Section 1 What We Know About Autism and How We Know It

Chapter 1

Autism nosology: historical perspectives

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In January 2009, the White House posted an action agenda on its website. In it, the new Obama administration made a commitment to "supporting Americans with Autism Spectrum Disorders," by increasing funding for research, treatment, screening, public awareness, and support services. Particular mention was made of advancing research on the treatment and causes of autism; improving lifelong services; enhancing federal and state programs; and implementing universal screening.

This statement was noteworthy, not only for its recognition of autism as a significant public health concern, deserving increased federal funding for research and treatment, but also for the use of the term *autism spectrum disorders*. By choosing this phrase to characterize the condition commonly known as autism, the White House was recognizing that autism is not a single disorder, but many.

A central theme of this book is that autism is a clinically and etiologically heterogeneous condition. Although people diagnosed with autism share certain characteristics – a triad of unique and severe deficits in social interaction, difficulties in verbal and nonverbal communication, and a restricted repertoire of interests and behaviors – they vary remarkably in the nature of these deficits, in accompanying symptoms, in intellectual functioning, and in underlying cause.

Given this heterogeneity, it is essential that there be some consensus on how to define and classify the disorders that we now refer to as autistic. Such a consensus is needed for research, so that investigators can agree upon the phenomena they are studying; for clinical care, so that patients can be diagnosed with consistency and treatments tailored for recognized diagnoses; and for the legal system, for provision of government and educational services, and for health insurance (Volkmar and Klin, 2005). Beginning with the initial description of autistic disorder in 1943 by Leo Kanner, there has been a lengthy process of refining and validating this particular diagnosis and those of the related conditions we now group as autistic spectrum disorders (Wing, 2005).

The purpose of this chapter is to review the presently agreed upon diagnostic and classification system for autism, specifically the diagnoses in the last published editions of the Diagnostic and Statistical Manual of the American Psychiatric Association, the DSM-IV (APA, 2000), and the International Classification of Diseases, ICD-10 (World Health Organization, 1992). The history of the clinical description of these diagnostic entities will be presented; controversies surrounding their use will be discussed; and some alternative conceptualizations and classification schemes will be reviewed. The changes in the definition and criteria for diagnosing autistic conditions that are anticipated for DSM-5, to be published in 2013, will also be discussed.

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Terminology

At present, there are five separate diagnoses in DSM-IV (and in DSM-IV-TR, the 2000 version with revised accompanying text), comprising the disorders we commonly call autism: Autistic Disorder; Pervasive Developmental Disorder, not otherwise specified; Asperger's Disorder; Childhood Disintegrative Disorder; and Rett's Disorder. With some minor variation, the diagnostic categories in ICD-10 are similarly named. However, differences between the two systems can be confusing. There are, moreover, a number of alternative terms used in autism. Table 1.1 attempts to provide some clarity by listing the diagnoses used in DSM-IV and ICD-10, together with less formal, largely equivalent terms. It should be noted that these diagnoses as a group are formally referred to as pervasive developmental disorders (PDDs), a term that was originally introduced in DSM-III (American Psychiatric Association, 1980) and is roughly equivalent to the term autism spectrum disorders (ASDs). The latter term is based on the concept of a spectrum, or continuum, of autistic characteristics that are shared by all these disorders (Wing, 2005). In DSM-5, these separate diagnoses are expected to be subsumed under a single diagnosis: Autism Spectrum Disorder.

As already mentioned, the term autism itself can be applied collectively to all PDDs or ASDs and is generally so used in this book. Historically, however, autism referred only to autistic disorder (childhood autism in ICD-10, also known as Kanner syndrome, infantile autism and full-syndrome autism), the first-described, best-validated and generally most severe of the PDDs.

One other source of confusion deserves mention, especially for parents. Although all ASDs are called pervasive developmental disorders, DSM-IV has a category of Pervasive Developmental Disorder, not otherwise specified (PDD-NOS). As discussed further below, this diagnosis is used in two ways: as a provisional diagnosis when there is insufficient information to specify what type of PDD a person has, and for cases of "atypical autism," when criteria for autistic disorder or one of the other PDDs are not fully met. It is not uncommon, however, for the "NOS" to be dropped in referring to such cases, and parents are often confused by the fact that their children have "PDD," not autistic disorder, when autistic disorder, properly speaking, is a PDD.

Table 1.1 Diagnostic terms for conditions classified as pervasive developmental disorders.

DSM-IV	ICD-10	Equivalent Terms
Autistic disorder (AD)	Childhood autism	Kanner syndrome, Infantile autism, Full-syndrome autism, autism
Pervasive developmental disorder, not otherwise specified (PDD-NOS)	Atypical autism, Pervasive developmental disorder, unspecified	
Asperger's disorder	Asperger syndrome (AS)	Asperger's syndrome
Childhood disintegrative disorder	Childhood disintegrative disorder	Heller's syndrome
Rett's disorder	Rett syndrome	
For the group as a whole:		
Pervasive developmental disorders (PDDs)	Pervasive developmental disorders	Autistic spectrum disorders (ASDs), autism

Three other terms relevant to the diagnosis and classification of autism that are frequently used are *primary*, *secondary*, and *syndromic* autism. The latter two terms are roughly equivalent and refer to the occurrence of autism in a person who has a medical condition or syndrome that is assumed to be the cause of the autism. Primary autism occurs in persons who do not have an identified, purportedly causative medical condition. Another term for primary autism is *essential* autism. The latter term is used in this book.

Still one more term in frequent use is *broad autism phenotype*. This construct is used in genetic research and refers not to autism, but rather to traits in relatives of autistic individuals that are qualitatively similar to symptoms of autism, but not of sufficient severity to confer a PDD diagnosis.

Autistic disorder: history of a diagnosis

Most of the diagnoses of mental disorders in DSM-IV and ICD-10 are based on clinical features – observed behaviors and reported symptoms – that are characteristic of the disorder and meet defined qualitative criteria. In the case of autistic disorder, the characteristic features were originally recognized in detailed clinical descriptions; the criteria for diagnosis were arrived at through expert consensus, tested for reliability and validity and refined over time. Establishing diagnostic criteria requires selection of essential or core features of the disorder that are expected to occur in every case, and separating these out from other, associated features that may accompany the disorder but are not universally present. This fact must be taken into consideration when considering autistic disorder as it is presented in DSM-IV and ICD-10. The consensus criteria permit a reliable diagnosis to be made, but they do not provide a comprehensive description of the disorder. Individuals with autistic disorder can vary enormously, and their treatment needs and prognosis depend on their individual patterns of strengths and deficits, developmental course over time and social context.

The recognition of autistic disorder began in 1943, when Leo Kanner, a psychiatrist at Johns Hopkins Hospital, published a report on 11 children he had examined who "differed markedly and uniquely" from children previously described in the psychiatric literature. He provided detailed clinical descriptions of these children, including his own observations, parents' narratives, physical examinations, EEG reports, and cognitive testing. These children, Kanner asserted, represented a unique syndrome.

Kanner went on to describe what he considered to be the defining features of this syndrome. First and foremost was the children's "inability to relate themselves in the ordinary way to people and situations." This inability was present from the beginning of life and manifested by a child's "acting like people weren't there," being "perfectly oblivious to everything around him," "failing to develop the usual amount of social awareness" – in the words of the patients' parents. Kanner called this feature extreme autistic aloneness and titled his paper "Autistic Disturbances of Affective Contact." (The term autism was borrowed from Eugene Bleuler's seminal work on schizophrenia and meant a withdrawal into the self and disregard of the outside world.)

Another prominent feature of the syndrome was disturbance in language. Three of the children described by Kanner failed to speak at all or spoke fewer than five words – by the ages of 4 years, 11 months; 5 years, 2 months; and 11 years. The others were delayed in language acquisition. Moreover, their speech did not "serve to convey meaning to others." They showed excellent rote memory, could name lists of objects and recite nursery rhymes and

prayers, but, in Kanner's words, their communication was "deflected in a self-sufficient, semantically and conversationally valueless . . . memory exercises." Their speech had other peculiarities: parrot-like repetitions – uttered immediately (echolalia) or days later ("delayed echolalia") – literalness with regard to prepositions, and repetition of personal pronouns as heard (saying "you" to refer to themselves).

A third feature was what Kanner called "an anxiously obsessive desire for the maintenance of sameness." This desire was manifest in the children's distress in response to any intrusions, such as loud noises, repositioned objects and parents' demands; by repetitive noises and motions; and by intense emotional reactions to changes in routine or rearrangements of furniture. Connected to this need for sameness was "limitation in the variety of spontaneous activity" and relating better to objects than to people – in part, Kanner opined, because objects do not change appearance and position and do not interfere with a child's aloneness.

These three features were the core of the syndrome described by Kanner and they remain, with some alteration and elaboration, the defining features of autistic disorder in the present. Kanner also made other observations that influenced ways in which autistic children were subsequently regarded, but are not part of contemporary criteria for the syndrome. He surmised that the 11 children he described were "unquestionably endowed with good cognitive potentialities." This description led to the perception, held for several decades, that intellectual disability (mental retardation) and autism are mutually exclusive developmental disorders. This is not the case: the social cognitive deficits and developmental language problems that are associated with autism can be accompanied by global cognitive deficits. Epidemiologic studies have reported that as many as 70% of children with autistic disorder also have intellectual disability (Coleman and Betancur, 2005).

More unfortunate for a generation of autistic children and their families was Kanner's brief description of the parents of the 11 children he presented. He mentioned that they were all "highly intelligent," but also made note of "a great deal of obsessiveness in the family background" and "few really warmhearted fathers and mothers." Although Kanner explicitly stated that he could *not* attribute the children's "aloneness from the beginning of the life" to the way in which these parents related to their offspring and said that "these children have come into the world with innate inability to form . . . affective contact with people, just as other children come into the world with innate physical or intellectual handicaps," other mental health professionals in the 1950s and 1960s attributed autism to aloof parenting (Bettelheim, 1967). This view was in keeping with theories, dominant at the time, that regarded nearly all childhood psychiatric disorders as caused by family environment. The result was that many parents were made to feel guilt over having caused their children's severe developmental disabilities by their own behavior, when no evidence of such an etiology ever existed.

For nearly 40 years after Kanner's initial description, and despite his assertion that he was describing a unique developmental syndrome, autism was classified as a psychotic disorder. The only diagnosis in the first two editions of the DSM (1952 and 1968) that was available for the children Kanner described was *childhood schizophrenia*. The terms childhood psychosis, childhood schizophrenia, and autism were often used interchangeably (Rutter, 1978). During this same period, there was disagreement about what constituted the essential features of the disorder. Kanner himself amended his original description to permit onset after a period of normal development of one to two years, and also reduced the essential symptoms to two – extreme aloneness and preoccupation with preservation of sameness – downplaying the

abnormalities of communication noted in his initial formulation (Eisenberg and Kanner, 1956). In contrast, other authors suggested that a specific cognitive deficit involving language function was the core feature of the disorder (Rutter *et al.*, 1971). Still others considered disturbance of perception and motility – not even mentioned by Kanner – to be the essential symptoms of the disorder (Ornitz and Ritvo, 1976).

By the late 1970s, sufficient research evidence had accumulated to confirm Kanner's conception of autistic disorder as a unique and valid diagnosis and to clarify its essential features. In 1978, the British psychiatrist Michael Rutter published a summary of this research. He stated that there were three broad groups of symptoms found in nearly all children with infantile autism, but much less frequently in children with other psychiatric disorders. These were "a profound and general failure to develop relationships; language retardation with impaired comprehension, echolalia and pronominal reversal; and ritualistic or compulsive phenomena." Rutter went on to cite studies that distinguished autism from intellectual disability by the pattern of associated cognitive deficits (but emphasized, at the same time, that autism and intellectual disability can coexist and that developmental level must be taken into consideration when assessing an autistic child's behavior). Rutter also cited research that distinguished autistic disorder from childhood psychosis, neurosis, and developmental language disorders. He made the observation that autism can develop in children "with heterogeneous disease states" and suggested it could very well be a behavioral syndrome without a single cause, but with a common biological mechanism of causation, like cerebral palsy.

According to Rutter, the principal symptoms of autism could be grouped as three diagnostic features:

(1) *Impaired social relationships*. Symptoms include lack of attachment behavior and relative failure of bonding that is most marked in the first 5 years, with characteristics including not seeking parents for comfort and not developing "kiss-and-cuddle" bedtime rituals. Withdrawal and lack of eye-to-eye gaze are not, however, invariable symptoms. Symptoms of social impairment in older autistic children are lack of cooperative play, failure to form friendships, and lack of empathy.
(2) *Language and pre-language skills*. Early symptoms include lack of imitation and use of gestures, such as "bye-bye;" failure to make meaningful use of toys; lack of imaginative play; failure to use communicative gestures, such as pointing at desired objects. Development of receptive language is delayed. Many children – Rutter cited a figure of 50% – fail to develop useful speech. Acquired speech is uniquely characterized by immediate and delayed echolalia and "I–you" pronominal reversal. Speech is often used without intent to communicate and without the reciprocal, back-and-forth nature of conversation.
(3) *Insistence on sameness*. Like Kanner, Rutter used this phrase to cover a wide range of stereotyped behaviors and routines. Symptoms of this feature of autism include limited play patterns that lack variety and imagination; attachment to objects; unusual preoccupations (in older children: with bus routes, train timetables, patterns, and numbers); repetitive, stereotyped asking of questions; and resistance to environmental change.

Rutter proposed these three features, plus onset by 30 months of age, as diagnostic criteria for autism. His criteria received broad acceptance and were used around the world in clinical work and epidemiologic research (see Chapter 2). The condition originally described by

Kanner, clarified over time and validated by the studies cited by Rutter, was now widely accepted as a unique childhood psychiatric diagnosis – clearly recognizable and distinguished from other pediatric mental and developmental disorders.

At around the same time as Rutter's 1978 article, the first standardized diagnostic and classification systems designating autism as a distinct condition were published. These were ICD-9 and DSM-III. In ICD-9, *infantile autism* was classified under "psychoses with origin specific to childhood." DSM-III defined infantile autism largely according to Rutter's criteria. It classified this condition, together with similar conditions, as *pervasive developmental disorders* (a new term). The other conditions in this category were *residual autism* (for cases in which children no longer met the full criteria for autism, but had done so when younger), *childhood onset pervasive developmental disorder* (COPDD, for cases with onset after 3 years of age), *residual COPDD*, and *atypical PDD* (for autistic-like conditions that could not otherwise be classified).

The introduction of the term pervasive developmental disorders was considered an important advance by most authors (Rutter and Schopler, 1988). It highlighted the fact that autism was the result of distortion in several developmental processes and was not a type of functional psychosis. The term also provided a diagnostic home for a number of conditions occurring in early childhood with features resembling autism, but apparently distinct from it. These autistic-like syndromes included children with severe intellectual disability and the triad of impaired social behavior, communication deficits, and repetitive behaviors; children who had been described by Asperger; children whose symptoms began beyond infancy; and children who showed profound regression after 3–4 years of normal development and then experienced loss of social skills and language and the onset of repetitive behavior – a condition called "dementia infantilis" by Heller (1930).

The existence of conditions that resembled infantile autism in some ways, yet differed from it – not actually meeting the diagnostic criteria proposed by Rutter – was emphasized in a 1979 epidemiologic study by Wing and Gould. The authors investigated the prevalence of severe impairments in social interaction, communication and social play in children with developmental disabilities in the Camberwell borough of London. They found a subgroup of this population with "Kanner's early childhood autism," but these children shared many abnormalities with other socially impaired children. Based on this work, Wing (1988, 2005) went on to describe a "continuum," and later a "spectrum" of autistic disorders, conceptualizing what we now call pervasive developmental disorders as "a range of clinical pictures that differ from each other but have an underlying unity," including the "most severe to the subtlest manifestations of the autistic triad" (Wing, 2005).

In 1987, the APA published a major revision of the DSM-III, the DSM-III-R. In this edition, the triad of autistic features continued to be the basis of the diagnosis, but infantile autism was renamed *autistic disorder*, and the diagnostic process required selection of 8 of a total of 16 separate, descriptive criteria in the three broad areas of impairment. The requirement for early age of onset was dropped; the categories of residual autism, COPDD, and atypical autism were eliminated. The diagnostic category *pervasive developmental disorder, not otherwise specified* (PDD-NOS) was introduced, to be used for late-onset and atypical cases, and for conditions on Wing's autistic spectrum, such as Asperger's syndrome. These changes had the effect of broadening the category of autistic disorder beyond the boundaries suggested by previous diagnostic systems (Volkmar and Klin, 2005). Also departing from past approaches was the elimination of the age-of-onset requirement, a clear departure from Kanner's and Rutter's formulations. The new criteria did, however, provide a better foundation for diagnosing autistic disorder in older children (Volkmar and Klin, 2005).

DSM-III-R was replaced by DSM-IV in 1994. The DSM-IV criteria for PDDs were designed to be consistent with ICD-10, although there are some differences between the two systems. Specifically, ICD-10 has separate diagnostic guidelines for clinical and research purposes, while DSM-IV uses one diagnostic system for both. There are also minor differences between the two systems in terminology, and ICD-10 retains the category of atypical autism. Both systems are in the process of revision, with DSM-5 publication planned for 2013.

Table 1.2 presents the DSM-IV criteria for autistic disorder (DSM-IV, APA, 1994; DSM-IV-TR, APA, 2000). Of note is that the early-onset criterion (with evidence before age 3 of delays or abnormal function in at least one of the three areas of social interaction, language, and imaginative play) has been restored. There are 12 separate symptom criteria, reduced from 16 in DSM-III-R. To be diagnosed with autistic disorder, a child must meet six of these 12 criteria, with at least two symptoms indicating impairment in social interaction and one symptom each of impaired communication and restrictive, repetitive, and stereotyped behavior and interests. This weighting of deficits in social interaction reflects the primacy that both Kanner and Wing attributed to social impairments in autism.

In the descriptive material that accompanies the table of criteria in DSM-IV-TR, there are a number of elaborations. With regard to peer relations (criterion A1b), it is stated that

Table 1.2 Diagnostic criteria for 299.00 Autistic Disorder.

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

(1) qualitative impairment in social interaction, as manifested by at least two of the following:
- (a) marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction
- (b) failure to develop peer relationships appropriate to developmental level
- (c) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g. by a lack of showing, bringing, or pointing out objects of interest)
- (d) lack of social or emotional reciprocity

(2) qualitative impairments in communication as manifested by at least one of the following:
- (a) delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
- (b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
- (c) stereotyped and repetitive use of language or idiosyncratic language
- (d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(3) restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:
- (a) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
- (b) apparently inflexible adherence to specific, nonfunctional routines or rituals
- (c) stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements)
- (d) persistent preoccupation with parts of objects

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

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

younger individuals may have little or no interest in establishing friendships, and older individuals may have an interest in friendship but lack understanding of the conventions of social interaction. Lack of social reciprocity (criterion A1d) is described as not actively participating in simple social play or games, preferring solitary activities, or involving others in activities only as mechanical aids. Autistic individuals may be oblivious to other children, have no concept of the needs of others or fail to notice another's distress.

Communication impairment is further described as follows.

> When speech does develop, the pitch, intonation rate, rhythm, or stress may be abnormal . . . Grammatical structures are often immature and include stereotyped and repetitive use of language (e.g., repetition of words or phrases regardless of meaning; repeating jingles or commercials) or idiosyncratic language (i.e., language that has meaning only to those familiar with the individual's communication style). Language comprehension is often very delayed and the individual may be unable to understand simple questions or directions. A disturbance in the pragmatic (social use) of language is often evidenced by an inability to integrate words with gestures and understand humor or nonliteral aspects of language such as irony or implied meaning. Imaginative play is often absent or markedly impaired. (APA, 2000, pp. 70–71)

A detailed description of restricted, repetitive and stereotyped patterns of behavior and interests is also provided:

> Individuals with autistic disorder display a markedly restricted range of interests and are often preoccupied with one narrow interest (e.g., dates, phone numbers, radio station call letters). They may line up an exact number of playthings in the same manner over and over again or repetitively mimic the actions of a television actor. They may insist on sameness and show resistance to or distress over trivial changes (e.g., a younger child may have a catastrophic reaction to a minor change in the environment such as rearrangement of the furniture or use of a new set of utensils at the dinner table). There is often an interest in nonfunctional routines or rituals or an unreasonable insistence on following routines (e.g., taking exactly the same route to school every day). Stereotyped body movements include the hands (flapping, finger flicking) or whole body (rocking, dipping, and swaying) . . . These individuals show a persistent preoccupation with parts of objects (buttons, parts of the body). There may also be a fascination with movements (e.g., the spinning wheels of toys, and the opening and closing of doors, an electric fan or other rapidly revolving object). The person may be highly attached to some inanimate object (e.g., a piece of string or a rubber band). (APA, 2000, p. 71)

DSM-IV-TR also makes note of symptoms and behaviors that may accompany autistic disorder but are not criteria for the diagnosis: hyperactivity; short attention span; impulsive, self-injurious, and aggressive behaviors; hypersensitivity to sounds, light, touch, smells; abnormalities in eating; sleep disturbance; and abnormalities of mood and affect.

The criteria for childhood autism in ICD-10 are broadly compatible with those for autistic disorder in DSM-IV. Prior to development of the DSM-IV, a multinational field trial was undertaken in which 125 clinicians rated 977 cases of autism and related disorders, using DSM-III, DSM-III R, and proposed ICD-10 criteria (Volkmar *et al.*, 1994). ICD-10 criteria were found to be more specific and to yield fewer false positive diagnoses than DSM-III R criteria. This field trial and subsequent discussion led to the decision to utilize criteria similar to those in ICD-10 in DSM-IV.

The two official diagnostic systems thus define autistic disorder (childhood autism) according to criteria that grew out of Kanner's seminal clinical work and Rutter's

reconfigured criteria – clarified, sharpened, and validated over time. These criteria show good reliability and validity, particularly with regard distinguishing autistic disorder from non-autistic psychiatric conditions (Volkmar *et al.*, 1994; Rutter and Schopler, 1988; Volkmar and Klin, 2005). What is less clear is the validity of the distinction between autistic disorder and other PDDs, as they are defined in DSM-IV and ICD-10 (Mahoney *et al.*, 1998; Myhr, 1998; Klin *et al.*, 2000; Witwer and Lecavalier, 2008). The absence of valid distinctions among the PDDs is one of the primary reasons that the plan for DSM-5 is to abandon the present distinctions among the PDDs and establish criteria for a single diagnosis, Autism Spectrum Disorder, that will unite the historic diagnoses of Autistic Disorder, Asperger's syndrome and PDD-NOS, which will then cease to be used.

Asperger's syndrome

In 1944, one year after Kanner described infantile autism, Hans Asperger, an Austrian pediatrician, published his postgraduate thesis. In this paper he described four boys, aged 6–11, as examples of a group of youngsters with what he called "autistischen psychopathen im Kindesalter," best translated as "autistic personality disorders in childhood." Asperger's report appeared in Austria during World War II. He was unaware of Kanner's work, and his borrowing the same word – autistic – from Bleuler was a coincidence. Asperger's paper remained largely unknown outside Austria, Germany, the Netherlands, and the Soviet Union until 1981, when Lorna Wing published "a clinical account" of what she called *Asperger's syndrome*.

Wing emphasized the following features of the syndrome, as described by Asperger.

(1) Absence of any delay in speech, a full command of grammar, but some problems initially with using pronouns correctly. Speech is described as pedantic and consisting of lengthy disquisitions on favorite subjects, with some repeated and stereotyped word usage.
(2) Impaired nonverbal communication, with limited gestures and facial expression; monotonous, droning or exaggerated vocal intonation; and poor comprehension of other people's expressions and gestures.
(3) Inability to understand the unwritten rules governing social behavior in such areas as speech, gesture, posture, eye contact, and choice of clothing. Accompanying this deficit are inappropriate social approaches (not adapted to the needs and personalities of others), sensitivity to criticism, and ineptitude with the opposite sex.
(4) Repetitive activities and resistance to change, including intense attachment to certain objects.
(5) Clumsy and ill-coordinated gross motor movements; odd posture and gait.
(6) Particular skills: excellent rote memory; intense interest in one or two subjects such as "astronomy, geology, history of the steam train . . . bus timetables . . . prehistoric monsters," at the exclusion of others. Talk about these areas of special interest consists of long repetition of memorized facts – whether or not the listener is interested.
(7) Appearing markedly eccentric in the school environment, with possible consequences of being bullied and becoming secondarily fearful, or being accepted as "eccentric professors." At school, these children may follow their own interests regardless of their teachers' instruction.

Based on her own experience with cases similar to Asperger's, Wing proposed several modifications to Asperger's account. Unlike Asperger, who indicated that symptoms are

not evident before age 3, Wing noted a lack of sharing pleasure with others; absent or restricted imaginative play; and a lack of the expected urge to communicate with babbling, gestures, and speech in infants and toddlers. Although Asperger specified that his patients develop speech early, Wing found that half of her cases were slow to talk. She also noted that when these children acquired speech, the language was impoverished, in the sense that it was copied from others and "gave the impression of being learned by heart" – despite the presence of well-developed vocabulary and good grammar. Wing also disagreed that these individuals were creative within their restricted areas of interest. She characterized their thought processes as narrow, pedantic, and literal.

Wing's discussion of Asperger's syndrome reflected the perspective derived from Wing and Gould's (1979) Camberwell study, namely that certain problems in child development clustered together: absence or impairment of social interaction, absence or impairment of comprehension or use of verbal and nonverbal language, and absence or impairment of flexible imaginative activities. Like children with Kanner's autism, people with Asperger's syndrome displayed common, co-occurring developmental deficits. The two conditions were, therefore, related. Wing left open the issue of whether the conditions were separate entities – something she believed could best be determined when their etiologies were finally known. In the meantime, she suggested that there was clinical value in using the concept when working with children and adults with features of Asperger's syndrome.

Wing's paper had enormous influence. The term Asperger's syndrome was adopted by clinicians worldwide and many research studies were undertaken to better define and validate the disorder. Diagnostic criteria were proposed by a number of authors, each with a somewhat different perspective on what constituted the defining features of the condition (Szatmari *et al.*, 1989; Gillberg, 1991; WHO, 1992; APA, 1994). The diagnoses Asperger syndrome and Asperger's Disorder were included in ICD-10 and DSM-IV.

In both ICD-10 and DSM-IV, the specific criteria for impairment in social interaction and for repetitive, restricted, and stereotyped behaviors in Asperger's syndrome are the same as those for autistic disorder. In addition, DSM-IV requires that there be no significant general delay in language, in cognitive development or in the development of self-help skills and adaptive behavior (other than in social interaction) and curiosity about the environment. If full criteria are also met for another PDD, then the diagnosis of Asperger's Disorder is excluded. This has been called the "precedence rule" (Klin *et al.*, 2005).

ICD-10 is somewhat more specific with regard to absence of language and developmental delays, specifying that single words should have developed by the age of 2 years, communicative phrases by the age of 3 years. It states that self-help skills, adaptive behavior, and curiosity about the environment during the first 3 years should be "consistent with normal intellectual development." ICD-10 also adds mention of motor skills, stating that motor milestones may be somewhat delayed and that motor clumsiness is "usual." It also states that isolated special skills, associated with preoccupations, are common, although not required for diagnosis.

Earlier diagnostic systems proposed by Szatmari and Gillberg included social dimensions that are not diagnostic criteria in DSM-IV and ICD-10. Both had a criterion of lack of desire for, or interest in, making friends. These authors also mentioned inability to "appreciate social cues" (Gillberg), "difficulty sensing feelings of others", and "clumsy social approach" (Szatmari) – features of the syndrome emphasized by Asperger and Wing. With regard to restricted interests and behavior, Gillberg required the presence of an "all-absorbing narrow interest" and *imposition* of routines on oneself or others.