training (PT) and after training (AT) in the same children (those children who have undergone training in various skills like speech&language. behaviour and sensory integration.2) features exhibited by retts and cdd were almost common/overlapping under different domains except few critical items which could differentiate both, which made the task of profiling even more difficult

Stage III - to over come the problems encountered in administering the checklist after undergoing stage II modifications, the following changes were incorporated. Under



part A prior to training and after training sections were included under each domains/areas. Profiling was also given separately to prior to training and after training sections. The items/questions remained same for both the sections, only the changes had to be indicated. Same modifications were incorporated in the score sheet also. The response obtained under each domain under 2 sections were noted in 2 different profiles provided in the score sheet for final diagnosis. Severity rating like mild, moderate and severe was included which was subjective as per clinician's observation. Modifications carried out under in part B were as follows 1) instead of considering questions/items under different domains, items/questions were pooled and distributed under 2 different groups like Retts and CDD which included the critical and differentiating items of both marked with \* (asterik). Since the age of onset and gender were the main differentiating factors between the two groups diagnosis has to be made based on these two factors confirmed by the critical items marked with asterik. Thus, the checklist was finalized.

/

#### **Phase II: SUBJECT SELECTION:**

For the purpose of standardization, 58 subjects in the age range of 2-10 years who are diagnosed as having autistic features, asperger disorder and PDD-NOS were selected from different places like cases from OPD AIISH, cases attending therapy at ASD unit AIISH, cases attending preschool training at AIISH, and JSS Hospital Mysore (to include any diagnostic label as autism, infantile autism, autistic traits, autistic disorders, PDD, ASD etc.) were selected for the present study. Subjects selected included children both male & females who had undergone therapy and those who had not undergone therapy.

#### **Phase III: ADMINISTRATION OF THE TEST:**

The checklist developed was administered on 56 children by taking information from the parents or caregivers through interview method and observation method. Test administration for the individual subject took around 30-40 minutes for completion. Then

the checklist administered on these children was scored for item accordingly. The data was subjected to statistical analysis.

#### **Phase IV: SCORING**

Under different domains of the checklist, the scoring pattern was as follows: binary choice (present/absent) was provided against each question. If the particular feature was exhibited by the child then it had to be indicated by putting a tick mark against present, if not exhibited by putting a tick mark against absent. Profiling had to be done under each domain. After completion of all the domains final profiling had to be done in the format provided. Suppose the child had undergone training profiling both prior to training and after training had to be done.

#### **Phase V: STATISTICAL ANALYSIS**

The results obtained were subjected to Item analysis and percentage analysis.

#### **Phase IV: FINALIZATION OF THE CHECKLIST:**

Based on the subject study, test material was finalized and diagnostic criteria for each of the ASD categories were listed. This would be useful in ready diagnosis of the client, which in turn would help in planning tailor made intervention.

## **RESULTS AND DISCUSSION**

The present study was embarked on with the purpose of developing an assessment checklist for differential diagnosis of Autism Spectrum Disorders (ASD).

Results of the study are discussed in 2 steps, as follows

### **STEP-I:**

Using the developed checklist, totally 56 children (40 male subjects and 16 female subjects) could be classified into 3 different categories of Autism Spectrum Disorders (Autistic disorder, Asperger's Disorder & Pervasive Developmental Disorders Not otherwise specified (PDD-NOS). Table 1 shows the number and percentage of children in each category of ASD among 56 subjects, Similarly Pie chart shows the distribution of these 2 categories of ASD.

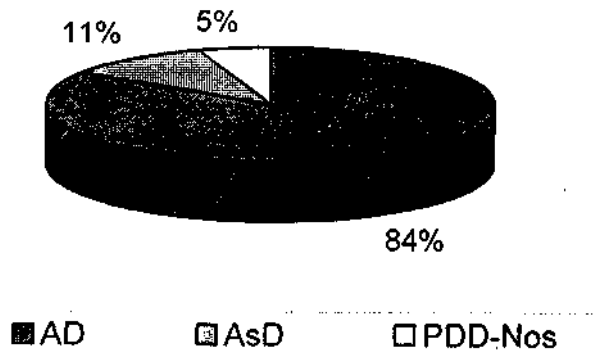
**Table I: Number and Percentage of Subjects in 5 different categories of Autism**

***Spectrum Disorders:***

<b>Categories of ASD</b>	<b>Number of subjects (56)</b>	<b>Percentage</b>
Autistic disorder	47	84%
Asperger's disorder	6	11%
Childhood disintegrative disorder	0	-
Rett's disorder	0	-
Pervasive Developmental Disorders Not otherwise specified (PDD -NOS)	3	5%

**Figure 1: Distribution of the different categories of Autism Spectrum disorders among 56 subjects**

**Distribution of three different categories of Autism Spectrum Disorders among 56 subjects**



**AD-Autistic Disorder; ASD - Asperger's Syndrome; & PDD-NOS-Pervasive Developmental Disorders Not otherwise specified.**

As seen in the table 1 and figure 1, maximum number of children met the criteria of autistic disorder (83.92%) followed by asperger's disorder (10.71%) and Pervasive Developmental Disorders Not otherwise specified (Pdd-Nos) (5.35%). As the checklist comprised of both prior training sections (PT) and after training sections (AT) during comparison, 47 children were classified under subgroup of autism prior to training. Out of 47 children, 5 children had undergone training duration ranging from 9 months - 2 years (communication, behavioral and sensory integration). Among these 5 children, category shift was noticed in 3 children after training and they were classified under the category of Pervasive Developmental Disorders Not otherwise specified (PDD-NOS). None of the children met the criteria to be diagnosed as having Rett's disorder and childhood disintegrative disorder, since there was no subject available during the study for this particular group. So retrospective study has been carried out on the already available data of clients (n=2) who had been diagnosed as Rett's (n=1) and Cdd (n=1) in the OPD of AIISH.

Anita.T (2007) - The results are in support with study with respect to autism and Asperger disorder. She found that 65% cases with autism, 5% cases with asperger syndrome and 25 % cases with PDD-NOS.

Malhotra, Gupta & Kumar (2002) found 12 cases of Childhood Disintegrative Disorder which is about 0.45% of all cases, two female cases of Rett's Disorder and 0.45% of cases with PDD-NOS in the period between 1989 and 1999 at the CAP (Child and Adolescent Psychiatry Clinic), PGIMER, Chandigarh.

In the present study during classification of children into different categories of the ASD, crucial/critical features helped in easy categorization of disorders. After carrying out item analysis features frequently exhibited/occurring in more than 50% of the children were taken into consideration and the critical features thus obtained are listed below. Commonly exhibited feature by both the groups of ASD are also listed below.

**The crucial features drawn for each disorder are listed below:**

**A) Autistic Disorder**

**MOTOR: -**

- Perseverative (repeated) motor movements

**BEHAVIOR: -**

- Pre-occupation (fixation) with parts of objects, dates, routes or time tables
- Unusual attachment for inanimate objects e.g., soap case, paper, keys, pen etc
- Spins objects especially the round ones & Circling movements
- Self-stimulatory behaviors (auditory, tactile, visual and olfactory etc.)
- Treats persons as objects rather than persons
- Self-stimulatory behaviors (auditory, tactile, visual and olfactory etc.)
- Self-injurious behavior (Head banging, biting etc.)

**PHYSICAL/MEDICAL: -**

- Fits or seizures (if the child had fits or seizures, but it has reduced or subsided after medication consider them under the subgroup autism only)
- Not toilet trained

**SENSORY: -**

- Auditory withdrawal (removal of auditory stimuli)&hyper sensitivity or over sensitivity to certain loud noises and to objects such as vacuum cleaners, lifts and even the wind or hypo sensitivity to stimuli
- Fails to responds to familiar voices by cooing, attending or social smiling & Selectively attends to voices and / or sound
- Acts as if deaf, does not react to speech or noises and inconsistent response to auditory stimuli e.g., does not respond to name call, but responds to TV advertisements or music's

- Auditory distractibility and auditory self-stimulation with vocal noises that would not be considered attempts at speech communication
- Stare into space, people or objects, finger or hand, lights, reflections or changing levels of illumination
- Distracted by visual stimuli and visual withdrawal eg, by covering eyes, closing eyes or averting eye contact
- Resist or withdraw from tactile or physical stimulation by another person or objects
- Frequently smells or sniffs the objects and exhibits strong food preferences (sweets, dairy products, meats, etc.)
- Explore objects by mouthing and frequently lick objects that are not edible

**INTELLIGENCE: -**

- Exhibits low verbal IQ but high performance IQ or may exhibit mild mental retardation

**SOCIAL: -**

- Lack of peer relationship e.g., does not engage or mingle with age appropriate peer group and poor interactions
- Lack of use of multiple non verbal behaviors such as eye to eye contact (e.g., persistently looks past or turns away from persons), facial expression, body postures and gestures
- Lack of social or emotional reciprocity
- Lack of social smile
- Adult preferred interaction e.g., the child often likes to interact with person of their choice either mother, father or maid and with other children only if insisted but not spontaneously
- Exhibits social communication deficits but adaptive skills are developmentally appropriate

- A profound autistic withdrawal (e.g., happiest when left alone)

#### **SPPECH AND LANGUAGE SKILLS : -**

- Significant delay or deviance in speech and language development
- No gestural language, they tend to prattle (nonsense) about meaningless conversation such as repeating words verbatim from a television or radio advertisements
- Mutism and Receptive language not age appropriate
- Poor verbal and nonverbal imitation
- Immediate or delayed echolalia

#### **B) Asperger's Disorder**

##### **BEHAVIOR: -**

- No obvious stereotypic motor movements noticed but looks as if gentle and cooperative child

##### **PHYSICAL/MEDICAL: -**

- Generally healthy and physically active

##### **INTELLIGENCE: -**

- Exhibits verbal IQ on par with performance IQ

##### **SOCIAL: -**

- Exhibits social communication deficits but adaptive skills are developmentally appropriate
- More social interest, "wants to make friends but does not know how"
- Affectionate with parents and siblings as well as interacts spontaneously



## **SPPECH AND LANGUAGE SKILLS: -**

- Normal speech and language development between 1.3 yrs followed by Superficially perfect language expression with impairment exhibited in pragmatics and prosody (odd prosody) and also exhibits telegraphic speech and poor functional concrete vocabulary
- Mitigated echolalia (repetition of speech fragments, modified within contexts)
- Impairment of comprehension including misinterpretation of literal/implied meaning
- Formal pedantic (precise) language

All the above-mentioned features are mainly based on the data collection and the age of onset of the behavior and the normal development (or) deviant development skills, language skills and cognitive skills.

Children diagnosed as having Autistic disorder had onset prior to 3yrs of age with delay in development of social, language and cognitive or behavior skills. In contrast, children with Asperger's disorder had normal development of language, social and cognitive skills till 3yrs of age. Based on the existing literature and the retrospective study, the following crucial features were listed out, which would enable us for attempts at differential diagnosis.

### **Crucial/Critical features are listed below**

#### **Rett's Disorder**

- a) Gender: Only in females
- b) Normal development till 5 months followed by regression
  - i. Motor: -deterioration
  - ii. Behavior: - loss of acquired previous hand skills and stereotyped hand movements e.g. hand wringing and hand washing and\* **mouthing (repeatedly putting the hand into the mouth and taking it out)**

iii. Social: - withdrawal from the surroundings, absence of reciprocal interaction and poor adaptive skills

- c) Abnormalities in gait (unsteady, scissored gait, wide based, stiff & toe walking)
- d) \* Reduced muscle tone and hypotonia
- e) \* Reduced body fat and muscle mass (power or strength)
  - Decelerated head growth after a period of normal development
- f) \* Exhibits severely delayed intellectual development or profound mental retardation noticed from 5 months & Develop severe learning disabilities

### Childhood Disintegrative Disorder (CDD)

- a) Gender: Commonly seen in males
- b) Normal development till 2yrs followed by regression
  - 1) Motor: -Deterioration
  - 2) Behavior: - loss of acquired hand skills and stereotyped hand movements e.g. hand wringing and hand washing
  - 3) Speech&language:- Regression in receptive and expressive language with echolalia (Immediate, Delayed)
  - 4) Social: - withdrawal from the surroundings, absence of reciprocal interaction and poor adaptive skills
- c) \*Failure to control bowel & bladder control
- d) \* Loss of play and motor skills
- e) Significant loss of previously acquired skills occurs areas like expressive or receptive language and social skills or adaptive behavior not due to any organic pathology

### **STEP-II:**

In the present developed checklist there were few overlapping features in the different domains; these features were overlapping among Autistic disorder, and Asperger's disorder.

**The overlapping features are listed below:**

**MOTOR: -**

- Motor delays, arrests, regressions and inconsistencies in gross and fine movements

**BEHAVIOR: -**

- Repetitive and sustained and odd play e.g., rattling stones in a can
- Stereotyped motor mannerisms e.g., hand or finger flapping or twisting or complex whole body movements, movements of ornaments or furniture in the home
- If the Child's demands are not satisfied the child exhibits hyperactivity or aggression
- Highly rigid, routinized and have overly narrow and restricted interests

**PHYSICAL/MEDICAL: -**

- Difficulty in modulating (changeable) or regulating behavior.
- Sleep disturbances

**SOCIAL: -**

- Inadequate appreciation of social emotional cues
- Exhibits deficit in social communication and adaptive skills

**SPEECH AND LANGUAGE SKILLS: -**

- Nonsense speech with unusual inflections
- Echolalia (Immediate or Delayed)

- Impaired ability to initiate or sustain a conversation with others

The presence of each of these criteria in a number of children in each group (Autistic disorder and Asperger's disorder) was found.

Based on the results in step-I and step-II, it can be inferred that by focusing more on the critical features and the overlapping features (which occurred in more than 50% of children), it is possible to easily differentiate children with autistic and asperger's disorder. On the other hand, for the Rett's and Childhood disintegrative disorder group, features listed out based on the review of the literature & retrospective study done from the existing case files of AIISH OPD/ASD would help/enable us in differential diagnosis.

s

## SUMMARY AND CONCLUSION

There have been enormous research studies in the area of ASD over the past 80 years, but still, this class of disorders remains a mystery to all speech language pathologists. There have been lots of misconceptions and controversies especially on the differential diagnosis of ASD among various groups of experts, considering the two schools of thoughts: one being that of precise, specific diagnostic labels, and the other adopting a more diffuse view of autism as a spectrum of disorders. This study considers the latter view.

Considering autism as a spectrum of disorders puts forth the important issue of differential diagnosis of ASD. So far the category of PDD was included in two classification system namely, The *Differential and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*, published in 1994, and *the International Statistical Classification of Disease 10<sup>th</sup> revision (ICD 10)*, 1992. These classification systems are mainly west based and which have been standardized on western population covering only the major triad areas like social, communication & restricted activities & interest.

On Indian front, there are few tools available for the diagnosis and differential diagnosis of autism spectrum disorders. Coming to the area of differential diagnosis on Indian front an attempt has been made by Anita (2007) to differentially diagnose ASD based on DSM-IV-TR criteria but in this particular study only few features are covered/included as well as features covered were overlapping which made the differential diagnosis task even more difficult.

Hence, this study is an attempt to develop an assessment tool for differential diagnosis of autism spectrum disorders (ASD) to contribute to the existing literature of differential diagnosis of ASD on the Indian front.

An exhaustive checklist was developed by pooling the features of the ASD subgroups from the available resources and classifying them under different

domains/areas for the purpose of differential diagnosis. The developed checklist/assessment tool was administered on 56 children (40 males and 16 females), by taking information from the parents or caregivers through interview method and observation method. Then the checklist administered on these children was scored for item accordingly. The data was subjected to items analysis for the purpose of differential diagnosis.

Based on the results it was concluded that, by focusing more QII crucial features and overlapping features which occurred in more than 50% of children for the (Autistic disorder, Asperger's Disorder), and based on the literature the features listed out for the Rett's and Childhood disintegrative disorder, this present assessment checklist can be considered as a clinical checklist/tool to differentially diagnose these four categories (Autistic disorder, Asperger's Disorders, Rett's and Childhood Disintegrative Disorders) of Autism Spectrum Disorders in Indian context.

#### **IMPLICATIONS OF THE STUDY**

- > Helps us in differential diagnosis and subcategorise children with ASD
- > It also makes allowance for profiling of these children, which is crucial before the planning strategies
- > The checklist can also be used as a measure of the child's progress following intervention

#### **LIMITATION OF THE STUDY**

- > The number of subjects taken up for the study was limited
- y Some of the subjects undertaken for the study had undergone therapy for different durations, which might imply that they have moved along the spectrum since their first diagnosis

## **SUGGESTION FOR FUTURE RESEARCH**

- > An extension of this study can be carried out as a field test across a larger population in order to standardize the assessment checklist.
- > A comparison study of this with other tools can be carried out.
- > Study can be extended by controlling other variables like duration of therapy attended, socio economic status, education status and occupation of the parents etc.

## REFERENCES

- 1) Aarons, M. & Gittens, T. (1987). *Is this Autism?* Windsor, Berkshire: NFER-Nelson.
- 2) American Psychiatric Association (1980). *Diagnostic and Statistical Manual*. 3<sup>rd</sup> Edn. (DSM-III). Washington, DC: APA.
- 3) American Psychiatric Association (1987). *Diagnostic and Statistical Manual*. 3<sup>rd</sup> Edn. (DSM-III R). Washington, DC: APA.
- 4) American Psychiatric Association (1994). *Diagnostic and Statistical Manual of mental disorders*. 4<sup>th</sup> Ed. Washington, DC: APA.
- 5) American Psychiatric Association (2000). *Diagnostic and Statistical Manual of mental disorders (Fourth edition-Text Revision)*(DSM-IV-TR): APA.
- 6) Anita, T. (2007). *Differential Diagnosis of Autism Spectrum Disorders-Validation of DSM IV Criteria*. An unpublished Master's Dissertation submitted in part fulfillment for the second year M.Sc (Speech-Language Pathology) University of Mysore, Mysore.
- 7) Asperger, H. (1994). In U. Frith (Ed). *Autism and Asperger syndrome*, (pp 5-6), London: Cambridge University Press.
- 8) Baron-Cohen, S., Allen, J. & Gillberg, C. (1992). Checklist for Autism in Toddlers, *British Journal of Psychiatry*, 12(6), 839-843.
- 9) Bishop, D.V. (1989). "Autism, Asperger's syndrome and semantic-pragmatic disorder: Where are the boundaries?" *British Journal of Disorders of Communication*, 24(2): 107-121.
- 10) Chakravarti, A. (2002). *Autism Spectrum Disorders: Construction of a diagnostic scale for SLPs*. An unpublished Master's Dissertation submitted in part fulfillment for the second year M.Sc (Speech and Hearing) University of Mysore, Mysore.
- 11) Chengappa, S. & Indu, V. (1991). Variation in verbal and non-verbal behavior in 5 Autistic children: A clinical observation. *Journal of the Indian Speech and Hearing Association*, 7: 37-44.



- 12) Cohen, D.J., Caparulo, B., Gold, J., Waldo, M., Shaywitz, B., Rutterberg, B. & Rimland, B. (1978). Agreement in diagnosis: Clinical assessment and behavior rating scales for pervasively disturbed children. *Journal of American Academy of Child Psychiatry*, 17, 689-695.
- 13) De-Sanctis (1986) cited in Volkmar, F.R. (1998). *Autism and pervasive developmental disorders*. Cambridge University Press.
- 13) Freeman, B.J., Schrolts, P., Ritvo, G. Guthrie, D. & Walce, L. (1980). The Behavior Observation Scale for Autism (BOS): Initial results of factor analysis. *Journal of Autism & Developmental Disorders*, 10, 343-346.
- 14) Gilliam, E.J. (1995). Gilliam's Autism Rating Scale. Retrieved on March, 28, 2004 from <http://www.isnt.net/jypsy/tests.htm>.
- 15) Heller, (1908, 1930/1969). In Volkmar F.R. (1998). *Autism and Pervasive Developmental Disorder*. Cambridge: Cambridge University Press.
- 16) Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250. Reprinted in Kanner, L. (1973) *Childhood Psychosis: Initial studies and new insights*. New York: Wiley.
- 17) Kanner, L. (1965). "Autism, Asperger's syndrome and semantic-pragmatic disorder: Where are the boundaries?" *British Journal of Disorders of Communication*, 24(2): 107-121.
- 18) Krug, D.A. Arick, J. & Almond, F. (1980). Behavior checklist for identifying severely handicapped individuals with high levels of autistic behavior. *Journal of Child Psychology and Psychiatry*, 21, 221-229.
- 19) Krug, D.A., Arick, J. & Aberrol, P. (1993). *The Autistic screening instrument for educational planning (2<sup>nd</sup> Ed) (ASIEP-2)*. Retrieved on March 28, 2004 from <http://www.internet/jypsy/tests.htm>
- 20) Lord, C. (1991). Methods and measures of behavior in the diagnosis of autism and related disorders, *psychiatric clinic of North America*, 14, 69-80.
- 21) Lord, C, Rutler, M. & LeConteur, A. (1994). Autism diagnostic interview - Revised: A Revised Version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism & Developmental Disorders*, 24, 659-685.

- 22) Malhotra S., Kumar, D., & Gupta, N. (2002). Rett's syndrome: A neurodevelopmental disorder: report of two cases. *Neurology India*, 50, 330-333.
- 23) Park, S.L. (1983). The assessment of autistic children: A selective review of available instruments. *Journal of Autism and Developmental Disorders*, 13, 255-267.
- 24) Ram, P. (2004). Efficacy and Clinical utility of the diagnostic scale for Autism Spectrum Disorders (DSASD). An unpublished Master's Dissertation submitted in part fulfillment for the second year M.Sc (Speech and Hearing) University of Mysore, Mysore.
- 25) Rett, A. (1996). In Volkmar F.R. (1998). *Autism and Pervasive Developmental Disorder*. Cambridge: Cambridge University Press.
- 26) Richard, G.J., Calvert, L.K. (2003). *Differential Assessment of Autism and other Developmental Disorders (DAADD)*.  
<http://www.linguisystems.com/itemdetail.php?id=473>.
- 27) Rilcy, A.M. (1984). *Autism behavior composite checklist and profile*. Arizona: Communication Skill Builders.
- 28) Rimland, B. (1968). On the objective diagnosis of infantile autism. *Acta Paedopsychiatry*, 35, 146-161.
- 28) Rimland, B. (1971). The differentiation of childhood psychoses: An analysis of checklists for 2,218 psychotic children. *Journal of Autism and Child Schizophrenia*, 1, 1161-1174.
- 29) Rimland B. (1993). *Developmental Disorders: The autism continuum*. *Journal of Autism and Developmental Disorders*, 4, (23), 71-85.
- 29) Rimland, B. & Edelson S.M. (2000). *Autism Treatment Evaluation Checklist (ATEC)* - <http://www.autismangelspurse.com/checklist.RTF>
- 30) Robins, D., Fein, D. & Barton, M. (1999). Modified checklist for Autism in Toddlers (M-CHAT). <http://www.depeds.org/articles/detil.efm?texttest id=466>.
- 31) Rutter (1977). Cited in Volkmar, F.R. (1998). *Autism and Pervasive Developmental Disorders*. Cambridge University Press.

- 32) Rutter, M. (1978). "Autism, Asperger's syndrome and semantic-pragmatic disorder: Where are the boundaries?" *British Journal of Disorders of Communication*, 24(2): 107-121.
- 33) Rutter, M. (1978a). Diagnosis and definition. In M. Rutter & E. Schopler (Eds.) *Autism: A reappraisal of concepts and treatment*. New York: Plenum Press.
- 34) Rutter, M. & Schopler, E. (1987). Autism and pervasive developmental disorders: Concepts and diagnostic issues. *Journal of Autism and Developmental Disorders*, 17, 159-186.
- 35) Schopler, E., Reichler, R.J. & Renner, B.R. (1988). *The Childhood Autism Rating Scale (CARS)*. Los Angeles: Western Psychological Services.
- 36) Schreibman, L. (1988). *Autism*. Newbury Park, CA: Sage Publishing Co.,
- 37) Siegel, B. (1996). *The world of the autistic child: Understanding and treating autistic spectrum disorders*. Oxford: Oxford University Press.
- 38) Tsai, L.Y. (1992). Diagnostic issues in high functioning autism. *High functioning individuals with autism* (pp 11-40 *Current issues in autism*). New York, Plenum Press.
- 39) Volkmar, F.R., Cohen, D.J., Hoshino, Y. & Rende, R.D.E.A. (1988). Phenomenology and classification of the childhood psychoses. *Psychological Medicine*, 18,191-201.
- 40) Volkmar, F.R., Canter, A., Sparrow, S.S. & Cicchetti, D.V. (1993). Quantifying social development in autism. *Journal of the Academy of Child and Adolescent Psychiatry*, 32,627-632.
- 41) Volkmar, F.R. & Lord (1998). *Autism and Pervasive Developmental Disorders*. (Pp. 16-32) Cambridge University Press.
- 42) Wetherby, A. & Prizant, B. (2001). The communication and symbolic behavior scales developmental profile infant/toddler checklist [http://firstwords.free\\_edu/pdf/checklistpdf](http://firstwords.free_edu/pdf/checklistpdf).
- 43) Wetherby, A., & Prizant, B. (2002). Autism spectrum disorders: A transactional developmental perspective. *Focus On Autism and Other Developmental Disabilities*, 17(1); 55-56.

- 44) Wheelwright, S. (1980). Checklist for Autism in Toddlers.  
<http://depts.washington.edu/dataproj/chat.html>
- 45) Wing, L. (1976). Diagnosis, clinical description and prognosis. In Early Childhood Autism. (Ed. L. Wing), pp 15-48: Pergamon: Oxford.
- 46) Wing, L. & Gould, J. (1979). Severe impairments of social interaction. and classification. *Journal of Autism and Childhood Schizophrenia*, 9, 11-29.
- 47) Wing, L. (1981). Sex ratio in early childhood autism and related conditions. *Psychiatry Research*, 5, 11, 129-137.
- 48) Woods, J.J., & Wetherby, A.M. (2003). Early Identification of and Intervention for infants and toddlers who are at risk for Autism Spectrum Disorders. *Language, Speech and Hearing Services in Schools*, 34; 180-193.
- 49) World Health Organization (1993). *The ICD-10 Classification of Mental and Behavioral Disorders: Clinical Description and Guidelines*. Geneva: WHO.

## APPENDIX

ALL INDIA INSTITUTE OF SPEECH AND HEARING  
DEPT OF SPEECH LANGUAGE PATHOLOGY  
ASD-ARF PROJECT  
MYSORE-6

*DIFFERENTIAL DIAGNOSIS CHECKLIST FOR ASP (DDC-ASD)*

### INSTRUCTIONS

The assessment checklist contains questions pertaining/related to the features frequently exhibited by ASD such as Autism, Asperger, Retts and Cdd covering the following areas such as Motor, Sensory, Behavioral, Physical, Social, Intelligence and Speech & Language.

### ADMINISTRATIONS AND SCORING

- a) Read the questions carefully as well as observe the child's exhibiting behavior and note the response in the score sheet provided with the checklist
- b) Two options are provided under each question or against each question (+ or -), the appropriate one needs to be underlined /ticked
- c) Interview the parent along with the observations for possible features or questions and indicate whether the particular feature is present or absent
- d) If the client had undergone training/therapy in the areas like speech and language, behaviour modifications and sensory integration, note down the features observed prior to training and after training parallelly in the sections provided. (PT-indicates prior to training and AT-indicates after training)
- e) After completing the particular domain or area represent the subgroup of ASD to which the child falls in the column provided, by noting the instructions provided against each area/domain
- f) Carry out the same procedure (as in step 'd') under each domain/area
- g) After the completion of all the domains or areas, indicate the subgroups of ASD identified in each domain by '+' in the **table provided for profiling**
- h) After profiling, diagnose the child under the subgroup under which maximum number of '+' is obtained, or under the subgroup, considering age of onset as main domain supported by any two major domains among social, speech&language and behavior or sensory**

- i) Diagnose the child under PDD-NOS in case if the distribution does meet the above said criteria
- j) If two different diagnosis are obtained prior to training and after training make it a point to note down the same by following the instructions given in the score sheet.

**ALL INDIA INSTITUTE OF SPEECH AND HEARING  
DEPT OF SPEECH LANGUAGE PATHOLOGY  
ASD-ARF PROJECT  
MYSORE-6**

**DIFFERENTIAL DIAGNOSIS CHECKLIST FOR ASP (DDC-ASD)**

Case. Name:

Case. No:

Age/Sex:

Date:

**SKILLS OR DOMAINS**

v **I. a) DEVELOPMENT:** - Normal/Affected

**AREAS AFFECTED:** - Motor/Social/Speech&Language/Cognitive/Sensory

**II. a) REGRESSION:** - Present/Absent

If present, observed in areas- Motor/Social /Speech&Language/Cognitive  
/Sensory/physical/Any other (specify): -

**b) AGE OF ONSET**

- a) Early infancy but before 3 yrs
- b) After 3yrs,before 4 yrs
- c) After 5 months or 2 yrs of age
- d) If any other (specify): -

**c) NATURE OF ONSET:** -Sudden/Gradual/Insidious

**IIIMOTOR:** -Affected/Not affected

If affected

- a) Toe walking (au, edd) present/absent
- b) Twirling (au) present/absent
- c) Perimeter walking (au) present/absent
- d) Persevarative (repeated) motor movements (au) present/absent
- e) Motor delays, arrests, **regressions and inconsistencies** in gross and fine movements (as) present/absent
- f) Exhibits difficulties in chewing and /or swallowing foods /
- g) Motor clumsiness (poor performance on neuro developmental examination) (as) present/absent
- h) Uncoordinated movements (as) present/absent
- i) Dysphagia (rs) present/absent
- j) Abnormalities in gait (unsteady, wide based, stiff & toe walking) (rs) present/absent

- k) Reduced muscle tone and hypotonia (rs) present/absent
- l) Gait (walking) shows shakiness (instability) of torso, limbs (rs) present/absent
- m) Normal development till 5 months or 2yrs followed by regression (rs, cdd) present/absent
- n) Motor deterioration (rs, cdd) present/absent
- o) If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups, a-d (Autistic), e-g (Asperger), h-m (Rett's), a, l&m (Cdd))**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**IV.BEHAVIOR:** -Affected/Not affected

If affected

- a) Pre-occupation (fixation) with parts of objects, dates, routes or time tables (au) present/absent
  - b) An obsessive (fixated) desire for the pre-separation of sameness (e.g., abnormally upset by changes of familiar surroundings) (au) present/absent
  - c) Unusual attachment for inanimate objects e.g., soapcase, paper, keys, pen etc (au) present/absent
  - d) Adherence (faithfulness) to specific rituals or routines (au) present/absent
  - e) Exhibits or noticed above behaviors during infancy period (au) present/absent
  - f) Repetitive and sustained and odd play e.g., rattling stones in a can (au) present/absent
  - g) Strong resistance to learn new behaviors or new skills (au) present/absent
  - h) Spins objects especially the round ones (au) present/absent
  - i) Treats persons as objects rather than persons (au) present/absent
  - j) Facial grimaces (au) present/absent
  - k) Self-stimulatory behaviors (auditory, tactile, visual and olfactory etc.)(au) present/absent
    - l) Self-injurious behavior (Head banging, biting etc (au) present/absent
  - m) Hyperactive, uncooperative and has odd movements (au) present/absent
  - n) Stereotyped motor mannerisms e.g., hand or finger flapping or twisting or complex whole body movements, movements of ornaments or furniture in the home (au, as) present/absent
  - o) Highly rigid, routinized and have overly narrow and restricted interests (as) present/absent
  - p) Exhibits or noticed after 3 yrs (as) present/absent
  - q) Loss of previously acquired hand skills between the ages of 5 and 30 months or 2yrs followed by stereotyped hand movements (e.g., hand wringing & hand washing) (rs, cdd) present/absent
  - r) Anxious, restive (restless, impatient), irritable and overactive (cdd) present/absent
- If any other (specify): -



**Observations Remarks**

**Falls under (shade the subgroups a-n (Autistic), n-p (Asperger), q (Rett's), q & r (Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**V.PHYSICAL/MEDICAL:** - Affected/Not affected

If affected

- a) Generally healthy and physically active (as) present/absent
- b) Fits or seizure (au) present/absent
- c) Difficulty in modulating (changeable) or regulating behavior (au) present/absent
- d) Not toilet trained (au) present/absent
- e) Always moving around without any purpose (au) present/absent
- f) Sleep disturbances (au, rs) present/absent
- g) Breathing difficulties (rs) present/absent
- h) Small feet (rs) present/absent
- i) Reduced body fat and muscle mass (power or strength) (rs) present/absent
- j) Reduced brain and head growth (rs) present/absent
- k) Fits or other dysarthric symptoms are noticed (rs) present/absent
  - l) Breath holding, air swallowing (rs) present/absent
- m) Loss of previously acquired hand skills (hand washing or hand wringing)(rs)
- n) Failure to control bowel & bladder control (cdd) present/absent
- o)<sup>N</sup> Loss of play and motor skills (cdd)
- p) Significant loss of previously acquired skills occurs areas like expressive or receptive language and social skills or adaptive behavior not due to any organic pathology (cdd) present/absent
- q) If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups b-f (Autistic), a (AspergW), f1 (Rett's), m&n (Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**VI.SENSORY:** - Affected/Not affected

If affected

- a) Hyper sensitivity or over sensitivity to certain loud noises and to objects such as vacuum cleaners, lifts and even the wind or hypo sensitivity to stimuli (au) present/absent
- b) Acts as if deaf, does not react to speech or noises and inconsistent response to auditory stimuli e.g., does not respond to name call, but responds to TV advertisements or music's (au) present/absent
- c) Spinning (rotating) movements (au) present/absent
- d) Difficulty in determining proper body space (au) present/absent

- e) Circling movements (au) present/absent
- f) Intense oral stimulation (extreme spoken or oral stimulation) (au) present/absent
- g) Minimal response to pain (au) present/absent
- h) Auditory withdrawal (removal of auditory stimuli) (au) present/absent
- i) Exhibits non disruptive sensory needs and routines (as) present/absent
- j) Regression followed by inconsistent response to auditory stimuli (rs, cdd) present/absent
- k) Visual **attending-does the** infant find difficulty in attending to toys or objects in the crib present/absent (au)
  - 1) Stare into **space, people** or objects, finger or hand, lights, reflections or changing levels of illumination present/absent (au)
- m) Distracted by **visual stimuli** present/absent (au)
- n) **Visual withdrawal** eg, by covering eyes, closing eyes or averting eye contact present/absent (au)
- o) **Atypical visual responses to** visual stimuli present/absent present/absent (au)
- p) **Lack of startle** response present/absent (au)
- q) Fails to localize **or turn in the direction of** the sound present/absent (au)
- r) Fails to responds **to familiar voices by cooing, attending** or social smiling (au) present/absent
- s) Selectively attends to voices and / or sound present/absent (au)
- t) Hypo (lack of appropriate attention or responses to sound or noise) or hyper (over response to sound or noise) sensitivity to auditory stimuli present/absent (au)
- u) . Auditory distractibility present/absent (au)
- v) Auditory self-stimulation with vocal noises that would not be considered attempts at speech communication present/absent present/absent (au)
- w) Atypical auditory responses present/absent (au)
- x) Tactile self-stimulating stereotypic movements (such as rocking, lunging, darting, hand flapping) present/absent (au)
- y) Self-stimulating touching behaviors (such as rubbing, saliva smearing) (au) present/absent
- z) Resist or withdraw from tactile or physical stimulation by another person or objects (au) present/absent
- aa) Inappropriate gesticulations (gestures) and facial grimaces present/absent (au)
- bb) Inappropriate physical behaviors (such as running and jumping) present/absent (au)
- cc) Exhibits rigidity or flaccidity when held or hugged (inappropriate physical responses) present/absent (au)
- dd) Frequently smells or sniffs **the objects** present/absent (au)
- ee) Exhibits strong food preferences (sweets, dairy products, meats, etc.) present/absent (au)
- ff) Explore objects by mouthing and frequently lick objects that are not edible present/absent (au)

If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups a-h (Autistic), i (Asperger), j(Rett's),j(Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**VII.INTELLIGENCE:** -Affected/Not affected

If affected

- a) Exhibits low verbal IQ (au) present/absent
- b) Exhibits high verbal IQ (as) present/absent
- c) Exhibits good performance IQ (au, as)
- d) Exhibits severely delayed intellectual development noticed from 5 months (rs) present/absent
- e) Regression of mental abilities and mental retardation noticed after 2yrs of age (cdd) present/absent
- f) Mental retardation from infancy along with all the skills are affected (mr) present/absent
- g) If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups a&c (Autistic), b&c (Asperger), d (Rett's), e (Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**VIII.SOCIAL:** - Affected/Not affected

If affected

- a) Lack of peer relationship e.g., does not engage or mingle with age appropriate peer group and poor interactions (au) present/absent
- b) Inadequate **appreciation of** social emotional cues (au) present/absent
- c) Deficient **pro-social contacts** (au) present/absent
- d) Poor modulation **of social** contexts (au) present/absent
- e) Lack of use of multiple non verbal behaviors such as eye to eye contact (e.g., persistently looks past or turns away from persons), facial expression, body postures and gestures (au) present/absent
- f) Lack of social or emotional reciprocity (au) present/absent
- g) Lack of pretend play (pretending to sleep/drink or brushing, feeding doll's, etc.) (au) present/absent
- h) Lack of social smile (au) present/absent
- i) Exhibits panic reaction if intruded (fright or fear reaction) (au) present/absent

- j) Adult preferred interaction e.g., the child often likes to interact with mother, father or maid (au) present/absent
- k) Poor adaptive skills e.g., lack of ability to adapt to and manage one's surroundings (au) present/absent
- l) A profound autistic withdrawal (e.g., happiest when left alone) (au) present/absent
- m) More social interest, "wants to make friends but does not know how" (as) present/absent
- n) Not responsive to social and environmental demands or requirements/expectations (as) present/absent
- o) Impaired ability to utilize social cues such as body language, irony (inconsistency) (as). Present/absent
- p) Affectionate with parents and siblings (as) present/absent
- q) Transient loss of **social engagement** early in course of this disorder (rs)
- r) Regression of social interaction early in the course or after 2 yrs of age followed by withdrawal, no preference for TV and video play activities and poor adaptive skills. (rs, cdd) present/absent
- s) If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups a-i (Autistic), j-m (Asperger), n (Rett's), n (Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**IX.SPPECH AND LANGUAGE SKILLS:** - Affected/Not affected

If present

- a) Delay or deviant in speech and language development (au) present/absent
- b) Lack of interpersonal interaction (communication between individuals) (au) present/absent
- c) Lack of creativity and **fantasy in thought** process
- d) Too quiet baby (au) present/absent
- e) Sing-song intonation, intone words or phrases in rhymes (a monotonously rising and falling inflection (alternation in the pitch) of the voice (au) present/absent
- f) Nonsense speech with unusual inflections (au) present/absent
- g) No gestural language, they tend to prattle (nonsense) about meaningless conversation such as repeating words verbatim from a television or radio advertisements (au) present/absent
- h) Mutism and Receptive language not age appropriate (au) present/absent
- i) Pronominal reversal (confusion with pronouns e.g., "I for YOU or YOU for I") (au) present/absent
- j) Poor verbal and nonverbal imitation (au) present/absent
- k) Telegraphic speech and poor functional concrete vocabulary (au) present/absent

- l) Echolalia (immediate or delayed and mitigated (repetition of speech fragments, modified within contexts) (au, as) present/absent
- m) There is no clinically **significant delay in** cognitive development of age - appropriate self-help skills, adaptive behavior and curiosity about the environment in childhood (as)
- n) Impaired ability to initiate or sustain a conversation with others (as) present/absent
- o) Academic skills (reading and writing) significantly discrepant (as) present/absent
- p) Normal speech and language development between 1.3 yrs followed by impairment in pragmatics and prosody (as) present/absent
- q) Impairment of comprehension including misinterpretation of literal/implicit meaning (as) present/absent
- r) Speech: monotone, droning (monotonous) voice, didactic verbose.(as) present/absent
- s) Odd prosody and peculiar voice characteristics (as) present/absent
- t) Superficially perfect language expression (as) present/absent
- u) Formal pedantic (precise) language (as) present/absent
- v) Impairment in non-verbal communication such as limited expression, inappropriate expressions or peculiar stiff gaze (as) present/absent
  
- w) Features like hyperlexia (advanced ability to read, fascination with numbers and letters) (as) present/absent
- x) Compulsion (preservative verbal interests) (a repetitive actions) (as) present/absent
- y) Pedantic (formal or precise) vocal production (as) present/absent
- z) Overly animated verbal production (as) present/absent
- aa) Conversation skills emerging one side (as) present/absent
- bb) Develop severe learning disabilities (rs) present/absent
- cc) Regression at the age of 2yrs followed by impairment in both receptive and expressive language with echolalia (immediate, delayed) (rs, edd) present/absent
- dd) Poor imitation skills (rs, edd) present/absent
- ee) If any other (specify): -

**Observations Remarks**

**Falls under (shade the subgroups a-k (Autistic), k-y (Asperger), z-bb (Rett's), aa-bb (Cdd)**

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**X.GENERAL CHARACTERISTICS**

- a) Lack of fear about realistic danger, may play with fire for example (au) present/absent
- b) Disturbances in sleep or appetite (au)
- c) Laughs or giggles for no appropriate reason (au) present/absent
- d) Not cuddly as a baby (au) present/absent
- e) Marked physical over activity (au) present/absent
- f) Repetitive adherence to the same range of activities (as) present/absent

- g) Imposition of routines and interests on self and others (imposes or expects others also do the same activity (as) present/absent
- h) Activities are more rote than meaning (as) present/absent

Falls under (shade the subgroups a-d (Autistic), e-g (Asperger),

(Rett's), (Cdd)

Autistic	Asperger	Rett's	Cdd	Pdd-Nos
----------	----------	--------	-----	---------

**PROFILING**

Skills Domains (or)	Autistic	Asperger	Retts	Childhood Disintegrative Disorder	Pdd-Nos
Motor					
Behavior					
Physical/medical					
Sensory					
Intelligence					
Social					
Speech & language					
General					

Diagnosis:

ALL INDIA INSTITUTE OF SPEECH AND HEARING  
DEPT OF SPEECH LANGUAGE PATHOLOGY  
ASD-ARF PROJECT-MYSORE-6

DIFFERENTIAL DIAGNOSIS CHECKLIST FOR ASP (DDC-ASD)

SCORESHEET

Case. Name:

Case. No:

Age/Sex:

Date:

SKILLS OR DOMAINS

I. a) DEVELOPMENT: - Normal/Affected

AREAS AFFECTED: - Motor/Social/Speech-Language/Cognitive/Sensory

II.a) REGRESSION: - Present/Absent

If present, observed in areas- Motor/Social /Speech -Language/Cognitive  
/Sensory/physical/Any other (specify): -

b) AGE OF ONSET

a)                      b)

c)                      d)

Falls under

AUTISM

ASPERGER

c) NATURE OF ONSET: -Sudden/Gradual/Insidious

NOTE: - Under the age of onset if the answer is either 'a\*' or 'b' please proceed with only PART A and if the answer is 'c'or 'd' proceed with only PART B.

If the client had undergone training/therapy in the areas like speech  
and

language, behaviour modification and sensory integration, note down  
the

features observed prior to training and after training parallelly in the  
sections provided. (PT-indicates prior to training and AT-indicates

after training

PART A

III.MOTOR: -Affected/Not affected

If affected

PT

a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
e) Present/absent    f) Present/absent    g) Any other (specify): -

**AT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Any other (specify): -

**Falls under (shade the subgroups, a-d (Autistic), e-f (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**IV.BEHAVIOR:** -Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent
- i) Present/absent    j) Present/absent    k) Present/absent
- l) Present/absent    m) Any other (specify): -

AT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent
- i) Present/absent    j) Present/absent    k) Present/absent
- l) Present/absent    m) Any other (specify): -

**Falls under (shade the subgroups a-j (Autistic), k&m (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**V.PHYSICAL/MEDICAL:** - Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Any other (specify): -

AT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Any other (specify): -

**Falls under (shade the subgroups b-e (Autistic), a (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**VI.SENSORY:** - Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent
- i) Present/absent    j) Present/absent    k) Present/absent    l) Present/absent



m) Present/absent n) Present/absent o) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent
- e) Present/absent f) Present/absent g) Present/absent h) Present/absent
- i) Present/absent j) Present/absent k) Present/absent l) Present/absent
- m) Present/absent n) Present/absent o) Any other (specify): -

**Falls under (shade the subgroups a-m (Autistic), n (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**VILINTELLIGENCE: -Status**

**PT**

- a) Present/absent b) Present/absent c) Present/absent
- d) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent
- d) Any other (specify): -

**Falls under shade the subgroups a (Autistic), b (Asperger), c(Mental retardation)**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**VIII.SOCIAL: - Affected/Not affected**

If affected

**PT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent
- e) Present/absent f) Present/absent g) Present/absent h) Present/absent
- i) Present/absent j) Present/absent k) Present/absent l) Present/absent
- m) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent
- e) Present/absent f) Present/absent g) Present/absent h) Present/absent
- i) Present/absent j) Present/absent k) Present/absent l) Present/absent
- m) Any other (specify): -

**Falls under (shade the subgroups a-g (Autistic), h-1 (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**IX.SPPECH AND LANGUAGE SKILLS: - Affected/Not affected**

If affected

**PT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent  
 i) Present/absent    j) Present/absent    k) Present/absent    l) Present/absent  
 m) Present/absent    n) Present/absent    o) Present/absent    p) Any other (specify): -

**AT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent  
 i) Present/absent    j) Present/absent    k) Present/absent    l) Present/absent  
 m) Present/absent    n) Present/absent    o) Present/absent    p) Any other (specify): -

**Falls under (shade the subgroups a-g (Autistic), h-o (Asperger),**

FT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**X. GENERAL OBSERVATION REMARKS: -**

***INSTRUCTIONS TO DIAGNOSE:-***

**-. After profiling, diagnose the child under the subgroup under which maximum number of '+' is obtained, or under the subgroup, considering age of onset as main domain supported by any two major domains among social, speech&language and behavior or sensory. If scatter responses are obtained, diagnose them under PDD-NOS prior to training. If the diagnosis obtained falls under two different categories prior to training and after training, (e.g., PT as autistic and AT as scatter or PT as asperger and AT as scatter) diagnose them under PDD-NOS and mention the same under the section provided.**

**PROFILING -PART -A**

**PT**

Skills (or) Domains	Autistic	Asperger	Pdd-Nos
Age of Onset			
Motor			
Behavior			
Physical/medical			
Sensory			
Intelligence			
Social			
Speech & language			
General			

PT-Diagnosis:

AT

Skills (or) Domains	Autistic	Asperger	Pdd-Nos
Age of Onset			
Motor			
Behavior			
Physical/medical			
Sensory			
Intelligence			
Social			
Speech & language			
General			

**AT-Diagnosis:**

**Severity (as per the clinicians observation): - Mild/Moderate/Severe**

**Staff**

**Clinician**

**ALL INDIA INSTITUTE OF SPEECH AND HEARING  
DEPT OF SPEECH LANGUAGE PATHOLOGY  
ASD-ARF PROJECT  
MYSORE-6**

**DIFFERENTIAL DIAGNOSIS CHECKLIST FOR ASP (DDC-ASD)**

**FINALIZED & USER VERSION**

**Case. Name:**

**Case. No:**

**Age/Sex:**

**Date:**

**SKILLS OR DOMAINS**

**I. a) DEVELOPMENT:** - Normal/Affected

**AREAS AFFECTED:** - Motor/Social/Speech&Language/Cognitive/Sensory

**II. a) REGRESSION:** - Present/Absent

If present, observed in areas- Motor/Social /Speech&Language/Cognitive /Sensory/physical/Any other (specify): -

**b) AGE OF ONSET**

- a) Early infancy but before 3 yrs (Either there is no progress or Regression noticed only in the areas like speech&Language and social)
- b) After 3yrs,before 4 yrs (No regression but problem noticed in the areas like Speech&language and social)
- c) After 5months -3yrs (Regression in all the areas along with deceleration of the head growth)
- d) After 2yrs -1 Oyrs (Regression in all the areas)
- e) If any other (specify): -

**c) NATURE OF ONSET:** -Sudden/Gradual/Insidious

**NOTE:** - Under the age of onset if the answer is either 'a' or 'b' please proceed with only PART A and if the answer is V or 'd' proceed with only PART B.

If the client had undergone training/therapy in the areas like speech and language, behaviour modification and sensory integration, note down the features observed prior to training and after training parallelly in the sections/columns provided. (PT-indicates prior to training and AT-indicates after training)

## PART A

### **III.MOTOR:** -Affected/Not affected

If affected

- a) Toe walking (au) present/absent
- b) Twirling (au) present/absent
- c) Perseverative (repeated) motor movements (au) present/absent
- d) Exhibits difficulties in chewing and /or swallowing foods (au)
- e) Motor delays, arrests, regressions and inconsistencies in gross and fine movements (as) present/absent
- f) Uncoordinated movements (as) present/absent
- g) If any other (specify): -

### **IV.BEHAVIOR:** -Affected/Not affected

If affected

- a) Pre-occupation (fixation) with parts of objects, dates, routes or time tables (au) present/absent
- b) Unusual attachment for inanimate objects e.g., soap case, paper, keys, pen etc (au) present/absent
- c) Repetitive and sustained and odd play e.g., rattling stones in a cane (au) present/absent
- d) Spins objects especially the round ones & Circling movements (au) present/absent
- e) Treats persons as objects rather than persons (au) present/absent
- f) Self-stimulatory behaviors (auditory, tactile, visual and olfactory etc.)(au) present/absent
- g) Self-injurious behavior (Head banging, biting etc (au) present/absent
- h) Hyperactive, uncooperative and has odd movements (au) present/absent
- i) Always moving around without any purpose (au) present/absent
- j) Stereotyped motor mannerisms e.g., hand or finger flapping or twisting or complex whole body movements, movements of ornaments or furniture in the home (au) present/absent
- k) No obvious stereotypic motor movements noticed but looks as if gentle and cooperative child (as)
- l) If the Childs demands are not satisfied the child exhibits hyperactivity or aggression (as)
- m) Highly rigid, routinized and have overly narrow and restricted interests (as) present/absent
- n) If any other (specify): -

### **V.PHYSICAL/MEDICAL:** - Affected/Not affected

If affected

- a) Generally healthy and physically active (as) present/absent
- b) Fits or seizures (au) present/absent (if the child had fits or seizures, but it has reduced or subsided after medication consider them under the subgroup autism only)
- c) Difficulty in modulating (changeable) or regulating behavior (au) present/absent

- d) Not toilet trained (au) present/absent
- e) Sleep disturbances (au) present/absent
- f) If any other (specify): -

**VI.SENSORY:** - Affected/Not affected

If affected

- a) Auditory withdrawal (removal of auditory stimuli)&hyper sensitivity or over sensitivity to certain loud noises and to objects such as vacuum cleaners, lifts and even the wind or hypo sensitivity to stimuli (au) present/absent
- b) Fails to responds to familiar voices by cooing, attending or social smiling & Selectively attends to voices and / or sound (au) present/absent
- c) Acts as if deaf, does not react to speech or noises and inconsistent response to auditory stimuli e.g., does not respond to name call, but responds to TV advertisements or music's (au) present/absent
- d) Auditory distractibility and auditory self-stimulation with vocal noises that would not be considered attempts at speech communication present/absent (au)
- e) Visual attending-does the infant find difficulty in attending to toys or objects in the crib present/absent (au)
- f) Stare into space, people or objects, finger or hand, lights, reflections or changing levels of illumination present/absent (au)
- g) Distracted by visual stimuli and visual withdrawal eg, by covering eyes, closing eyes or averting eye contact present/absent (au)
- h) Tactile self-stimulating stereotypic movements (such as rocking, lunging, darting, hand flapping) and self-stimulating touching behaviors (such as rubbing, saliva smearing) (au) present/absent
- i) Resist or withdraw from tactile or physical stimulation by another person or objects (au) present/absent
- j) Inappropriate gesticulations (gestures) and facial grimaces present/absent (au)
- k) Inappropriate physical behaviors (such as running and jumping) and exhibits rigidity or flaccidity when held or hugged (inappropriate physical responses) present/absent (au)
- l) Frequently smells or sniffs the objects and exhibits strong food preferences (sweets, dairy products, meats, etc.) present/absent (au)
- m) Explore objects by mouthing and frequently lick objects that are not edible present/absent (au)
- n) Exhibits non disruptive sensory needs and routines (as) present/absent  
If any other (specify): -

**VII.INTELLIGENCE:** -Status

- a) Exhibits low verbal IQ but high performance IQ or may exhibit mild mental retardation (au) present/absent
- b) Exhibits verbal IQ on par with performance IQ (as) present/absent

- c) Mental retardation from infancy along with all the skills are affected (mr) present/absent
- d) If any other (specify): -

**VIII.SOCIAL:** - Affected/Not affected

If affected

- a) Lack of peer relationship e.g., does not engage or mingle with age appropriate peer group and poor interactions (au) present/absent
- b) Inadequate appreciation of social emotional cues (au) present/absent
- c) Exhibits deficit in social communication and adaptive skills (au) present/absent
- d) Lack of use of multiple non verbal behaviors such as eye to eye contact (e.g., persistently looks past or turns away from persons), facial expression, body postures and gestures (au) present/absent
- e) Lack of social or emotional reciprocity (au) present/absent
- f) Lack of social smile (au) present/absent
- g) Adult preferred interaction e.g., the child often likes to interact with person of their choice either mother, father or maid and with other children only if insisted but not spontaneously (au) present/absent
- h) Exhibits social communication deficits but adaptive skills are developmentally appropriate (as)
- i) A profound autistic withdrawal (e.g., happiest when left alone) (au) present/absent
- j) More social interest, "wants to make friends but does not know how" (as) present/absent
- k) Impaired ability to utilize social cues such as body language, irony (inconsistency) (as) Present/absent
- l) Affectionate with parents and siblings as well as interacts spontaneously (as) present/absent
- m) If any other (specify): -

**IX.SPPECH AND LANGUAGE SKILLS :** - Affected/Not affected

If present

- a) Significant delay or deviant in speech and language development (au) present/absent
- b) Nonsense speech with unusual inflections (au) present/absent
- c) No gestural language, they tend to prattle (nonsense) about meaningless conversation such as repeating words verbatim from a television or radio advertisements (au) present/absent
- d) Mutism and Receptive language not age appropriate (au) present/absent
- e) Pronominal reversal (confusion with pronouns e.g., "I for YOU or YOU for I") (au) present/absent
- f) Poor verbal and nonverbal imitation (au) present/absent
- g) Echolalia (Immediate or Delayed) (au) present/absent
- h) Normal speech and language development between 1.3 yrs followed by Superficially perfect language expression with impairment exhibited in pragmatics and prosody (odd prosody) and also exhibits telegraphic speech and poor functional concrete vocabulary (as) present/absent

- i) Mitigated (repetition of speech fragments, modified within contexts)(as) present/absent
- j) Impaired ability to initiate or sustain a conversation with others (as) present/absent
- k) Academic skills (reading and writing) significantly discrepant & Features like hyperlexia (advanced ability to read, fascination with numbers and letters) (as) present/absent
- l) Impairment of comprehension including misinterpretation of literal/IMPLIED meaning (as) present/absent
- m) Speech: monotone, peculiar voice characteristics- droning (monotonous) voice (as) present/absent
- n) Formal pedantic (precise) language (as) present/absent
- o) Conversation skills emerging one side-does not let others to talk (as) present/absent
- p) If any other (specify): -



## PART-B

### INSTRUCTIONS: -

Under the age of onset if the answer is 'c' with gender being female proceed with part of checklist under RETT's for supportive features especially critical features marked with '\*'(astric) to confirm the diagnosis. If the answer 'd' proceed with part of checklist under CDD.

### Rett's Disorder

- a) Gender: Only in females
- b) Normal development till 5 months followed by regression
  - i. Motor: -deterioration
  - ii. Behavior: - loss of acquired previous hand skills and stereotyped hand movements e.g. hand wringing and hand washing and\* **mouthng (repeatedly putting the hand into the mouth and taking it out)**
  - iii. Social: - withdrawal from the surroundings, absence of reciprocal
    - 1. interaction and poor adaptive skills
- c) Abnormalities in gait (unsteady, scissored gait, wide based, stiff & toe walking)
- d) \* Reduced muscle tone and hypotonia
- e) \* Reduced body fat and muscle mass (power or strength)
  - a. Decelerated head growth after a period of normal development
- f) \* Exhibits severely delayed intellectual development or profound mental retardation noticed from 5 months & Develop severe learning disabilities

### Childhood Disintegrative Disorder (CDD)

- a) Gender: Commonly seen in males
- b) Normal development till 2yrs followed by regression
  - a. Motor: -Deterioration

- b. Behavior: - loss of acquired hand skills and stereotyped hand movements  
e.g. hand wringing and hand washing
- c. Speech&language:- Regression in receptive and expressive language with  
echolalia (Immediate, Delayed)
- d. Social: - withdrawal from the surroundings, absence of reciprocal
  - 1. interaction and poor adaptive skills
- c) \* Failure to control bowel & bladder control
- d) \*Loss of play and motor skills
- e) Significant loss of previously acquired skills occurs areas like expressive or  
receptive language and social skills or adaptive behavior not due to any organic  
pathology

ALL INDIA INSTITUTE OF SPEECH AND HEARING  
DEPT OF SPEECH LANGUAGE PATHOLOGY  
ASD-ARF PROJECT-MYSORE-6

DIFFERENTIAL DIAGNOSIS CHECKLIST FOR ASP (DDC-ASD)  
SCORESHEET - FINALIZED & USER VERSION

Case. Name:

Case. No:

Age/Sex:

Date:

SKILLS OR DOMAINS

I. a) **DEVELOPMENT:** - Normal/Affected

**AREAS AFFECTED:** - Motor/Social/Speech-Language/Cognitive/Sensory

H.a) **REGRESSION:** - Present/Absent

If present, observed in areas- Motor/Social /Speech -Language/Cognitive  
/Sensory/physical/Any other (specify): -

b) **AGE OF ONSET**

- |    |    |
|----|----|
| a) | b) |
| c) | d) |

Falls under

AUTISM	ASPERGER
--------	----------

c) **NATURE OF ONSET:** -Sudden/Gradual/Insidious

**NOTE:** - Under the age of onset if the answer is either 'a' or 'b' please proceed with only PART A and if the answer is 'c' or 'd' proceed with only PART B.

If the client had undergone training/therapy in the areas like speech and language, behaviour modification and sensory integration, note down the features observed prior to training and after training parallelly in the sections provided. (PT-indicates prior to training and AT-indicates after training)

PART A

**III.MOTOR:** -Affected/Not affected  
If affected PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Any other (specify): -

**AT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Any other (specify): -

**Falls under (shade the subgroups, a-d (Autistic), e-f (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**IV.BEHAVIOR:** -Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent  
 i) Present/absent    j) Present/absent    k) Present/absent  
 l) Present/absent    m) Any other (specify): -

AT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent  
 i) Present/absent    j) Present/absent    k) Present/absent  
 l) Present/absent    m) Any other (specify): -

**Falls under (shade the subgroups a-j (Autistic), k&m (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**V.PHYSICAL/MEDICAL:** - Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Any other (specify): -

AT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent  
 e) Present/absent    f) Any other (specify): -

**Falls under (shade the subgroups b-e (Autistic), a (Asperger),**

PT 1 AUTISM 1 ASPERGER 1 PDD-NOS

AT 1 AUTISM 1 ASPERGER | PDD-NOS

**VI.SENSORY:** - Affected/Not affected

If affected

PT

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent

- e) Present/absent f) Present/absent g) Present/absent h) Present/absent  
 i) Present/absent j) Present/absent k) Present/absent l) Present/absent  
 m) Present/absent n) Present/absent o) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent  
 e) Present/absent f) Present/absent g) Present/absent h) Present/absent  
 i) Present/absent j) Present/absent k) Present/absent l) Present/absent  
 m) Present/absent n) Present/absent o) Any other (specify): -

**Falls under (shade the subgroups a-m (Autistic), n (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**VII.INTELLIGENCE:** -Status

**PT**

- a) Present/absent b) Present/absent c) Present/absent  
 d) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent  
 d) Any other (specify): -

**Falls under shade the subgroups a (Autistic), b (Asperger), c(Mental retardation)**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**VIII.SOCIAL:** - Affected/Not affected

If affected

**PT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent  
 e) Present/absent f) Present/absent g) Present/absent h) Present/absent  
 i) Present/absent j) Present/absent k) Present/absent l) Present/absent  
 m) Any other (specify): -

**AT**

- a) Present/absent b) Present/absent c) Present/absent d) Present/absent  
 e) Present/absent f) Present/absent g) Present/absent h) Present/absent  
 i) Present/absent j) Present/absent k) Present/absent l) Present/absent  
 m) Any other (specify): -

**Falls under (shade the subgroups a-g (Autistic), h-l (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**IX.SPPECH AND LANGUAGE SKILLS: - Affected/Not affected**

If affected

**PT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent
- i) Present/absent    j) Present/absent    k) Present/absent    l) Present/absent
- m) Present/absent    n) Present/absent    o) Present/absent    p) Any other (specify): -

**AT**

- a) Present/absent    b) Present/absent    c) Present/absent    d) Present/absent
- e) Present/absent    f) Present/absent    g) Present/absent    h) Present/absent
- i) Present/absent    j) Present/absent    k) Present/absent    l) Present/absent
- m) Present/absent    n) Present/absent    o) Present/absent    p) Any other (specify): -

**Falls under (shade the subgroups a-g (Autistic), h-o (Asperger),**

PT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

AT	AUTISM	ASPERGER	PDD-NOS
----	--------	----------	---------

**X. GENERAL OBSERVATION REMARKS: -**

**INSTRUCTIONS TO DIAGNOSE: -**

After profiling, diagnose the child under the subgroup under which maximum number of '+' is obtained, or under the subgroup, considering age of onset as main domain supported by any two major domains among social, speech&language and behavior or sensory. If scatter responses are obtained, diagnose them under PDD-NOS prior to training. If the diagnosis obtained falls under two different categories prior to training and after training, (e.g., PT as autistic and AT as scatter or PT as asperger and AT as scatter) diagnose them under PDD-NOS and mention the same under the section provided.

**PROFILING-PART -A**

PT

Skills (or) Domains	Autistic	Asperger	Pdd-Nos
Age of Onset			
Motor			
Behavior			
Physical/medical			
Sensory			
Intelligence			
Social			
Speech & language			
General			

PT-Diagnosis:

AT

Skills (or) Domains	Autistic	Asperger	Pdd-Nos
Age of Onset			
Motor			
Behavior			
Physical/medical			
Sensory			
Intelligence			
Social			
Speech & language			
General			

AT-Diagnosis:

Severity (as per the clinician's observation): - Mild/Moderate/Severe

Staff

Clinician

**PART B**

Diagnosis:

Severity (as per the clinician's observation): - Mild/Moderate/Severe

Staff

Clinician