CHAPTER 29

Clinical Evaluation in Autism Spectrum Disorders: Psychological Assessment within a Transdisciplinary Framework

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Autism is no longer considered a rare condition, and the number of children being referred for developmental disabilities assessments with a differential diagnosis of autism continues to increase every year. The increase in referrals creates the need for guidelines on best practices for assessment of individuals with autism spectrum disorders (ASDs; National Research Council [NRC], 2001), who are no longer seen primarily in academic centers specialized in those conditions, and whose disabilities and assets need to be assessed with no delay for service providers to generate individualized recommendations for treatment and interventions.

Children with autism and other pervasive developmental disorders (PDDs) present unique issues for clinical assessment. Examiners are confronted with great challenges resulting from profiles of development that cover the entire IQ and language spectrum. Additionally, in many cases, there are extreme variability and scatter across skills, and behavior problems need to be addressed to ensure validity and reliability of performance on standardized measures. Yet, developmentally based assessment of cognitive, social, communicative, and adaptive skills provides the essential bases on which decisions on diagnosis, eligibility for services, and program planning have to be made. Observations on the child's unique strengths and weaknesses have a major impact on the design of effective intervention programs.

This chapter provides a summary of overall approaches to clinical evaluation of children with ASDs, as well as a summary of psychological assessment within a transdisciplinary framework. This framework reflects the need for a cohesive clinical team benefiting from expertise in different disciplines (Klin et al., 1997), working together in a highly integrated manner while casting clinical phenomena within a developmental psychopathology perspective (Sparrow, Carter, Racusin, & Morris, 1995). Within transdisciplinary teams, the role of psychological assessment is to frame the understanding of clinical phenomena in terms of the child's developmental resources and challenges. Most symptoms in autism are mediated by levels and profiles of cognitive skills. We, therefore, single out this realm of assessment for a more detailed discussion in this chapter. Together with the assessment of communication (Chapter 30, this *Handbook,* this volume), qualitative and quantified observations of developmental abilities form the core on which clinical judgment is made about diagnostic formulations and programmatic intervention. It must be emphasized that the efforts of professionals from various other disciplines are often needed, such as physical and occupational therapy, pediatrics, genetics, and neurology. The emphasis on psychological skills in this chapter and communication skills in Chapter 30 reflects a commonly adopted priority, which, however, needs to be adjusted to

the specific issues and concerns arising in individual cases presenting for evaluation. And while individualized developmental profiles typically form the basis for intervention programs, other areas can be critical for many children. Other chapters in the *Handbook* address issues not discussed in detail here, such as neurological problems (Chapter 18) and genetic vulnerabilities (Chapter 16). Other chapters also address in much greater detail some of the issues included in this chapter, such as diagnostic instrumentation (Chapters 27 and 28); behavioral approaches to promote learning and decrease maladaptive responses (Chapters 31, 34, and 35); sensory and motor problems in autism (Chapter 32); the development of communication, play, and imitation skills (Chapters 12 and 14); neuropsychological functioning and profiles (Chapter 13); and special considerations associated with different periods of children's life in school (Chapter 9). The focus of this chapter is on practical issues encountered by clinicians assessing children with ASDs. This work, however, cannot be done adequately without a thorough training in all of these developmental domains because the challenges of autism can be adequately characterized only against the backdrop of typical development. With these various chapters as background, therefore, we introduce the transdisciplinary approach to the clinical assessment of children with ASD and proceed with a more detailed discussion of psychological assessment methods, which require the combination of careful qualitative observations with the use of standardized and well-validated instruments.

A final word of introduction relates to the emphasis given in this chapter to the preschool and school-age periods of development. Most referrals to clinics are still within this age range, although the numbers of toddlers, on the one hand, and older and higher functioning children and adolescents, on the other hand, are increasing at a very fast pace. Readers interested in special issues involved in the assessment of toddlers and older and more cognitively able children and adolescents are referred to more detailed discussions of clinical evaluations of these two groups (e.g., Klin, Chawarska, Rubin, & Volkmar, 2004; Klin, Sparrow, Marans, Carter, & Volkmar, 2000).

A COMPREHENSIVE DEVELOPMENTAL APPROACH

Autism is the paradigmatic condition among a class of disorders marked by social and communication deficits and behavioral rigidities called the *pervasive developmental disorders* (American Psychiatric Association, 2000), also variably called the *autism spectrum disorders.* The term PDD was chosen because it implies disruptions in multiple areas of development, including not only social and communication disabilities but also atypical patterns in play and delays in cognitive development among many others. There is a need, therefore, to adopt a comprehensive developmental approach (Sparrow, Carter, et al., 1995), which emphasizes the assessment of multiple areas of functioning and the reciprocal impact of abilities and disabilities. As a substantial proportion of children with autism also present with mental retardation (Fombonne, 1999), it is important to cast both quantified and informal observations in terms of a developmental perspective. Hence the overall developmental or intellectual level establishes the frame within which we may interpret more meaningfully both the performance obtained and the behaviors observed during the assessment. By explicitly framing the assessment in terms of the normative course of development, it is possible to appreciate delays in the acquisition of skills that emerge systematically in typical children. This information allows the clinician to fully appreciate the departures from normal expectations that delineate autistic symptomatology. In toddlers, for example, the more obvious markers of autism may not be present (e.g., "mechanical voice," motor stereotypies). Therefore, it is often the absence of normative behaviors (e.g., reduced social orientation and rate of communicative approaches) rather than the display of aberrant behaviors that becomes the hallmark of risk for autism in this young age group (Wetherby, Prizant, & Schuler, 2000).

Multidisciplinary Teams

The need for assessment of multiple areas of functioning requires the involvement of professionals with different areas of expertise. To

avoid multiple views of a child (which can be conflicted, thus confusing parents and service providers), there is an equal need for transdisciplinary cohesion in which a single coherent picture can emerge and be translated into a set of intervention recommendations. An interdisciplinary format also encourages discussion among the clinicians involved, with the beneficial effects of creating a more complex and accurate view of the child (e.g., due to variability of presentation across people, time, and setting), reconciling meaningful differences, and fully appraising the impact of findings in one area on other areas of functioning (e.g., language level and social presentation).

Multidisciplinary work can be associated not only with conflicted messages conveyed to parents but also with ineffectual reporting of findings. A plethora of individual reports is less helpful than a longer report that integrates input from all members of the evaluation team. Quantitative findings and their associated technical language (e.g., standard deviations and other psychometric terms) as well as discipline-specific concepts and terms should be explained to parents or avoided altogether if they do not contribute to any aspect of the child's evaluation or follow-up. A brief narrative summary, presenting succinctly the child's competencies and problems across domains and their implication for treatment and interventions, should be included in all clinical reports.

Variability across Settings

The settings in which the child is observed and tested can vary greatly in terms of familiarity, degree of structure and intrusion adopted by the adult interacting with the child, and complexity of the physical environment. If these factors are not fully considered, highly discrepant views of the child may emerge, leading to conflicted impressions or narrowly framed observations. Given that the child's presentation in different settings informs clinicians more comprehensively about areas of strengths and weaknesses and about optimal and less helpful educational environments, it is important to consider these factors explicitly and to deliberately alter them to obtain a more complete view of the child. Clinicians involved in different sections of the assessment may adopt different approaches. Thus, the assessment of intellectual functioning may require a highly structured, adult-directed approach within a very bare testing environment to yield the child's "best" performance (e.g., maximizing attention and minimizing distractions). In contrast, the assessment of social presentation may require a much less intrusive approach to create opportunities to observe the extent to which the child spontaneously initiates social contact, requests desired objects, shares experiences with others, and seeks socially salient aspects of the environment. This more naturalistic approach is likely to create the greatest social interaction demands, given that in the absence of the typical adult scaffolding that takes place whenever a child interacts with an adult, the spontaneous social predispositions of the child and absence thereof are more likely to be observed (e.g., tendency for self-isolation, exploration of extraneous physical stimuli such as lights and shades rather than representational toys or people). It is also useful to explore the extent to which a child is able to profit from therapeutic interventions, intrusively interfering with what a child is doing and redirecting him or her to more socially engaged situations, while providing augmentative forms of communication such as pictures or modeled gestures. This approach can greatly inform the kinds of interventions that are likely to be of help in the child's daily treatment plan.

Children's presentation can vary greatly as a function of time of day and state (including level of fatigue, minor illness), among a host of other factors. The potential misleading effect of such conditions can be addressed by continuously seeking information from parents or caregivers as to how representative the child's behaviors are relative to what they are used to seeing in other settings. Equally informative is a systematic comparison of observations among the clinicians involved, who can outline discrepancies in observations as a function of the underlying factors creating the setting for each observation (e.g., early in the morning versus later in the day, first day versus second day, clinic-based versus school versus home-based observations). Differences in test results can also be examined with a view to

variables such as familiarity with the task, inherent structure (forced choice versus generative), complexity, degree of novelty, mode of engagement (e.g., active versus passive), processing demands (e.g., verbal versus visual, unimodal versus multimodal), and external supports used (e.g., visual cues, verbal prompts).

Parents' Involvement

An understanding of findings related to specific skills measured in the assessment must be qualified in terms of the child's adjustment to everyday situations and real-life demands. This can be achieved only through the participation of parents in the assessment as a source of information. Although parents may not have the experience and objectivity to appreciate the extent to which their child conforms or not to normative expectations (e.g., this might be their first child; they might have developed a style of interaction in which the adult's approach masks the child's more marked social disabilities), the information they can provide has been shown to be both useful and sufficiently reliable to inform the diagnostic process (Lord, Rutter, & Le Couteur, 1994). This process includes historical data, observations of the child in naturalistic settings such as home and school program, and incidental observations such as a visit to the playground or a birthday party. By grounding the findings obtained during the assessment in this contextual base of information, many advantages follow including a better sense of the child's developmental path, a validation of clinical observations, and the opportunity for comparisons across environments and situations.

Parental involvement is also advantageous from other perspectives. The clinician's intervention is likely to be much more effective if parents have the opportunity to directly observe what takes place in the evaluation and then to discuss specific behaviors (rather than more vague concepts or symptoms) with the clinicians afterwards. It is in the context of this understanding, as well as in the process of discussing a child's strengths and weaknesses and the required interventions emerging from this profile, that parents are optimally prepared to become advocates and coordinators of the child's intervention program.

Profile Scatter

As the profiles of children with ASDs typically involve great variability of skills across different domains (e.g., relative strengths on sensorimotor tasks contrasting with significant weaknesses in conceptual or language-mediated tasks), it is important to delineate a profile of assets and deficits rather than simply presenting an overall and often misleading summary score or measure because such global scores may represent the averaging of highly discrepant skills. Similarly, it is important not to generalize from an isolated performance (e.g., a "splinter" skill, peaks in performance on geometric puzzles, precocious reading decoding skills) to the overall impression of level of functioning because this, too, may be a gross misrepresentation of the child's capacities for learning and adaptation. The importance of sampling a range of abilities also lies in the fact that most psychological measures are not "pure" and do not assess one ability domain alone. Results are interpreted on the basis of multiple lines of converging evidence from different tests sharing common underlying factors.

Functional Adjustment

The understanding of findings related to specific skills measured in the assessment needs to take place in the context of the child's adjustment to everyday situations and adaptation to real-life demands and entails several factors. First, a thorough assessment of the child's adaptive behaviors—that is, the child's ability to translate capacities into consistent, habitual behaviors fostering self-sufficiency in naturalistic settings—is essential. Second, there is a need to view assessment findings in terms of their impact on the child's ongoing adaptation, learning, and behavioral adjustment so that the interrelatedness of assessment and intervention is fully considered, with a view toward translating findings into directives for treatment and remedial approaches. Third, because the central and defining feature of autism and related disorders is a pervasive impairment of socialization, it is important to explore the interrelationships among social, communication, and emotional functioning and the other areas

assessed to identify any contributors to social deficits and deviance (e.g., learning or language deficits), and, conversely, to consider the impact of the social disability on the child's behavior and performance in the various procedures comprising the assessment (e.g., difficulties with tasks requiring imitation or social cognition). Adequate consideration of these issues strengthens the interpretation of the assessment findings. Full consideration of functional adjustment aspects of testing procedures informs intervention strategies and strengthens the rationale for educational and other recommendations, transforming the evaluative process from a potentially anxiety-provoking situation overly focused on numerical results into a first step to a supportive and hope-building, as well as constructive and well-informed, intervention.

Delays and Deviance

Even though this distinction is implied in the developmental psychopathology approach outlined earlier, it is important to explicitly frame the assessment in terms of a distinction between normative course of development (i.e., the child's developmental resources) and deviant patterns of development and behavior (i.e., symptoms that are characteristic of the ASDs as well as comorbid symptomatology). The normative approach places the child's resources in the context of abilities and skills that emerge systematically (e.g., walking at around 11 to 13 months, joint attention skills at around 11 to 16 months, two-word combinations at around 18 to 24 months, understanding of beliefs and nonliteral speech at around 4 to 5 years) and describes advances or delays in the rate of acquisition of normative behaviors. In contrast, the deviance approach refers to behaviors that are not typically observed in normally developing children, representing deviations from normal expectations (e.g., pronounced body rocking or hand flapping). Normative behaviors are usually measured through well-normed instruments, allowing the examiner to place the child in a dimensional continuum available for the entire population of his or her age. In contrast, abnormal behaviors that have very low base rates and that do not follow systematic patterns across settings and developmental level are more difficult to sample and to quantify, defying attempts to place the child in a dimensional continuum anchored by "normalcy" on one end and "extreme autism" on the other end. Therefore, normative capacities such as intellectual functioning or adaptive behavior can be measured using instruments built on age-based, population norms, whereas information on deviant behaviors needs to be obtained through diagnostic instrumentation that quantifies symptoms for relevant subgroups of people. However, although current diagnostic instruments are not population normed, they are nevertheless well standardized (see Chapter 28, this *Handbook,* this volume, on diagnostic instrumentation); that is, they set specific rules for sampling and eliciting behaviors and for coding and quantifying them.

Continuous Contact

The typical complexity of the child's clinical presentation may necessitate direct and continuous contact with the various professionals implementing the recommended interventions (e.g., teachers, speech pathologists, and occupational therapists). Such a team approach not only maximizes the efficacy of the interventions adopted but also establishes a partnership with all those involved in the child's care, clarifying objectives, aiding in specific problem solving, and monitoring the child's progress. It also reassures parents who have the complex task of processing a great amount of, often technical, information and of acquainting themselves with the various health, educational, and advocacy systems whose services are required for their child.

ESSENTIAL ELEMENTS OF CLINICAL EVALUATION IN AUTISM SPECTRUM DISORDERS

The comprehensive developmental approach outlined earlier calls for a highly integrated and, to some extent, necessarily overlapping, group of procedures aimed at obtaining information necessary for diagnostic determination and for outlining a comprehensive profile of assets and deficits needed to design and implement a program of treatment and intervention.

The essential elements in clinical assessment of children with ASDs include (1) a psychological evaluation including developmental or intellectual assessment and adaptive functioning, (2) a speech, language, and communication assessment, and (3) a diagnostic work-up, including a thorough health, behavioral, and educational and intervention history; aspects of autism as well as comorbid symptomatology as obtained through direct assessment and parental report; and familial vulnerabilities. In many cases, there is a need for additional assessment and consultation, including sensory, motor or neuropsychological functioning, neurological status, and clinical genetics. This section addresses each one of these areas of assessment.

Psychological Assessment

Developmental (for younger children) or intelligence (for older children) assessments capable of describing and measuring the child's current intellectual and other resources are critical in any clinical evaluation of individuals with developmental disabilities. These measures should frame subsequent observations in terms of the child's current potential to inform decisions about the kinds of intervention strategies from which the child is developmentally ready to profit. The overall goal of the psychological assessment is not only to establish a benchmark against which other measures and observations can be judged but also to characterize the child's specific style of learning and relative assets that need to be capitalized on in treatment.

In addition to framing the child's overall developmental level, the psychological assessment should more specifically describe patterns of both verbal and nonverbal functioning across several domains: (1) problem solving (e.g., can the child generate strategies and integrate information?), (2) concept formation (e.g., can the child abstract rules from specific instances or understand principles of categorization, order, time, number, and causation, and generalize knowledge from one context to another?), (3) reasoning (e.g., can the child transform information to solve visual-perceptual and verbal problems?), (4) style of learning (e.g., can the child learn from modeling, imitation, using visual cues, or verbal prompts?), and (5) memory skills (e.g., how many items of information can the child retain; is there a difference in the child's ability to recognize different kinds of stimuli such as objects, facts, or faces; are the child's memory skills in one modality better than in another such as visual versus verbal?). Other areas of psychological assessment include adaptive functioning (real-life independence skills), motor and visual-motor skills, play skills, and social cognition. Of these elements, the assessment of the child's demonstrated functional adjustment in day-to-day situations is probably the most critical. Universally, children with ASDs have adaptive skills that significantly lag behind their best performance in laboratory-based evaluations (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). The discrepancy between intellectual potential and consistently displayed skills in naturalistic settings can be very pronounced in individuals with normative intelligence (e.g., Klin et al., in press), and it is typically already large even within the context of the reduced parameters of toddler development, with some children failing to achieve skills that are normatively acquired in the first few months of life (Klin, Volkmar, & Sparrow, 1992). Given that children with autism typically acquire many skills, spontaneously or as a result of structured intervention, but fail to use them in real life—indeed, difficulties in generalization are probably one of the most entrenched challenges in autism—it is crucial that detailed measures of adaptive behavior are obtained in a way that a plan for addressing disparities between potential and real-life capacities is fully outlined for service providers.

Speech, Language, and Communication Assessment

Particularly during the early childhood of individuals with ASD, but to some extent throughout life, communication patterns are inextricably tied to global social development. It is, therefore, not surprising that this area of development is invariably impaired in children with autism and represents a core aspect of assessment and possibly the most central area of intervention (Wetherby et al., 2000; Prizant,

Wetherby, & Rydell, 2000). Consequently, it is important that speech, language, and communication assessment is not limited in focus and measures to the more formal aspects of linguistic skills such as phonology, vocabulary, language comprehension and expression, or syntax. Thus, assessment in this domain should include qualitative observations and quantified measures (when possible) of skills such as prosody (i.e., communicative use of volume, pitch, rate, stress, and phrasing of speech), pragmatics (i.e., language use within the context of social interaction, turn taking, rules of presupposition—how much information to offer the conversational partner—and register—the style of communication to adopt given a particular social situation), metalinguistics (e.g., nonliteral speech such as metaphors, irony, sarcasm, and humor), the language of mental states (e.g., intentions, motivation, beliefs, thoughts, and feelings), and narrative skills. Observations and measurements in these areas should be presented within the context of the child's patterns of social interaction and relationships, as well as potential contributors to the understanding of a child's mood states (e.g., anxiety resulting from being perplexed by the complex communication demands of social life at school) and maladaptive behaviors (e.g., frustration-related aggression caused by limitations in language comprehension).

In younger children, a thorough assessment of preverbal communicative and social cognitive skills can be fundamental in establishing appropriate priorities for intervention. Thus, there is a need for qualitative and quantified information on skills such as communicative intent, joint attention, and symbolic behaviors, as well as the child's ability to self-regulate and learn (e.g., to calm down, explore a new situation, overcome a frustrating experience), making use of adults and of peers. It is particularly important to ensure that areas of known peak performance in children with ASD (e.g., single-word expressive vocabulary) are not considered to represent overall linguistic abilities (e.g., sentence comprehension, narrative skills) or communicative competence (e.g., the capacity for reciprocal social and communicative engagement).

Diagnostic Work-Up

The diagnostic process needs to integrate every aspect of the child revealed through the assessment (Lord & Risi, 2000). Cognitive level frames expectations as to social, communicative, and play skills. Speech and language levels qualify difficulties in social interaction, learning, and communication. Levels of adaptive functioning reveal discrepancies between demonstrated potential and real-life functional adjustment highlighting challenges in spontaneous adjustment, particularly in the social domain, as well as areas for focal intervention when specific adaptive behaviors have not been mastered despite sufficient cognitive skills. This body of knowledge provides the necessary canvas for a careful delineation of departures from normalcy in terms of both developmental history and current presentation.

The diagnostic process is by necessity composed of two complementary strategies of data acquisition. First, parents need to provide a detailed view of their child's history and current representative behaviors. Second, direct observations are necessary to explore the parents' concerns and to obtain an independent sampling of the child's social, communication, and play behaviors, as well as other behavioral patterns related to exploration of the environment, self-regulation and self-stimulation, and reactions to environment stimuli.

The first part of the diagnostic process is thus to involve parents as a welcome and important source of information about the given child. Well before the visit to the clinic, parents should be requested to provide information about their child. This process primes them to think about developmental history, allows them to consult materials (e.g., videotapes, baby books) that can refresh their memory and to solicit the thoughts of other pertinent adults (e.g., grandparents, day care providers), promotes more detached observations of the child in naturalistic settings, and otherwise prepares them for the kind of interviews that they will complete during the evaluation. One efficient way to accomplish this goal is to provide parents with detailed forms that include developmental inventories (e.g., information on gestation, birth, developmental

milestones, typical patterns of normative behaviors, lists of developmental concerns). Such inventories may also include screening instruments for the purpose of further preparing the clinicians to explore specific areas of concern. Additional areas to be covered include medical information, behaviors or symptoms of grave concern to parents, and family history (given the need to explore genetic liabilities).

From a diagnostic perspective, direct interview with parents is aimed at collecting a body of information on social, communication, play, and other forms of behavioral functioning that is of particular importance in diagnostic formulation. Although this can be achieved more informally, to ensure that major symptom areas are covered in conversation with parents, there are specific instruments that help structure these interviews in such a way that all relevant behavioral features are covered. Chief among these instruments is the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003). This instrument was developed as a way of standardizing diagnostic procedures in multisite genetic research projects (Lord, 1997). It follows a semistructured format of interview with the parent or primary caregiver and includes an exhaustive list of items related to onset patterns, communication, social development and play, and restricted patterns of interests and behaviors, which are pertinent to the diagnosis of autism. Besides standardizing the obtainment of developmental history and current presentation, the ADI-R also provides a diagnostic algorithm that is keyed to the *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition (*DSM-IV;* American Psychiatric Association, 1994), criteria for autism. Although the ADI-R offers these various advantages, some caution needs to be exercised to see it as part of the diagnostic process rather than synonymous with the final diagnostic formulation (see Chapter 28, this *Handbook,* this volume, for further details). For example, the ADI-R has some limitations in the case of young children with ASD relative to the gold standard of diagnosis by experienced clinicians (Lord, 1995). It tends to overdiagnose children with significant cognitive delays as having autism at age 2 but to underdiagnose a small proportion of children who at age 2 do not show symptoms in the restricted patterns of interests and behaviors (thus failing to meet *DSM-IV* criteria for autism; Lord & Risi, 2000). Another area of limitation concerns the limited demonstrated contribution to the differential diagnosis of autism relative to other PDDs (e.g., Asperger syndrome), although this limitation is more a reflection of the nosologic status of the various PDDs rather than of a flaw in the instrument itself. In other words, while the PDDs can be fairly reliably separated from non-PDD conditions, distinctions among the PDDs are more problematic (see Chapters 1, 4, 6, and 21, this *Handbook,* Volume 1, for detailed reviews of nosologic difficulties associated with the classification of autism, Asperger syndrome, and PDD-not otherwise specified [NOS]). For example, one study found that interrater agreement for the diagnosis of autism versus a non-PDD condition is very high, but the rates are much lower for distinctions among the PDDs (e.g., between autism and Asperger syndrome or PDD-NOS; Klin, Lang, Cicchetti, & Volkmar, 2000). In many respects, some limitations of the ADI-R speak to the difficulties in using parental reports as sources of specific information relevant to a diagnosis of autism. What might not be obvious signs of abnormality in the way the child explores the environment or plays with toys to a parent may be seen very differently in direct observation by an experienced clinician. Hence it is important to both frame questions in a way that will make sense from the perspective of a parent's experience with his or her own child and supplement this information with direct observations.

The ADI-R probes cover primarily four areas of diagnostic information. The *early development domain* focuses on onset patterns including developmental milestones and age of recognition of specific concerns. The *communication domain* covers information on speech and language acquisition and typical autistic symptomatology (e.g., immediate echolalia, stereotyped utterances and delayed echolalia, social vocalization and reciprocal conversation, nonverbal communication, and attention to the human voice). The *social development and play domain* covers aspects of gaze behavior (e.g.,

eye contact, directing other people's attention through pointing), sensitivity to and appropriateness to social approaches, nature and range of facial expressions, prosocial behaviors (e.g., offering comfort), peer interaction, and play patterns (e.g., imitative play, pretend play by self and with others). The *restricted interests and behaviors domain* covers behaviors associated with circumscribed interests, unusual preoccupations, repetitive use of objects or interest in parts of objects, ritualistic behavior, unusual sensory interests, and motor mannerisms.

The second part of the diagnostic process involves direct observation of the child, and it should include observations of the child during more and less structured periods (e.g., unstructured spontaneous play sessions versus structured adult-guided cognitive testing), with different people (e.g., parents, siblings, or peers versus unfamiliar examiners), and in different situations (e.g., during conversation about the child's favorite topic versus conversations about the child's experiences at school or about social relationships). These various contrasts have the potential of creating a rich texture of observations for the characterization of both relative strengths and particularly challenging situations in the domains of social, communicative, play, and other behaviors. For example, a child who is overly focused and engaged when discussing a topic of circumscribed interest may become scattered, inattentive, "hyperactive," or maybe withdrawn and nonresponsive when asked to talk about experiences with friends. Social deficits and deviance are typically most apparent in unstructured times and when observations are focused on the child's own overtures and approaches. It is critical, therefore, that the child be given the opportunity to be left to his or her own devices for brief periods of time (e.g., exploring play materials). Whether the child becomes self-absorbed or attempts to involve the examiner, the nature of isolated activities (e.g., repetitive play or stereotypic exploration of toys), among a host of other important observations, can be made by means of these less intrusive approaches.

The sampling of spontaneous social, communication, and play skills is probably best done in the context of a diagnostic play and conversation session. This session should be set in as naturalistic a fashion as can be contrived in the context of a clinic environment. One standardized approach to creating such an environment is through the use of the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 1999). Like the ADI-R, the ADOS was developed with a view to standardize diagnostic procedures in multisite genetic projects (Lord, 1997). The instruments are complementary in that one focuses on parents as sources of information (ADI-R) whereas the other focuses on direct observations (ADOS).

For younger children, the ADOS consists of a series of playlike "presses" in which a situation is created to generate observations of the spontaneous behaviors. It starts with a free play session that makes possible for the observer to sample the child's preferential patterns of attention (e.g., focusing on people vs. things) and play behaviors (e.g., focusing on cause-effect vs. representational play materials, solitary vs. socially engaged play). Opportunities for showing sensitivity to social cues (e.g., calling the child's name, trying to elicit a smile without touching the child), joint-attention behaviors (e.g., pointing to distant objects, creating highly attractive stimuli such as soap bubbles and waiting for the child to bring another person's attention to the bubbles), patterns of request and showing (e.g., showing attractive objects and then placing them out of the child's reach), imitative skills and familiarity with social routines (e.g., modeling actions on miniatures, creating a pretend birthday party), among others, are all created in a playful and seamless fashion. These observations are coded according to detailed criteria in the various clusters defining autism. For older individuals, the presses are created around conversations about daily events at school or other environments, about social difficulties, friendship experiences and relationships in general, chores and responsibilities in daily life, as well as through more directed activities eliciting spontaneous verbal and gestural communication, imitation, and shared pretend play or imaginative activity. As in the case of younger children, this body of observations is then coded according to detailed criteria in central areas of diagnostic consideration such as

prosody and voice; echoing; idiosyncratic use of words and phrases; coordination of gaze, gesture, and verbal communication; facial expressions; empathy and insight into social relationships including an individual's own role in them; social and communicative reciprocity; and imagination and creativity, as well as the occurrence of narrow and interfering interests or stereotyped behaviors.

The ADOS provides a diagnostic algorithm that is keyed to *DSM-IV* (American Psychiatric Association, 1994). In contrast to the ADI-R, which makes possible a distinction only between autism and a non-PDD condition, the ADOS makes a distinction between autism and PDD-NOS on the basis of level of severity. For very young children, the ADOS appears to be more predictive of a subsequent diagnosis of autism than the parental reports obtained with the ADI-R (Lord & Risi, 2000; Lord et al., 1999). However, the more higher functioning toddlers (i.e., those with some language) may sometimes be misidentified as nonautistic. The ADOS has limitations when used with children below the developmental level of 18 months or so (Klin et al., 2003; also see Chapter 28, this *Handbook,* this volume). Data on older children also reinforce the notion that neither parent reports of history and current presentation or protocols based on direct observation can be viewed in isolation and that there are important gains to be made by combining these two complementary sources of diagnostic information.

Diagnostic Formulation and Differential Diagnosis

The diagnostic formulation should use and integrate qualitative and quantified data emerging from all of the other components of the assessment to better understand the child's developmental history and current presentation. Although one aspect of the diagnostic process is the diagnostic assignment of a syndrome label—for example, based on *DSM-IV-TR* (American Psychiatric Association, 2000) or *International Classification of Diseases,* 10th ed. (*ICD-10;* World Health Organization, 1992)—this is hardly its most important role. Given the heterogeneity of autism along all dimensions of abilities and symptomatology, a diagnostic label, while necessary for communication among professionals and for deeming children eligible for special education services and other treatments, can hardly provide the basis for programmatic recommendations for intervention. Such recommendations are built on detailed, individualized profiles of relative strengths and significant deficits revealed through comprehensive assessments of the kind described here. Thus, in addition to a diagnostic label, the diagnostic formulation should provide some information about the nature and intensity of needed remediating services, as well as some indication of level of concern relative to eventual outcome.

The differential diagnosis of the ASDs includes primarily language and other specific developmental disorders and global developmental delays or mental retardation. In some cases, congenital sensory impairments such as deafness or reactive attachment disorder may have to be considered. Traditionally, children with language disorders have not been thought to exhibit the pattern of serious social deviance and deficits, impoverished pretend play and imagination, and stereotyped behaviors exhibited by children with autism. They may, in fact, exhibit relative strengths in gestural and other nonverbal forms of communication and are more likely to become more socially integrated to the extent that their means for communication are expanded. More recent follow-up studies of children with language disorders have blurred somewhat these clear-cut lines of distinction (see Chapters 1 and 7, this *Handbook,* Volume 1), although the nature and pervasiveness of the social and communicative deficits in autism are still seen as of a much greater magnitude. In global delays or mental retardation, social and communicative skills are usually commensurate with the child's overall cognitive level, and deviant behaviors in all areas are much less common (with, maybe, the exception of severely to profoundly mentally retarded individuals, in relationship to which the differential diagnosis can be at times difficult). Congenitally deaf and congenitally blind children may exhibit some difficulties in social interaction and some repetitive activities (Hobson, 2002), although they are usually interested in social interaction and may make use of nonaffected

modalities of expression (e.g., facial and bodily gestures in the case of deaf children) for the purpose of communication. Children with reactive attachment disorders have, by definition, experienced marked psychosocial deprivation that results in deficits in social interaction, most notably in attachment patterns (expressed as either withdrawal or indiscriminate friendliness). However, the quality of the social deficit is different from autism in that the disturbance tends to remit or diminish significantly after an appropriately responsive and nurturing psychosocial environment is provided.

In contrast to the relatively clear differential diagnosis of the PDDs relative to non-PDD conditions, diagnostic differentiation across the subcategories of the PDDs, and particularly between higher functioning autism (i.e., autism unaccompanied by mental retardation), Asperger syndrome, and PDD-NOS, is fraught with difficulty. The validity status of these differentiations is discussed in great detail in Chapters 1 to 7 of the *Handbook*. Although there are many reasons to consider the differentiation among these conditions, it is important to note and to convey to parents not only that the specific label is less important than the individualized diagnostic formulation as described earlier but also that there is consensual agreement among clinical researchers (Filipek et al., 1999; NRC, 2001; Volkmar et al., 1999) that, regardless of which of the PDDs is assigned to a given child, the nature and intensity of services to be provided should be the same as for a child with autism.

Other Areas of Assessment

Although the psychological and communication assessments and the diagnostic work-up form the core of every developmental disabilities evaluation of children with ASDs, a number of additional assessment considerations should be given on the basis of the specific challenges faced by individual children. Particularly, but not exclusively, in the case of younger children, assessment of reactions to sensory aspects of the environment, motor control and execution, self-regulation, and other domains of functioning typically covered by occupational and physical therapists can be of great value in our effort to better understand the optimal levels of arousal for a given child, what distractions are making the child less available for learning, and which approach style is more likely to foster social engagement and reciprocal communication. Children with ASDs vary greatly in terms of their reactivity to the environment, self-regulation abilities in excitable situations, and need for either calming and soothing or animated and intrusive adult approaches in order to respond more meaningfully to others. Insights emerging from these observations can be critical in devising optimal classroom environments and teaching strategies. Conversely, the effectiveness of educational interventions can suffer greatly if enough consideration is not given to factors impacting on the child's attention to tasks, compliance, capacity for self-regulation, sensory-seeking behaviors, self-stimulatory behaviors, and other child-specific characteristics that are not necessarily part of the core features of the ASDs but that can be equally impairing. Thus, the goals of occupational and physical therapy assessments are to maximize the effectiveness of social, communicative, and cognitive activities by treating disruptive behaviors, optimizing the learning environment, and fostering more competence in the areas of self-awareness, motor planning, and visual-motor exploration of the environment. To accomplish these goals, occupational and physical therapists can join communication specialists and special educators within a common effort to create the best fit between environmental conditions and child-specific characteristics.

In the absence of medical concerns (see Chapter 20, this *Handbook,* Volume 1), exhaustive medical work-ups usually have limited clinical benefit (Klin et al., 1997). Therefore, in the absence of clinical indicators, brain and metabolic studies are unlikely to be of help. Nevertheless, a small number of medical exams should be considered. These include hearing assessments (this has to be done for any child with speech, language, and communication impairments), blood screening for fragile X syndrome (because a number of individuals with autism also exhibit fragile X syndrome), and a child neurology assessment if there is any concern about a possible seizure

disorder because of periodic unresponsiveness (e.g., "absence spells" or staring in the distance for long periods, being unresponsive to calls and touch). When there is a family history of mental retardation or the cooccurrence of cognitive delays and dysmorphic features, a genetic evaluation and more extensive laboratory studies are required to rule out a possible genetic syndrome of mental retardation. Although additional medical procedures may be warranted in the case of individual children, the physician should consider their cost-benefit value (particularly in terms of the child's and family's discomfort) given the typically low yield of common medical exams in children with ASDs.

Summary of Clinical Assessment

The multifaceted nature of the clinical assessment of children with ASDs underscores the need for integration of the oftentimes voluminous information produced by the various clinicians. To prevent fragmentation, the contribution of each professional should not be confined to his or her own area of specialty (e.g., test scores); rather, the team should strive to pool clinical observations, despite the redundancy incurred, to obtain a more valid clinical picture of the child's presentation across different settings and persons and over time. And the quality of the clinical assessment should be judged on the basis of how individualized and detailed are the treatment and intervention recommendations emerging from this transdisciplinary procedure.

PSYCHOLOGICAL ASSESSMENT

The primary goal of the psychological assessment is to quantify the child's overall level of cognitive development, and it is important for several reasons:

1. It provides *a frame for the interpretation of all of the other qualitative and quantified observations* made as part of the evaluation. From a diagnostic standpoint, the diagnostic category of autism and other ASDs should be used only if a child's social disability exceeds what might be expected given his or her level of intellectual functioning (Rutter, 1978). This is of particular importance in the case of individuals with mental retardation, who as a consequence of their cognitive limitations are likely to also exhibit social and language and communication difficulties but not in excess of what might be expected of same-age individuals at their cognitive and developmental level.
2. It provides *a frame for decisions on teaching strategies,* which may be entirely inappropriate if it targets unrealistically higher or neglectfully lower capacity for learning. If the way the interventionist approaches the child implies unrealistically higher expectations, this discrepancy may cause a great deal of unnecessary frustration and maybe even maladaptive reactions such as withdrawal or aggression. If the discrepancy is in the other direction, the intervention may instill a great deal of underachievement in the program and maybe even boredom and lack of motivation in the child. Targeting the appropriate cognitive level allows the interventionist to increase difficulty at the right amount to create realistic challenges that can be successfully achieved.
3. The level of cognitive functioning has been shown to be possibly the most important factor mediating a wide range of clinical phenomena, such as severity of symptomatology in the social, language, and communication domains, as well as in terms of stereotypic behaviors and self-injury and level of self-sufficiency (Volkmar et al., 1987), eventual outcome (see Chapter 7, this *Handbook,* Volume 1), and medical complications such as seizures (see Chapter 20, this *Handbook,* Volume 1).
4. In the United States, intellectual functioning below the normative range (i.e., IQ below 70) typically entitles individuals to additional services during the school years and lifelong benefits that may include additional personnel to help with respite care, access to residential care, assistive equipment, and others. In some states, individuals with ASD are not entitled to any services once they graduate from the school system unless they have been shown to have mental retardation. Critically, however, eligibility for these services typically

requires documentation (i.e., assessment using standardized measures of intellectual functioning) produced prior to the age of 18 years.

The careful assessment of overall cognitive functioning is, however, merely the first step of the psychological assessment. Almost by definition, individuals with ASDs have highly variable learning profiles and a great deal of scatter across multiple domains (see Chapter 13, this *Handbook,* Volume 1). Thus, overall cognitive scores may be the averaging of highly discrepant skills. Because appropriate interventions are meant to address needs and capitalize on strengths, this variability is of great importance for decisions on the type of teaching strategies to adopt, ways of compensating for significant deficits, and ways to use cognitive assets to make up for deficient development in other areas. For example, many individuals with ASDs profit from the use of visual strategies for learning, often to compensate for language deficits, but some may exhibit nonverbal learning disabilities and can make best use of verbal scripts rather than visual materials. Preconceptions about a child's learning style solely on the basis of the child's diagnostic label can lead to ineffectual, and sometimes even deleterious, teaching strategies. Quantification of variability and consistency across various areas of learning provide, therefore, a decisive contribution to the planning and implementation of educational and other interventions, where the main goal is to maximize the child's learning potential and to optimize the learning environment, which in turn makes possible for the child to achieve a sense of mastery and self-control regardless of level of disability.

Besides the assessment of overall cognitive levels and detailed profiles of learning, the psychological assessment needs to cover one more critical area of development: the capacity for translating cognitive potential into real-life skills, typically referred to as the *assessment of adaptive behavior.* Almost by definition, individuals with ASD show a large discrepancy between cognitive potential as measured in the context of a standardized assessment of IQ and real-life skills as measured with standardized interviews using parents or other caregivers as informants, favoring the former (Klin et al., in press). This discrepancy can reach magnitudes of 2 to 3 or even more standard deviations in the more cognitively able (or higher functioning) individuals, but it is also quite considerable even in severely mentally retarded individuals. Because real-life independency is ultimately one of the central goals for any individual with disabilities, the importance of the documentation of adaptive behavior deficits cannot be overly emphasized. In higher functioning individuals with ASD, the typical low scores in adaptive behavior help advocates to secure services and convey to others the importance of intervention for those individuals who otherwise might be considered too bright or too talented (in some isolated area) to require any help at all. In lower functioning individuals, quantified monitoring of adaptive behavior (i.e., periodic reassessment) helps the interventionists to ensure that the hierarchy of goals that they are pursuing in the individual's program is having the desired positive impact on the all-important, longer term goal of achieving the greatest degree of self-sufficiency.

For some individuals, there is a need to pursue a more detailed assessment of their learning profiles because they may exhibit areas of strength and deficit that cannot be adequately captured in general assessments of cognitive functioning such as IQ tests. These areas may involve difficulties with integrating fragments of information into coherent wholes (weak central coherence; see Chapter 24, this *Handbook,* Volume 1); difficulties in planning, organizing, and generating strategies to solve problems (i.e., executive dysfunction; see Chapter 22, this *Handbook,* Volume 1); difficulties in learning key concepts in social understanding such as mental states (i.e., theory of mind; see Chapter 23, this *Handbook,* Volume 1); and specific discrepancies in motor and visual motor, attention, and perception, as well as memory and learning skills (see Chapter 13, this *Handbook,* Volume 1). Some of these issues might require additional testing using standardized neuropsychological tests or qualitative observations obtained during less formal procedures such as a play session, a conversation sample, drawing activities, or additional interviews or inventories using parents

or other caregivers as informants. However, in the context of a transdisciplinary evaluation, the addition of procedures needs to be weighed in terms of its potential yield for the overall insight into the child's profile and in ways that these contributions translate into practical recommendations for treatment and intervention. While most traditional elements of psychological assessment, from cognitive to personality assessments, may contribute something to this goal, there is a need to create a hierarchy of procedures on the basis of how necessary and central is the contribution to be achieved with a given procedure.

Issues in Psychological Assessment of Individuals with Autism Spectrum Disorder

Psychological assessments are analogous to single-subject experimental designs in which conditions are kept constant such that the child's abilities provide the only source of variance. The advantages of using standardized procedures lie in the fact that the evaluator can then compare the child's performance to the performance of same-age children using age-based norms. Even though the adherence to standardized procedures is of paramount importance for the valid and justified use of normative information, with some children with ASD, the rigid fulfillment of test instructions may sometimes not be possible. Although deviations from standard procedures should be avoided, it is sometimes necessary to make clinical modifications of procedures. Such adaptations are particularly critical to obtain a measure of the child's skills when doing otherwise would signify the obtainment of no measure at all. However, the examiner should be aware that as a consequence of such a break with standardized administration, results obtained should then be viewed with great caution, and the accompanying interpretation should make any deviations from standard administration explicit to the reader.

In testing sessions, it is always critical to consider the child's level of interest and engagement. Sometimes the usual verbal instructions and social reinforcements might not be effective to elicit the child's optimal cooperation and effort. In such situations, it is then necessary to empirically establish potential reinforcers for the particular child. For example, visual-spatial or hands-on tasks might have to be interspersed with verbally mediated measures to maintain an acceptable level of effort and engagement. Operant techniques may be particularly useful if an effective reinforcement can be identified, and, though not a primary choice, food reinforcers or even stereotypic interests and activities (e.g., winding up a music box, manipulation of a spin top) may be used to motivate the child.

A key component in appropriate psychological assessment is the choice of instruments to use with a given child. The examiner may have to adopt a hierarchy of procedures, choosing first those instruments that have been shown to best capture the concepts in question and that have the largest body of evidence and documentation in their favor. If such instruments are, however, not viable, then other, less optimal instruments might have to be chosen. In fact, in the case of children with ASD who have severe cognitive and/or language deficits, the examiner might need to have a thorough knowledge of psychological instruments not typically employed with the normative population. Several factors should be considered when choosing a test: (1) level of language skills required, (2) the complexity of the instructions and the tasks, (3) the level of social demands, (4) the utilization of timed tasks, and (5) number of shifts from one subtest or format to another. As an informal rule, instruments that require less language mediation and imitative skills (i.e., modeling), are more concrete and straightforward and more dependent on visual rather than auditory skills, require fewer attentional and cognitive shifts, and have fewer time constraints tend to be more appropriate for cognitive and language-delayed children with ASDs. An individual may obtain different results on tests tapping on the same psychological construct because of the different level of social or language demands included in the administration of each one on the tests, which is one of the reasons that profiles of psychological assessment results cannot be interpreted in isolation from the remainder of the procedures carried out in the transdisciplinary evaluation. For example, the interpretation of results on a neuropsychological battery

in terms of the constructs purported to be examined in it (e.g., strengths and deficits in memory or executive functions) may not be fully warranted without consideration of the fact that the child may have a significant language comprehension deficit (as revealed in the communication assessment) and that the latter might be a more parsimonious explanation of the obtained profile. Similarly, a child with significant social and imitation deficits may score differently on a neuropsychological test of a given construct when it is computer-administered (thus avoiding the need for imitation of an examiner) relative to when the test is administered by the examiner (e.g., Ozonoff, 1995).

This consideration can be stated more generally in terms of the need for the professional carrying out the psychological assessment to be experienced not only in psychological testing but also in the work with children with ASDs and the peculiarities sometimes involved in their psychological profiles. Of these, one potentially great source of confusion relates to the children's areas of "peak performance," which can and often are dissociated from more general measures of overall cognitive functioning. Some young children may be able to read fluently (sometimes precociously) without, however, being able to understand what they read (i.e., hyperlexia; Grigorenko et al., 2003). Others may assemble sophisticated geometric puzzles extremely well, particularly if these can be solved by using parts-to-whole strategies (as in typical block design tests in which geometric designs need to be reproduced using colored blocks) but cannot perform basic verbally mediated tasks such as providing definitions of words or solving basic word puzzles. Knowledge of the typically extreme profiles of cognitive functioning and the oftentimes astonishing "islets of special ability" seen in some individuals with ASD is critical for any professional conducting psychological assessments. Lack of knowledge and experience in this respect may result in erroneous conclusions about and generalizations from the set of testing results.

Finally, It is important to consider that within each testing session a large amount of extremely important qualitative information is gathered. Nearly every aspect of the events taking place can be viewed as empirically derived information that may prove useful for the purpose of intervention. For example, the amount of structure imposed by the adult, the optimal pace for presentation of tasks, successful strategies to facilitate learning from modeling and demonstrations, and effective ways of containing off-task and maladaptive behaviors are all important observations that can be extremely useful for designing an appropriate intervention program. And within each test, there may be specific illustrations that create opportunities to convey to parents, in a more intuitive manner, the main themes emerging from results of the child's cognitive testing. For example, a particularly disjointed protocol of visual-motor testing involving copying of geometric designs can serve as a concrete illustration of the child's fragmented learning style, which in turn may have relevance to the understanding of the child's difficulties in social adaptation (e.g., focusing on isolated aspects of a social situation while missing the more holistic, and crucial, overall context or meaning).

Areas of Psychological Assessment

Traditional psychological evaluations comprise measures in the areas of intelligence (i.e., intellectual profile), adaptive behavior (i.e., level of self-sufficiency in real-life situations), achievement (i.e., proficiency in academic areas taught at school), additional neuropsychological functioning (i.e., higher cognitive or psychomotor processes), and personality (intrapersonal conflicts, emotional presentation, and style of social adaptation). With the exception of intelligence and adaptive behavior, which are essential components of any psychological evaluation, the other areas may or may not be included in the psychological assessment conducted within a transdisciplinary evaluation depending on the clinical priorities (e.g., referral questions), on direct observations made during the assessment (e.g., an important qualitative observation or quantified finding), and on other practical considerations (e.g., the amount of time allotted to the psychological assessment, the optimal length of time that the child's compliance and engagement can be maintained). The following dis-

cussion focuses on intellectual testing (and developmental testing for the younger child) and adaptive behavior. Achievement testing is typically conducted at schools rather than clinics, and if necessary to be included in the transdisciplinary evaluation, the instruments and procedures are not very different from the ways in which achievement assessment is carried out in less specialized settings. More traditional forms of personality assessment using projective techniques are typically of less importance than the assessment of social and communicative style and disabilities. Sometimes these forms of assessment are not possible because of a child's language limitations, extreme concreteness, and limitations in insight. When relevant and appropriate, however, such as in some cases of higher functioning individuals who may show fragmented or fragile thought processes or comorbid symptomatology such as depression, projective measures can be administered using standardized methodology. The area of assessment that requires more serious consideration is neuropsychological testing, although a decision may have to be made in the course or as a result of more general cognitive testing in response to an important question emerging from observations or findings.

The most widely used instruments used in psychological assessments of individuals with ASD are provided in Table 29.1.

Intelligence

Although definitions of intelligence are almost as numerous as there are theorists who strive to define the concept (Sattler, 1988), there is a high degree of consensus among psychologists as to what specific, operationalized capacities should be measured to obtain a useful indicator

TABLE 29.1 Recommended Instruments for Use In Psychological Assessment of Children with ASD

Area of Assessment	Instrument	Measurement	Age Range	Indication
Overall Cognitive Assessment	WPPSI-III	Full Scale IQ; Verbal & Performance IQ; Index Scores	2 years, 6 months to 7 years, 3 months	Standard IQ testing for young children
	WISC-IV	Full Scale IQ; Index Scores	6 years to 16 years 11 months	Standard IQ testing
	K-ABC-II	Mental Processing Index (Luria) or Fluid-Crystallized Index (CHC); Scale Index Scores	3 to 18 years	Mental processing and acquired knowledge
	DAS	General Conceptual Ability; Verbal, Nonverbal, & Spatial Cluster Scores	2 years, 6 months to 17 years, 11 months	Developmental abilities
	Leiter-R	Nonverbal Full IQ; Brief IQ; Reasoning Scores	2 years to 20 years, 11 months	For children with severe language limitations
Development Assessment	Mullen	Early Learning Composite; Domain Scores	Birth to 68 months	Nonverbal, language, & motor skills
Adaptive Behavior	Vineland	Adaptive functioning in communication, daily living, social, and motor domains	Birth to 18 years, 11 months	Required for the assessment of every child with ASD
Additional Neuropsychological Testing	NEPSY	Core Domain Scores; Scaled Scores	3 to 12 years	Neuropsychological development

of a child's intellectual level (Snyderman & Rothman, 1987). These include verbal and nonverbal reasoning or abstract/conceptual thinking, problem solving, the capacity to acquire knowledge, linguistic competence, mathematical competence, memory, mental speed, and perceptual discrimination and organization. Most intelligence batteries currently in use include these areas in varying degrees. The various instruments differ, however, in terms of emphasis placed on linguistic skills, speed of performance (i.e., timed tasks), reliance on visual or auditory presentation, motor demands, and number of constructs tested.

As noted previously, individuals with ASDs cover the entire spectrum of intellectual functioning and formal language capacities. Nevertheless, a large number of children presenting for evaluation typically exhibit significant language delays, difficulties in social interaction, poor imitation skills, high levels of distractibility and off-task behaviors, and low tolerance for prolonged periods of testing. Accordingly, when necessary, testing procedures and instruments should be chosen to circumvent such difficulties while safeguarding validity and maximizing the sampling of skills.

Among the various intelligence batteries currently in use, the age-proven Wechsler scales—Wechsler Preschool and Primary Scale of Intelligence, third edition (WPPSI-III; Wechsler, 2002), and Wechsler Intelligence Scale for Children, fourth edition (WISC-IV; Wechsler, 2003)—provide the standards for the testing of intelligence in terms of psychometric properties, standardization procedures, and extent of research. Whenever possible, these batteries should be used because they provide valid measures across a large number of relevant constructs and yield profiles of functioning that can be readily translated into intervention objectives. The Wechsler scales' division of the various tasks into factor scores (Kaufman, 1994) can be particularly helpful in the interpretation of profiles of children with ASD given the typical performance scatter found in these children's protocols (McDonald, Mundy, Kasari, & Sigman, 1989). Whereas the WPPSI-III maintains the familiar verbal-performance IQ dichotomy, the WISC-IV yields a composite IQ score and four Index scores based on factors derived from the individual subtests:

1. *Verbal Comprehension,* an index of verbal knowledge and understanding obtained informally and through formal education.
2. *Perceptual Reasoning,* an index of problem-solving ability and reflection of the ability to interpret and integrate visually perceived material.
3. *Working Memory,* an index of the ability to attend to and retain information in memory, as well as perform mental operations.
4. *Processing Speed,* an index of speed of information processing, which requires focused execution and visual motor coordination.

Salient comparisons on both scales include the capacity for dealing with verbal versus visual content, as well as central and shared processes such as concept formation, reasoning ability, attention and concentration, and memory. For example, reasoning ability may be considered further in terms of abstraction abilities (conceptual versus concrete responses), associative versus analytic style, inductive versus deductive abilities, and use of verbal strategies to reason versus nonverbal (e.g., pattern recognition, visual analysis, perceptual organization). One of the core subtests not retained on this latest edition of the WISC is Picture Arrangement. The Picture Arrangement and Comprehension subtests were especially salient for this population because they are two measures thought to involve some social judgment. Whereas the Comprehension subtest requires the child to reason through questions that involve conventional knowledge of practical social situations, using verbal means, the Picture Arrangement subtest requires the child to arrange pictures in sequence to form a story about people and events. On the latter subtest, the information presented is visual, sequential, and contextual in nature. Often, performance discrepancies are observed on these two subtests and are strongly suggestive of a preference for one mode of processing versus another, with direct implications for treatment strategies. Related processing variables such as cognitive rigidity and distraction from internal or external sources during test performance should also

be considered when interpreting test results for children with ASD.

The Wechsler scales are sometimes not viable for this population because of not only language requirements but also their reliance on timed tasks, knowledge of specific content, and number of tasks that are exclusively auditory in nature (and thus more susceptible to the disruptive effects of distractibility and poor rapport). Therefore, there is a need for alternative batteries that can provide measures of intellectual level with varying degrees of comprehensiveness. These batteries include, but are not limited to, the Kaufman-Assessment Battery for Children, second edition (K-ABC-II; Kaufman & Kaufman, 2004), and the Differential Abilities Scales (DAS; Elliot, 1990). The K-ABC-II is particularly useful because of its wide range (3 to 18 years), reduced emphasis on verbal abilities and acquired knowledge, attractiveness and straightforward nature of stimuli, close association with neuropsychological processes, and a provision included in the standardization procedure making possible for the examiner to teach and demonstrate initial items to the child. This latter provision allows for an opportunity to test the child's capacity for learning through demonstration and, at times, makes possible for the examiner to overcome the child's initial failure to understand instructions. Additionally, the K-ABC-II is expanded to provide a profile of learning style in terms of two different neuropsychological models: Luria and Cattell-Horn. The scales include Sequential Processing/Short-Term Memory (information is presented in serial order), Simultaneous Processing/Visual Processing (requires processing in an integrated, Gestalt manner), Learning Ability/Long-Term Storage and Retrieval, Planning Ability/Fluid Reasoning, and Crystallized Ability. Either approach provides information relevant to learning and teaching style. Although the K-ABC does not include a measure of understanding of social situations per se, it does contain a test of face recognition (or memory for faces) that has been shown to have diagnostic value (e.g., Klin et al., 1999).

The DAS is also a very useful measure of cognitive ability that is less verbally demanding, has few time constraints, and involves tasks that allow for hands-on performance through the use of manipulatives. Like the K-ABC-II, the DAS has a broad age range (from 2 years 6 months to 17 years 11 months) and allows for teaching items. The DAS also allows profile analysis including cluster score comparisons and subtest comparisons. The General Conceptual Ability (GCA) score is considered to be an excellent measure of general cognitive ability. Significant differences in cluster scores may represent differences in verbal ability, nonverbal reasoning ability, or spatial ability. Individual subtests can be compared for knowledge of word meanings (Word Definitions) versus forming abstract concepts (Similarities) or differences in spatial ability (Pattern Construction) and visual motor ability (Recall of Designs). Supplemental tests are provided to assess attention, memory, and achievement, and there is provision for a nonverbal composite score. The DAS is especially useful for the youngest age groups. A notable drawback is the variability in the test battery through the age levels covered by the instrument, limiting comparisons of test profiles and performance over time.

For children with no or very low levels of linguistic skills, the Leiter International Performance Scale-Revised (Leiter-R; Roid & Miller, 1997) is the test of choice if attempts to use the other batteries were unsuccessful or were considered a priori to be unlikely to provide useful sampling of the child's intellectual abilities (Tsatsanis et al., 2003). The instrument is expanded to include a Visualization and Reasoning (VR) battery and Attention and Memory (AM) battery, composed of 10 subtests each. The VR battery most closely resembles the original Leiter, and it measures traditional intelligence constructs such as nonverbal reasoning, visualization, and problem solving (Roid & Miller, 1997). The Leiter-R is normed for individuals between 2 years 0 months and 20 years 11 months of age with current normative data and good psychometric properties. Four subtests comprise a Brief IQ Screener for all ages, and two sets of six subtests (one set for children between 2 and 5 years and a second set for individuals 6 to 20 years) are used to obtain a full-scale IQ. Three composite scores are also yielded on the Leiter-R: *Fluid Reasoning,* which is available for all ages; *Fundamental Visualization,* obtained for

children 2 to 5 years of age; and *Spatial Visualization,* available for the 11- to 20-year age. The provision of individual subtest and composite scores permits an analysis of profiles of performance including abilities related to visual scanning and visual discrimination, as well as pattern recognition, analogic reasoning, and visual parts to whole reasoning. The Leiter-R has minimal language demands in that both the administration and responses are nonverbal, and the basis of each subtest of the VR battery is visual matching. Despite its applicability for lower functioning and nonverbal individuals, the Leiter-R presents some limitations for very low-functioning individuals in that teaching trials are limited and that the materials quickly transition from manipulative foam shapes to stimulus cards. With the latter, individuals are required to either place the cards in an easel slot or point to the appropriate response stimulus, both of which require a degree of motoric ability that can be limited if not lacking in individuals with ASD.

When the Leiter-R proves to be too challenging to a given child, its older form, the Leiter International Performance Scale (Leiter, 1948) may offer an acceptable (though last resort) measure of nonverbal intelligence. The Leiter is based on a visual matching procedure that remains the same for the entire age range of the test (years 2 to 18). Items range from pairings of colors, shapes, and figures at early levels to items involving analogies and concepts at the later levels. Apart from its ability to attract and maintain the attention of more uncooperative autistic children, the Leiter has many advantages in this population (Shah & Holmes, 1985):

1. No speech is required from the examiner or the child (i.e., instructions are given in pantomime if needed).
2. The tasks are self-explanatory, and, for the initial items, unlimited demonstration is permitted.
3. The response format is uniform (placing blocks in a slot), and there is a consistent visual matching procedure.
4. With the exception of four items at higher levels, there are no timed tasks or time limits. This is a very useful attribute in the case of those children who do not understand the need for speed, who have fleeting attention, or whose stereotypies interfere with their performance.
5. The Leiter requires only minimal record keeping, and the tasks can be introduced casually and in a playlike manner.

These are useful attributes when testing children with attentional and behavioral problems as well as high levels of activity. Unfortunately, these advantages are counterbalanced by several limitations including:

1. The scale measures primarily nonverbal skills and should not be seen as a measure of general intellectual ability.
2. There are too few items at each age level, which may lead to an inaccurate estimate of mental age.
3. Item difficulty level is not constant.
4. Many of the pictures used are outdated.
5. Unlike other psychological batteries, the Leiter uses a ratio IQ rather than standard scores.

When other batteries prove impractical, the combination of the Leiter with measures of listening vocabulary such as the Peabody Picture Vocabulary Test-Third Edition (PPVT-III; Dunn & Dunn, 1997) may provide an estimate of the child's overall intellectual level. However, both the Leiter and PPVT-III tend to provide somewhat inflated scores because these tests focus on domains of peak performance in the case of children with autism (see Shah & Holmes, 1985, and Tsai & Beisler, 1984, respectively).

Intellectual testing in very young children is achieved with the use of developmental scales. Although these scales provide an estimate of cognitive level, the concept of IQ is avoided in young children because of the close interdependence of cognitive functioning with other domains of development below the age of 3 or 4 years and because estimates of cognitive level within this age range may not be predictive of IQs obtained subsequently in school-age years. While some of the scales rely purely on parental report, others involve direct sampling of the child's skills across a number of relevant domains. Only the latter are discussed here, given that it is essential that direct as-

sessment of developmental skills be performed. Scales based on parental report can be used to further contextualize and validate clinic-based data or if for any reason direct assessment cannot be conducted. Direct observation is necessary not only to obtain information about levels of performance (e.g., scores) but also to document styles of learning and a wide range of factors that impact on the child's learning potential. These observations are even more important in young children than in older individuals. Two developmental scales have been used most frequently in the assessment of young children with ASD: the Bayley Scales of Infants Development-II (Bayley; Bayley, 1993) and the Mullen Scales of Early Learning (Mullen, 1995). Although both scales allow for scoring some low frequency or difficult to elicit behaviors based on parental report, these are primarily performance-based scales assessing the child's development in several domains. This is done in the context of direct interaction with the child around goal-oriented activities.

The Bayley is the most widely used measure of developmental skills in both clinical and research settings. Its scales range from 1 to 42 months of age. The test consists of three main components: the Mental Development Index (MDI), Psychomotor Development Index (PDI), and Behavior Rating Scale (BRS). While the MDI provides information about the child's problem-solving and language skills, the PDI assesses the child's fine and gross motor skills. The BRS is a form designed to be used by the evaluators to rate the child's behavior during the testing, including attentional capacities, social engagement, affect and emotions, as well as the quality of movement and motor control. Although the Bayley provides a method for obtaining age-equivalent scores for four facets of development, namely Cognitive, Language, Social, and Motor, empirical support for the validity of these facet scores is limited (Bayley, 1993). The Bayley takes about 60 minutes to administer for children over 15 months. Despite its excellent statistical properties and its sensitivity to high-risk childhood conditions (Bayley, 1993), its value for the assessment of young children with autism can be limited, primarily because the summary scores are likely to be averages of highly discrepant skills in the various domains, thus creating a great misrepresentation of the child's developmental skills. For example, the MDI summarizes scores in nonverbal problem solving, expressive and receptive language, as well as personal-social functioning. Children with autism typically present with a highly scattered profile of skills, with higher level nonverbal problem-solving skills (e.g., color matching, assembling puzzles), lower level expressive language skills (although this score may still be inflated due to the these children's higher single-word vocabulary relative to typically lower sentence construction skills), and lowest scores in receptive language (due to their difficulty in responding consistently to spoken language). Thus, any composite index score summarizing performance across a number of domains is likely to misrepresent the child's developmental profile. In many respects, the average of these scores will hardly convey the most important information to the special educators whose mission is to address the child's needs while capitalizing on the child's strengths. For this purpose, the profile, in all its variability and scatter, is more informative than overall scores. Similarly in the motor domain, a child may have relatively good gross motor skills but score poorly on fine motor tasks due to difficulties in motor imitation inherent to autism (see Chapter 14, this *Handbook,* Volume 1).

For these reasons, the popularity of the Mullen has increased dramatically in the past few years. The Mullen is a multidomain assessment scale that emphasizes the measurement of distinct abilities rather than developmental summaries. Its range is from birth to 68 months of age. It contains five domains: Visual Reception (primarily nonverbal visual discrimination, perceptual categorization, and memory), Receptive Language, Expressive Language, Fine Motor, and Gross Motor. The Mullen yields standard T scores in all five domains and an Early Learning Composite score based on the first four domains. The Mullen takes between 15 and 60 minutes to administer, depending on the child's age. Its separation of visual perceptual abilities from expressive and receptive language, as well as the separation of fine and gross motor skills, serves very well the assessment of young children with autism

who, as noted, typically display highly scattered profiles.

Finally, very low functioning older individuals, who cannot reach a basal level of performance on any of the more traditional intellectual batteries, present a great challenge for clinical evaluations because there is a need for some estimate of their cognitive skills to establish the frame of reference for other observations, including the diagnostic work-up. These are individuals with mental age below the 2- to 3-year level. The use of developmental batteries is problematic because these tests involve materials that are more appropriate for infants and toddlers rather than adolescents or adults. Although there is no satisfactory solution, the examiner may choose to use selected tasks from a developmental battery that are less infant-specific such as puzzles and pegboards. Alternatively, the examiner may choose a developmental test that focuses on basic cognitive achievements such as object permanence and means-ends relationships that have implications for decision on intervention strategies intended to augment the individual's means of learning and communication. One example of such a test is the Uzgiris-Hunt Ordinal Scale of Infant Development (Uzgiris & Hunt, 1975), which focuses on Piagetian concepts rather than age-based norms. Such testing may be a little more appropriate to severely retarded adolescents and adults because profiles obtained with more traditional developmental batteries may carry very little relevance to the day-to-day real life of these individuals. It is unfortunate that a more appropriate test of intellectual functioning is not yet available for this group of very low-functioning, older individuals.

Despite the difficulties inherent in the intellectual testing of children with ASD, several studies have substantiated the validity and predictive usefulness of intelligence scores (Lord & Schopler, 1988). The clinician should be aware that the larger the sampling of cognitive skills (i.e., comprehensiveness of the test or combination of tasks), the higher the validity and accuracy of the estimate of intellectual functioning.

There are several measurement peculiarities in the assessment of autistic children. First, it should not be assumed that the correlations between different batteries reported in the test manuals are directly applicable to this group of children. This is a direct result of the atypical patterns of strengths and weaknesses observed among children with autism and related disorders. For example, measurements using one-word receptive or expressive picture vocabulary tests in typical populations are highly correlated with both overall measures of intelligence and language comprehension (Sattler, 1988). In children with ASD, however, correlations are much lower. Second, it is not unusual to observe a drop in standard scores over time. This phenomenon usually does not indicate a loss of acquired skills; rather, it suggests that the child's intellectual gains are not commensurate (i.e., they are at a slower rate) with gains in chronological age. Third, given autistic children's usual strengths in visual perceptual tasks and weaknesses in conceptual and reasoning tasks, it is not uncommon to observe a drop of standard scores at around school-entry level. This follows the typical developmental organization of test batteries that reduce the number of items dependent on perceptual discrimination and rote learning and increase the number of items requiring reasoning and concept formation during this transitional time.

Adaptive Behavior

Adaptive functioning refers to capacities for personal and social self-sufficiency in real-life situations. Its aim is to obtain a measure of the child's typical patterns of functioning in familiar and representative environments such as the home and the school, which may contrast markedly with the demonstrated level of performance and presentation in the clinic. It provides the clinician with an essential indicator of the extent to which the child is able to use his or her potential, as measured in the assessment, in the process of adaptation to environmental demands. The commonly found large discrepancy between intellectual level and adaptive level signifies that a priority should be made of instruction within the context of naturally occurring situations to foster and facilitate the use of skills to enhance quality of life. In addition, in most circumstances, a measure of adaptive level is required to establish a child's entitlement to services.

The most widespread measurement of adaptive behavior is provided by the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984b). The Vineland assesses capacities for self-sufficiency in various domains of functioning including Communication (receptive, expressive, and written language), Daily Living Skills (personal, domestic, and community skills), Socialization (interpersonal relationships, play and leisure time, and coping skills), and Motor Skills (gross and fine). These capacities are assessed on the basis of the individual's current daily functioning using a semistructured interview administered to a parent or other primary caregiver. The Vineland is available in three editions: (1) a survey form to be used primarily as a diagnostic and classification tool for normal to low-functioning children or adults (Sparrow et al., 1984b), (2) an expanded form for use in the development of individual education or rehabilitative planning (Sparrow, Balla, & Cicchetti, 1984a), and (3) a classroom edition to be used by teachers (Sparrow, Balla, & Cicchetti, 1985). Among the various editions, the expanded form is the most useful in the case of children with ASDs, whose level of adaptive functioning is usually much lower than their demonstrated intellectual level (Volkmar, Carter, Sparrow, & Cicchetti, 1993). Using the child's developmental level as a point of reference, this form makes it possible for the clinician to plan intervention on the basis of those skills that the child should have acquired given his or her intellectual level. Because the items of the Vineland were selected on the basis of their immediate relevance to real-life adaptation, the skills described therein can be readily incorporated into the child's intervention plan.

Several research studies (e.g., Volkmar et al., 1987) have helped delineate the usual profile obtained for autistic children. This typically consists of relative strengths in the areas of Daily Living and Motor Skills and significant deficits in the areas of Socialization and, to a lesser extent, Communication. Some studies (Klin et al., 1992; Volkmar et al., 1993) have demonstrated the utility of the Vineland for diagnostic purposes. Vineland supplementary norms for autistic individuals are now available (Carter et al., 1998). And, as noted, Vineland scores are very low even for higher functioning individuals with ASD (Klin et al., in press), whose adaptive scores can be viewed as a more accurate quantification of their disability relative to their cognitive potential.

A new and more comprehensive version of the Vineland is currently being standardized and will be available commercially in 2005. Among the various improvements, there has been a dramatic increase in the sampling of early emerging socialization skills. This improvement was introduced with the intent of increasing its utility in both clinical practice and research with individuals with autism and related disorders.

Additional Neuropsychological Assessment

In addition to intelligence batteries, additional neuropsychological testing may be used to complement a psychological assessment when there are indications of specific disabilities impacting on identifiable and discrete learning systems. These measures may include sensory-perceptual functions (tactile, visual, and auditory modalities); laterality and psychomotor functions related to speed and visual-motor integration; specific language learning and verbal and visual memory skills; concept formation; attention and executive functions including working memory, forward planning, categorization, and inferencing; strategy generation; and mental shifting. Such measures may also be indicated to explore the nature of a child's learning disability in greater detail. A commonly used neuropsychological battery for children ages 3 to 12 years is the NEPSY, which provides tasks in the domains of attention and executive functions, language, visual-spatial processing, sensorimotor functions, and memory and learning (Korkman, Kirk, & Kemp, 1998). Children with autism have been found to exhibit deficits in attention and executive functions and memory skills, particularly memory for faces, compared to normal controls (Korkman et al., 1998).

For possibly the majority of children with ASD presenting for evaluation at specialized clinics, extensive neuropsychological batteries may not offer a significant enough contribution to justify the cost, in time and effort, for their use. Nevertheless, the employment of selected tasks from these batteries (e.g., memory

for faces on the NEPSY or K-ABC-II) may be justified for the purpose of hypothesis testing regarding observations emerging in general intellectual testing or in other areas of the evaluation. Also, given the centrality of executive functioning deficits in autism (see Chapter 22, this *Handbook,* Volume 1) and their deleterious impact on everyday functioning, the examiner may choose an inventory such as the Behavior Rating Inventory of Executive Functions (BRIEF; Isquith & Gioia, 2002) to document executive deficits with a view to target them for remediation.

Other brief tests exploring the child's visual-motor skills or motor functioning can be of value for some children whose learning and adaptation appear to be hindered by deficits in these skills. For example, the Beery Buktenica Developmental Test of Visual-Motor Integration (VMI; Beery & Buktenica, 1989) provides a quick assessment of the child's grapho-motor skills, perceptual accuracy, and hand-eye coordination. It may also reveal perseverative behaviors, laterality problems, and distortions, which may be indicative of neurological involvement (Stellern, Vasa, & Little, 1976). The Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) provides useful measures of gross and fine motor skills and is indicated whenever the child appears to present with significant deficits in coordination. Some of these tests, however, are now typically employed by occupational and physical therapists at schools. Data on these domains may have a significant contribution to educational programming given the important role played by motor and coordination skills in learning processes, particularly for the young child. In this context, there is a need to integrate the various components of the educational program with a view to maximize learning opportunities in regard to those skills that are typically areas of weakness for children with ASD. For example, occupational therapy may include activities focused on the teaching of conceptual terms (e.g., quantity, position, size), problem solving, and awareness of self and others (e.g., body awareness, motor planning). This may be achieved with the use of large, three-dimensional objects or structures that can be moved, positioned, and played with the intent of teaching a concept via multiple sensory modalities in a hands-on and exaggerated fashion.

Additional Social Emotional Assessment

As noted, traditional methods of personality assessment are typically not very useful in the evaluation of the majority of children with ASD because of limited linguistic and narrative skills and overconcreteness. Nevertheless, some studies (e.g., Dykens, Volkmar, & Glick, 1991) have demonstrated the usefulness of projective instruments such as the Rorschach Inkblot Test (Exner, 1990) in the diagnosis of disorganized thinking for a small group of higher functioning autistic individuals. More commonly, though, the use of simpler projective techniques such as drawings as well as play sessions may be more revealing with regard to social-cognitive skills, emotional presentation, and intrapsychic preoccupations that are typically not explored during other sections of the evaluation. However, these data can be appropriately interpreted only within the context of the child's overall developmental level and language skills.

Drawings may provide a wealth of information about cognitive level, interests, understanding of social life, primary attachments, and even diagnostic information. In the case of children with ASD, there are several specific guidelines that have to be kept in mind when requesting a child to produce a drawing and when interpreting this work. The child should have an opportunity to draw spontaneously before a specific request is made. The resultant work may be a perseverative interest, which may range from an oval stroke drawn repeatedly, to meaningful figures representing inanimate objects such as a clock or a piece of machinery. This work should be analyzed in terms of its perseverative quality, salience of social vis-à-vis inanimate elements, visual-perceptual coherence, and presence of unusual qualities given the child's age and developmental level. These unusual features may include a precocious sense of perspective and "realistic" representations such as visual occlusion (e.g., an object is partially superimposed on another with no overlapping lines as they might be perceived if someone was actually looking at them). Such features are important because normally developing children's

drawings often reflect their symbolic or cognitive understanding of an object, for example, a person's body parts are drawn first and then clothed, resulting in overlapping strokes. In contrast, visual occlusion is thought to reflect the predominance of perceptual, rather than cognitive, determinants, in visual representation (Selfe, 1978) and is thought to be typical of at least some children with autism.

The child should then be requested to draw a person, himself or herself, and his or her family. This work can be analyzed in terms of traditional cognitive scoring systems (Harris, 1963) but also, and more importantly, in terms of the difference in quality between the inanimate and the social drawings. Particular attention should be paid to the sense of coherence of the human body and differentiation among people depicted in the drawing. It is also important to question the verbal child, to the extent possible, about the drawing because oftentimes what appears to be an indistinguishable stroke may represent the child's effort to comply with the request to draw a person.

Play offers innumerable opportunities to explore aspects of the child's development and behavior (see Chapter 14, this *Handbook,* Volume 1). These include cognitive quality, for example, functional/manipulative versus representative and imaginative, and the presence of role play (Fein, 1981), which provides an indication of the child's capacity for taking the perspective of others. This is an essential social-cognitive skill necessary for adequate interaction with others and development of self-understanding (Selman, Lavin, & Brion-Meisels, 1982). If opportunities to observe these phenomena are not available in the child's spontaneous play, the examiner may initiate play situations to directly explore the child's understanding of social-emotional phenomena. For example, a puppet setting can be used to elicit the child's responses to situations of joy and distress, as well as to explore the child's ability to impute mental states (e.g., beliefs, intentions) to others and predict their behavior accordingly (Baron-Cohen, 1988). These observations may help validate the measurements obtained with more standardized instruments to sample play skills such as the ADOS (see earlier Diagnostic Work-up section).

CONCLUSION

This chapter presents an overview of psychological assessment of children with ASD within the broader context of transdisciplinary evaluations. We advocate the use of a comprehensive developmental approach involving adherence to several core principles:

1. The adaptive and maladaptive functioning of individuals with autism must be interpreted in terms of the interrelationship between normative developmental expectations and the delays and typical deviant patterns of behavior associated with these conditions.
2. To fully capture an individual's psychological functioning, it is critical to assess, in an integrated fashion, multiple domains of functioning. The selection of relevant domains of functioning should be based on state-of-the-art knowledge of typical psychological profiles observed in individuals with ASD as well as the presenting problems of the specific individual. Tests should be chosen that are developmentally appropriate and that maximize the sampling of a wide range of skills.
3. In light of the variability in performance across time and settings typically observed in individuals with autism, it is essential that information be gathered from multiple sources, particularly those related to the individual's naturalistic settings (e.g., school, home).
4. In the administration and interpretation of specific tasks, attention should be paid to conditions that optimize or diminish performance (e.g., level of structure, social demands, task shifts).

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