Autism Spectrum Disorders: Developmental History of a Concept

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Rutger-Jan van der Gaag

The term autism was first introduced in 1908. The famous Swiss psychiatrist Eugen Bleuler used the term autism to describe the very aloof and withdrawn condition of some patients with what he called schizophrenia. Leo Kanner (1943), when describing eleven children with "an autistic disturbance of affective contact", clearly had Bleuler's thoughts in mind. Likewise Hans Asperger (1944) called the atypical boys in his study "autistic psychopaths", hereby also alluding to some resemblance with schizophrenia. Despite the fact that "autistic aloofness" does not by far cover the complexity of the pervasive developmental disorder described nowadays as "autism spectrum disorder", the term has become the common way to describe the large range of individuals with a syndrome characterized by impairments of the development of social and communicative reciprocity and a rigid and restricted repertoire of interests and behaviours. In this chapter a historical overview of the development of a concept in psychopathology will be presented.

It may be interesting to note, before entering into the matter, that Bleuler believed that there was a continuum between psychiatric disorders and normality. This is very much in line with the current concept of a broad autism spectrum ranging from severe cases to well-adapted individuals with autistic features bordering what Simon Baron-Cohen would call an *autistic condition* including 5 % of the population.

This chapter aims at giving the reader a stepwise overview of the development of the concept of the condition/disorder currently labelled as "autism spectrum disorder" (ASD) to get a better understanding of what is understood by ASD, what the current issues are both in terms of clinical problems and integration of individuals with ASD in our complex societies and what is at stack in terms of

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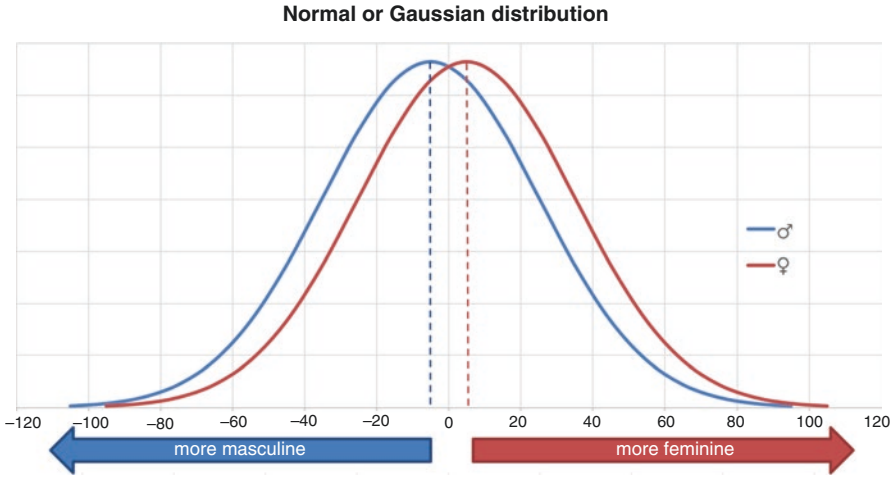
research. This chapter has no pretention of being exhaustive, and readers interested in more details will find references to solid overviews at the end of this chapter.

1.1 Autism Has Always Been Around as an Evolutionary Trait

Johan Cruyff, a brilliant Dutch soccer player and coach who recently passed away, was well known for his very down to earth pragmatic sayings: one sounded like, "You can only see it when you know about it". This holds true for the condition that we have been calling autism for the past seven decades since the seminal reports in the 1940s of the past century. But that does not mean that the condition since then called autism had not been not around for ages already. Simon Baron-Cohen (2002) refers to autism as the "extreme male brain". If so there must have been good evolutionary reasons why the male brain developed in a different way compared to the female brain. Before going further on the pathway of evolutionary speculation, it is good to note that apart from clear bodily distinctions between males and females, the distribution of psychological and behavioural characteristics is by no means clearly split between sexes but shows a huge overlap.



But when it comes to the gross differentiation of the evolution of the male and female brain, the speculation is (Skuse et al. 1997) that the differences are linked to adaptive behaviour. In primitive societies, male and female roles were clearly distinct: females were sedentary and occupied with raising children, preparing food and socializing with other families to ensure a peaceful co-existence. The faculties required for such tasks are empathy (understanding what others mean and intend and feel) and a global way of perceiving situations in

order to understand its dynamics and act in consequence. In that sense the pattern of thinking in those women was mostly "analogue", in other words open to different interpretations in the context. In those primitive societies, men were the hunters who went out to gather food and make sure the community was not under threat from other groups or tribes, eager to steel their goods and eventually wives and children. This asked for quite a different set of skills: perseverance, detailed observation (in order to find the trails of their prey and signs of the presence of potential enemies) and a rather digital way of thinking as they had to make quick and clear decisions such as take a left or a right and inhibit all kinds of interferences to be completely focused on their task. As we know, in evolution neither the brightest ones nor the strongest survive but those that can adapt best to the circumstances under which they live. Thus, in those societies warm and socially oriented females and detail-geared perseverant males were favoured and often chosen as mating partners to ensure the survival of the species. This differentiation was of course by no means absolute. As societies evolved, men differentiated to become responsible for law and order, and those "poli(=city)ticians" obviously needed all kinds of qualities earlier more attributed to women, such as awareness of what is happening and a certain social shrewdness to "manipulate" others to reach one's goals. But the earlier described "male traits" of detail-focused and digital thinking were popular in another area, namely, scientific development of tools, agriculture and later culture altogether and science. It goes beyond the scope of this chapter, but it is obvious that from monks to great scientists, men (and women) with autistic traits/"extreme male brains" have contributed enormously to scientific progress and innovation in technology. We are all acutely aware of the fact that no progress in the seminal computer science would have been achieved without the contribution of binary thinking, single-minded (wo)men that invented and still help promote our rapidly expanding digital world. So in many cases "the extreme male brain" seems to (have been) be a definitive asset. Yet we all realize that many of these geniuses were cognitively brilliant but oftentimes socially odd, or strange, call it eccentric, and in many ways different. Some of them were so absorbed by their research and activities that they did not take time to wonder if they were happy. The ones, who did, often felt isolated and miserable.

We are currently able to better understand this evolutionary trait, much better thanks to the tremendous progress that we have made from studying extreme clinical cases.

Those clinical cases raised interest in different parts of the world, and the tribute should be given to Leo Kanner (1943) and Hans Asperger (1944) who nearly simultaneously, without being aware of each other's publications, drew attention to what they both called a clinical syndrome. A clinical syndrome means the co-occurrence of a similar set of symptoms in different individuals. So let us see how they defined their syndromes, which they called "autistic disturbances of affective contact" and "autistic psychopathy", respectively (the word psychopathy should not be read here as the summon of the callous antisocial personality but merely as "psychopathology").

PATHOLOGY

To understand and measure emotional qualities is very difficult. Psychologists and educators have been struggling with that problem for years but we are still unable to measure emotional and personality traits with the exactness with which we can measure intelligence.
—Rose Zeligs in *Glimpses into Child Life**

AUTISTIC DISTURBANCES OF AFFECTIVE CONTACT

By Leo Kanner

SINCE 1938, there have come to our attention a number of children whose condition differs so markedly and uniquely from anything reported so far, that each case merits—and, I hope, will eventually receive—a detailed consideration of its fascinating peculiarities. In this place, the limitations necessarily imposed by space call for a condensed presentation of the case material. For the same reason, photographs have also been omitted. Since none of the children of this group has as yet attained an age beyond 11 years, this must be considered a preliminary report, to be enlarged upon as the patients grow older and further observation of their development is made.

1.2 Autistic Disturbances of Affective Contact (Kanner 1943)

Leo Kanner (1894–1981) was an Austrian psychiatrist who trained in Berlin and Vienna. He immigrated to the USA in the 1920s and was selected to set up the first child psychiatry department at John Hopkins in Baltimore. There he and his team devoted themselves to very scrupulous case histories and trying to discern similarities between different cases to be able to classify them as syndromes. The first case, Donald T, was followed by ten other cases (together eight boys and three girls) that Kanner wrote up for his seminal publication in 1943. What struck him and his team in the first instance was that they were all *good-looking children*, presenting with the same kind of *inability to relate themselves in the ordinary way to people and situations from the beginning of their life*. They seemed completely secluded from the outside in a state of *extreme autistic aloofness*. Another similarity he described was their *failure to assume an anticipatory posture*. Three of them never developed

spoken language, whilst the others spoke late and in various peculiar ways: echoing both directly and as so-called delayed echolalia (repeating long sentences by heart but completely out of the context), speaking nonsense words (neologisms), knowing whole chains of related words and nursery rimes and mostly *naming* instead of using language to communicate. Kanner also observed that when they understood what was being said, these children tended to take everything literally. They all had *excellent rote memory*. Intrusions like *loud noises* and *moving objects* terrified them, each one with specific hypersensitivities. They definitely showed *limitations in the variety of spontaneous activities*, time and again engaging in *monotonous repetitious* movements and habits. And these children all seemed governed by *an anxious obsessive desire for the maintenance of sameness*. They had a good *relation with objects*, with which they would engage in exciting activities, such as spinning, leading in many cases to a seemingly *ecstatic fervour* that eyed as "*masturbatory orgastic gratification*". Though they seemed to have *good cognitive potentials* and all had *strikingly intelligent physiognomies* and came from *highly intelligent families*, their outcome was poor, and they seemed to function at a far lower level of intelligence than one would have expected. Kanner thought the condition could have an *innate disturbance*, pointing to an inborn organic cause (both *physical and intellectual*), although in the last paragraph of his article, he also alluded to "coldness in the parents" and the fact that several marriages of the parents were painful failures. Though Kanner did not specify that he thought these parental conditions were the cause of the disturbance in the children, he never really opposed to those who overread the "organic cause" Kanner suggested and strongly pointed to the parents as bearing responsibility for the condition of their kids.

This is the sad part of an incredibly accurate description that still characterizes autism spectrum disorders in their current definitions.

1.3 Boys with Autistic Psychopathy

Nearly at the very same time, Hans Asperger (1906–1980), an Austrian paediatrician from Vienna, published a very similar paper describing the features of four boys (representative of a group of 200 over whom he published later). The paper is less accessible than Kanner's writings for two reasons, the first being that it was written in German and not translated before the 1980s and the second that it starts with a long and interesting but tough reflection on psychopathology and how to classify syndromes. But strikingly, Asperger seems to describe the other side of the same coin. He uses the same term "autistic" for the lack of "social reciprocity" and the boys' "autistic intelligence". To a certain extent, the resemblance is striking: social aloofness, restricted patterns of interest and hyper-focalisation on specific preoccupations of stereotypies and extraordinary skills on a limited scope.

(Aus der Wiener Universitäts-Kinderklinik [Vorstand: Prof. *Franz Hamburger*].)

Die „Autistischen Psychopathen“ im Kindesalter[1].

Von

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Leiter der Heilpädagogischen Abteilung der Klinik.

(Eingegangen am 8. Oktober 1943.)

Problemstellung.

Ordnung und Erkenntnis des Aufbaues der Dinge ist eines der letzten Ziele der Wissenschaft. In der Fülle der Erscheinungen des Lebens, die voller Gegensätze sind, die mit verschwimmenden Grenzen in einander übergehen, sucht der denkende Mensch dadurch einen festen Standpunkt zu finden, daß er den einzelnen Erscheinungen einen Namen gibt, sie abgrenzt gegen die anderen Erscheinungen, Zusammenhänge, Ähnlichkeiten und Gegensätze feststellt, kurz, die Dinge in eine Ordnung, in ein System bringt. Diese Arbeit ist eine wesentliche Voraussetzung des Erkennens.

Die Wissenschaft vom Menschen mußte ähnliche Wege gehen. Nirgendwo aber sind die Schwierigkeiten größer als hier:

Jeder Mensch ist ein einmaliges, unwiederholbares, unteilbares Wesen („In-dividuum“), darum auch letztlich unvergleichbar mit anderen. In jedem Charakter finden sich einander scheinbar widersprechende Züge — gerade aus Gegensätzen und Spannungen lebt ja das Leben.

On the other hand, there are definitive differences: a high, though disharmonic and oddly focussed intelligence, motor clumsiness and high verbal skills lacking pragmatism (yet again not used for communication). But Asperger described other areas that Kanner did not mention or mentioned only briefly. First he pointed at the extremes in emotions (panic and anger) and the terrorizing behaviours these boys showed vis-à-vis their parents in order to have it always their way (a behaviour that parallels the need for sameness in Kanner's autistic children); secondly he was far more explicit in his causal thoughts: he refers to the "erbbiologisches" aspects, meaning that he was strongly convinced that this condition was hereditary as the sons (he only described boys) looked very much like their fathers. However, he was intrigued by the fact that the fathers seemed rather successful in their careers as scientists and engineers and seemed to be just less subject to strong emotional swings and single minded than their offspring. This is despite the fact that what Asperger referred to as "autistische intelligenz" (digital – strictly and extremely logical – rigid in its reasoning) seemed to apply both to the fathers and the sons. Finally, Asperger was far more optimistic about the outcome. Where Kanner complained that most of the patients he described where *dumbed in schools for feeble-minded*, Asperger saw that many of his patients grew over their ill tempers and dictatorial behaviour towards their parents, did well in science and were able to pursue a career in that field.

But as stated earlier, Asperger had hardly any impact abroad until Lorna Wing (1981) (through Uta Frith, who could read German) rediscovered Asperger's work, where she found an adequate description of those patients with autistic features who, in her studies, did not meet Kanner's diagnostic criteria by far.

1.4 Dark Times of Blaming Parents for the Autism in Their Children

Meanwhile, as an unintended consequence of Kanner's allusions to the typology of the parents of his patients as cold and distant, blaming the parents for the autistic condition of their child had been taken up by the dominant stream within psychiatry in those days and especially by psychoanalysts, with a great deal of tragic, unnecessary suffering as a consequence. For nearly two decades, it was strongly put forward that these "refrigerator" mothers should be blamed for the autistic condition of their children. The culmination of this movement was the publication of the book *The Empty Fortress* by Bruno Bettelheim (as late as 1967). For parents these were extremely painful years, not only did they suffer from the dramatic condition of their children, moreover they were overloaded with accusations by those treating their children and felt utterly guilty. Though this ceased in the 1970s in most of the Anglo-Saxon world and the Nordic countries in Europe, the influence of psychoanalysis remain(ed)s very strong in Latin countries in Europe and South America. It is painful because the evidence that the parents are not to blame in causal terms is extremely strong. Firstly, most of the parents with an autistic child also have healthy children, which makes it even more intriguing as to why one should be affected! Secondly, it has become evident that the despair of the parents, perceived as coldness, is not the cause of the autism in their children but, on the contrary, is a consequence of having, and being burdened by, a child who does not at all respond as one should expect, hardly relates, and is extremely difficult to sooth.

1.5 Emergence of a Pragmatic Empirical Approach

The psychoanalytical approach had a great impact and lasted worldwide for nearly two decades. But slowly changes started to occur. Parents united in users-group associations and expressed their discontent with the unfair blaming. A nice illustration was formed by a button in the USA stating "*Madness is hereditary, you get it from your kids*". This was a heartbreaking appeal. It illustrates the immense burden of having a child with autism. On the other hand, it indirectly calls for a different, more scientific approach. And that is what emerged in different ways in the 1960s and 1970s of the twentieth century. Different approaches were favoured, including epidemiology, neurophysiology and genetics. Emerging attention was given also to treatment and guidance approaches, as the intensive psychoanalytical approaches did not seem to bring cure or, at best, produce an improvement that was so slim, which without any intervention development might have had the same result.

Yet in order to study a condition/disease/disorder, it is of great importance to have consensus on how to identify those cases who are targeted in those studies. This was the start of the movement aiming at defining autism as a distinct clinical entity by offering a set of diagnostic criteria. In the UK Mildred Creak's working party (1961) came up with a list of nine criteria to be used as when diagnosing autism or when doing research into this condition. These criteria enabled systematic research such as the first prevalence study on autism by Victor Lotter (1966). This study yielded an estimated prevalence for this condition of 4.5/10.000. Subsequent replications of this study showed that the prevalence worldwide was practically the same, rendering it rather unlikely that autism might be caused by parents' way of bringing up their child, as child-rearing styles vary greatly from one culture to the other.

Tentatively some psychoanalysts started studies into the hypersensitivity of children with autism such as Ritvo and Freeman (see Ritvo and Freeman 1984) at Yale Child Study Centre, where Sally Provence favoured a dual approach to developmental psychopathology.

But in those days, parents who were also health professionals and scientists made the difference. To illustrate this point, let us look into the contributions of Bernard Rimland and Lorna Wing.

Rimland (see Rimland 1968) was triggered by his son's behaviours. Marc Rimland, in later life a talented artist, had a most atypical development. His father attributed this to autism and perceived it as a neurodevelopmental disorder. Leo Kanner himself acknowledged this when he wrote the foreword in Rimland's book *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior* (1964) that paved the way to more research into the neurological correlates of this intriguing disorder.

Lorna Wing, mother of a daughter with autism and intellectual disability and spouse to John Wing, a well-known expert in the field of schizophrenia, took a very different approach. Together with her Maudsley colleague Judy Gould, she undertook a comprehensive epidemiological study in the London Borough of Camberwell (Wing and Gould 1979). This was an absolutely seminal tipping point in the developmental history of the concept of autism.

The Camberwell Study The initial goal was to replicate the Lotter study by a comprehensive and systematic study of the prevalence of autism in a defined area with approximately 150.000 inhabitants. The results were of great interest especially because of the way Wing and Gould analysed the huge data set in a population of 155.000, including 35.000 children and adolescents, but even more so by the very clear manner in which they reported their results:

- Firstly, they discovered that the prevalence of "autism" as defined by Kanner was in line with Lotter's findings: 4.9 in 10.000. But they found a much larger group adding up to nearly 0.21 % of the population that displayed a number, but not all, of the symptoms described by Kanner. Amongst these they identified cases very similar to those that Asperger had discovered. Thanks to her collaborator Uta Frith, Wing was able to introduce Hans Asperger work to the Anglo-Saxon community: a welcome finding as many clinicians knew these

individuals but failed to diagnose them correctly because they were not familiar with Asperger's work.

- Secondly, Wing and Gould clustered the symptoms in different dimensions. The three first, known as the Triad of Wing, still form the basis of the international classification systems to date:
  - Impairment of the quality of social interaction
  - Impairment of the development of reciprocal communication
  - Restricted and repetitive stereotypies and preoccupations
  - (Impaired development of imagination)
- Thirdly, they point to the variety of expression on the different dimensions. For example, on the impairment of the social interaction, the expression ranged from aloof, via passive to what they named "active but odd". And likewise for all the other dimensions, they could show that in individuals with autism, or autism in a broader sense, the presenting symptoms varied greatly both in the way they expressed themselves but also in the way they would change as development progressed.

Thus, Wing and Gould changed our perception of autism profoundly, from a very rare disorder with dramatic impairments to a developmental syndrome with a core group and lesser variants and an evolving clinical picture from early childhood into adulthood with variations both for the better as for the worse as time progresses. Wing (1997) was the first one to take an even broader view, stating that autism was not only a spectrum disorder but that the autistic features were on a continuum ranging from profoundly impaired with mental retardation via bright eccentricity into normality.

This concept of autism as a developmental disorder was strongly supported by reports from the group at Yale Child Study Centre (Cohen, Volkmar, Klin) who in a comprehensive study of cases from 1947 onwards (Dahl et al. 1986) could identify four distinct groups of children with developmental disorders: (1) those with a global retardation; (2) those with classic Kanner autism (with and without learning disability); (3) the autism-related group including the more rigid Asperger group and the group with severe problems in behaviour, emotion and thought regulation multiple complex developmental disorders (McDD); and finally (4) children with specific isolated developmental disorders (motor coordination, language, reading, calculating, etc.).

Lorna Wing's triad, as mentioned above, has from 1980 formed the core triad of impairment criteria for diagnosing autism and related disorders. This recognition of autism as a disorder in its own right led to an explosion of research in autism… but also to a fivefold increase in the prevalence of autism!

In the following paragraphs, we will look into these developments step by step.

1.6 Inclusion of Autism and Pervasive Developmental Disorders in DSM III (1980)

Though the Camberwell study made it clear that "autism" is a very heterogeneous condition, the international classification systems (DSM III and ICD 9) opted for a strictly categorical approach. In 1980 the committee of the American *Diagnostic*

and Statistical Manual of Mental Disorders proposed to include "autism" within a broader category they named "pervasive developmental disorder (PDD)" (in contrast with general and specific developmental disorders). The DSM III subdivided the PDD category into five disorders: (1) infantile autism, (2) residual infantile autism, (3) child-onset PDD, (4) residual child-onset PDD, and (5) PDD – not otherwise specified.

This induced a major change in the approach to autism. Well-defined behavioural criteria were very welcome and helped shape sound and broad research. In the following paragraphs, we will review the progress of research along very different pathways to end up with the current situation.

Splitting or Lumping? The greatly regretted Donald Cohen (1940–2001), from Yale Child Study Centre, emphasized that classification systems should, in principle, be heuristic. That is, they should incite research to make them even better and, in the case of pervasive developmental disorders, lead to further exploration of areas that are still unclear. As the approach was mainly categorical, the search was for distinct subgroups that would help to specify the fuzzy areas called "Childhood onset Developmental Disorders" and even more the ill-defined "PDD-NOS" area. Some even at that time, in the late 1980s/early 1990s, preferred the idea of a continuum ranging from infantile autism to normality via subgroups where the symptoms appeared less severe and finally would fade away into normality (Wing 1997). Others focussed more on describing distinct groups. On the one hand were those who mainly addressed the "aloof" side of the autistic triad as described by Wing and Gould. Obviously, Wing herself favoured Asperger's description to define this group. Asperger's was the term used by Christopher Gillberg and his Swedish group. They published a great number of impressive population-based studies to underscore the face validity of Asperger's concept… with emphasis on the social and motor awkwardness that they eventually also coined as DAMP syndrome (Deficits in Attention, Motor control and Perception). They thus broadened the scope by putting more emphasis on the developmental aspect of the condition than on a static disease category. Interestingly, very similar children and adolescents were well described by Sula Wolff from Edinburgh under the name schizoid children, summarized in a beautiful book as *Loners*. Moving more to the "active but odd" part of the continuum were those who tried to categorize those children with autistic features who were not aloof but eager and boundless in approaching others and also characterized by mood swings, strong affects and thought problems. This group had been described by Scandinavian authors as from 1968 under the label "borderline syndrome in children" (Aarkrog 1981 – Wergeland 1979), but after the apparition of DSM III and the Dahl study on subtyping of developmental disorders, this group received scrupulous scientific attention under different names: Peter Szatmari from Canada published several studies in which the term schizotypal was used, whilst others embraced the concept of multiplex developmental disorders (later multiple complex developmental disorders (McDD)) proposed by Donald Cohen, based on the Dahl et al. study, to describe this group. Different groups studied these patients in depth: Kenneth Towbin et al. (1993) in the USA and Rutger Jan van der Gaag in the Netherlands (1993) and Jonathan Green (1998) in his seminal

book on in-patient treatment in childpsychiatry. These studies, though clinically very relevant, were not taken on board in the revisions of DSM and ICD for two possible reasons: they appeared too late (DSM III was already revised by 1987), and they were not in line with the, at that time, generally favoured view that autism and schizophrenia were entirely distinct conditions.

Now why was DSM III revised so quickly? In general one can say that this happened because DSM III was an armchair consensus document that needed empirical evidence. But when it comes to the autism section, more was at hand: It appeared quite rapidly that the proposed categories were not fit for clinical nor for scientific use. Infantile autism had such strict criteria with regard to age of onset and severity of symptoms that many children clinically diagnosed with autism did not meet the criteria. Childhood-onset PDD could only be classified if the onset was after 30 months of age, and atypical autism and PDD-NOS appeared to be indistinct. The DSM-III-R revision into autistic disorder and PDD-NOS dropping of the age of onset criteria and stretching out of the criteria for autistic disorder to a less stringent interpretation of the Wing triad did not help much either. It was rightly criticized for being overinclusive. Yet another move would follow quickly as DSM IV appeared as soon as 1994. Within those 7 years, whilst research was going on to test the validity of the PDD subgroups, the DSM committee took on board three rather randomly chosen subgroups and based the face validity on armchair field trials. Two new subgroups – Rett syndrome (in girls) and disintegrative disorders (formerly Heller's syndrome) – were in fact more neurological than psychiatric. Both had severe regressive characteristics in children who, after a seemingly sound development of 9 months to 3 years, lost speech and motor skills and who, during their regression, could display "autistic" features. But no real reasons existed to assume they had anything in common with autism in essence. The last inclusion was neither a happy one either. Asperger's disorder was introduced in DSM IV as "autism with a normal language development". Quite unfortunate as Asperger had described children with apparently good speech but no language skills in terms of reciprocal communication. Thus, the DSM IV criteria for Asperger were not fit for Asperger's original cases, who in DSM terms would either be diagnosed as autistic disorder or merely PDD-NOS.

But empirical research made it clear that a categorical approach to autism and PDD was the right way to go. So what have these studies revealed thus far?

1.7 Scientific Progress from Different Angles

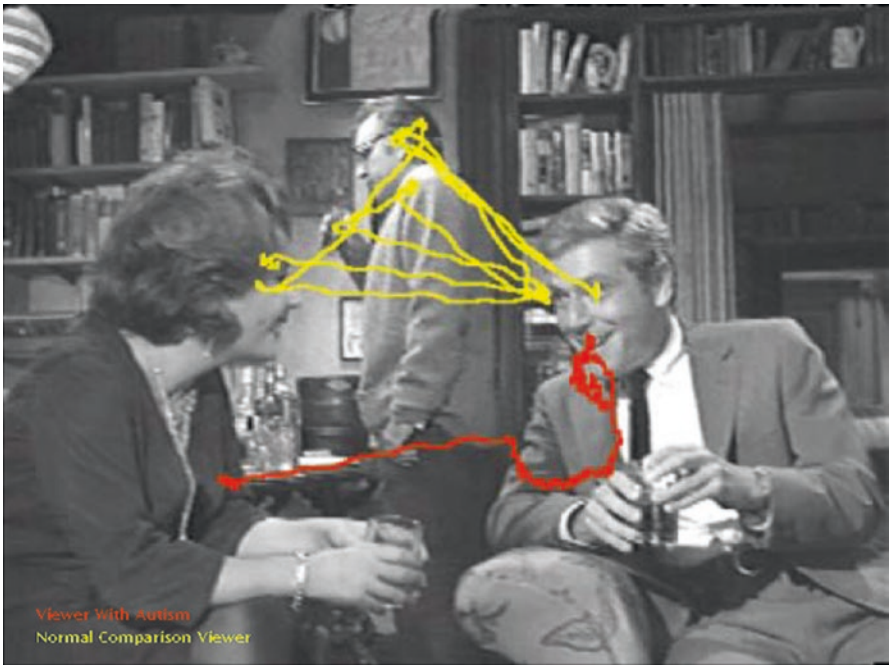
The movement that led to the publication of DSM III with its theoretical criteria along with an explosion of new techniques in neuroimaging and genetics fostered an incredible amount of empirical research in autism, in various domains.

1.7.1 Findings from Electrophysiology

In the 1970s of the past century, it became possible to measure the arousal levels in experimental conditions through combined measures of skin conductance and heart

rate. In the 1980s computer technology enabled filtering out all the noise in the electroencephalogram to analyse the brain's response to external stimuli (evoked response potentials). These studies showed that individuals meeting the criteria for pervasive developmental disorders (from autism to PDD-NOS) have aberrant neurophysiological patterns. Their levels of arousal are either too high or too low to process (social) information correctly. They also appear to process incoming (social) information in a different way; where typical individuals show high responses to novel information and a pattern of habituation when the same information is repeated or encountered, individuals with autism in the broad sense tend to either ignore novelty or respond very intensely. As they do not show normal habituation patterns, the world for them seems new over and over again, making life fraught with anxiety.

These conclusions seem solid, as they were independently reproduced worldwide. At the same time, they raised a fundamental question, namely, if people with autism do in fact perceive the information that is offered to them. This is a pertinent interrogation, since, from the first descriptions by Leo Kanner, gaze aversion has been described as a prominent feature in individuals with autism. Further technical developments led to studies in which gaze patterns of individuals could be monitored by linking eye movements to eye tracking of images perceived on a screen. This lead to a series of seminal studies by Ami Klin (2002) and his team that showed that where typical individuals look at the eyes to appraise the other person's emotions and intentions, people with autism are more inclined to look at moving parts, thus missing essential social information.



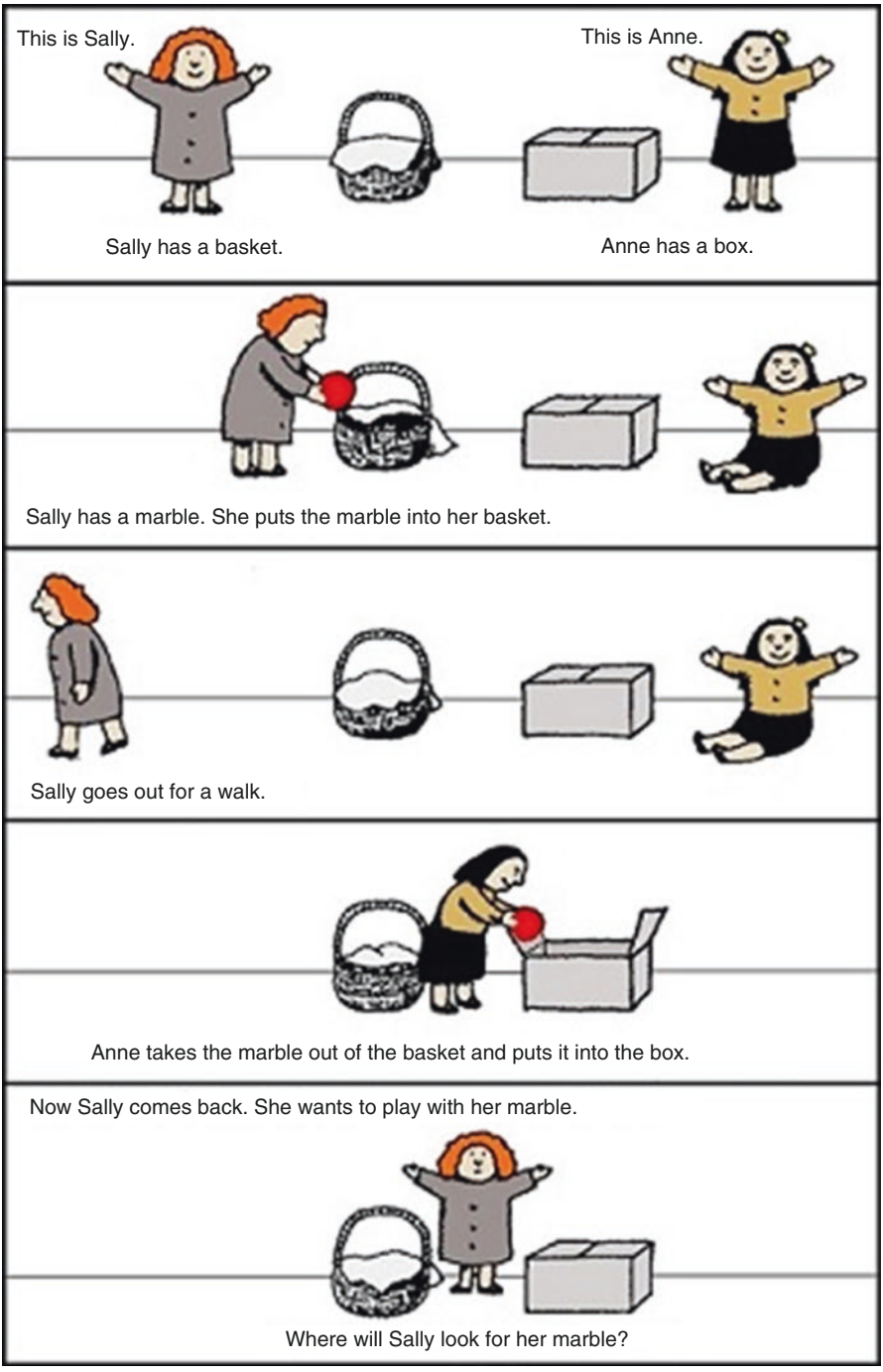
This picture (Klin et al. 2002) clearly illustrates this point: typical individuals (yellow) scan the scene in such a fashion that they look at the interaction between the two individuals on the foreground but also include the third person, clearly showing that they understand that the conversation relates to that third person. Individuals with autism (in this study high functioning college students) clearly miss the point by paying too much attention to mouth movements and clothing.

These information processing findings matched well with the great leap forward made in neuropsychology by groups in the UK and USA, helping greatly to understand why people with autism are so different when it comes to their appraisal of, and reactions to, social situations.

1.7.2 Findings in Neuropsychology

Neuropsychology yielded two important contributions to our understanding of autism. The first is the fact that individuals with autism appear in general to have very disharmonic profiles when it comes to their IQ as measured, for instance, on the classic Wechsler scales. But here again it is more the disharmonic pattern that emerges rather than "one" and the same disharmonic pattern common to all individuals with autism. Roughly speaking individuals with "Kanner-like" autism seem to have higher scores on their performance IQ than on their verbal IQ, whereas individuals with Asperger's tend to have the reverse pattern, namely, high verbal IQ versus low performance IQ (a pattern extensively studied by Rourke (1989) and his team as "nonverbal learning disabilities" but that appears by no means to be specific for autism nor for a subgroup within autism spectrum).

The second contribution refers to more complex information processing related to understanding other individuals and appraising their emotions and intentions. The first series of studies referred to what is commonly called the *theory of mind* (Uta Frith and Francesca Happé 1994). This relates to the development, at an early age, of the child's ability to understand that other people have other perspectives, intentions and motives than oneself. It refers to the individual's capacity to take the other's perspective in order to understand what he/she thinks and why he/she should think this. In a series of well-conducted experiments, it appeared that the development of the theory of mind in individuals with autism is most often delayed and in many cases different. This insight has greatly helped outsiders to better understand why people with autism can so grossly misunderstand others and react so awkwardly in social situations.


This is Sally.
This is Anne.
Sally has a basket.
Anne has a box.
Sally has a marble. She puts the marble into her basket.
Sally goes out for a walk.
Anne takes the marble out of the basket and puts it into the box.
Now Sally comes back. She wants to play with her marble.
Where will Sally look for her marble?

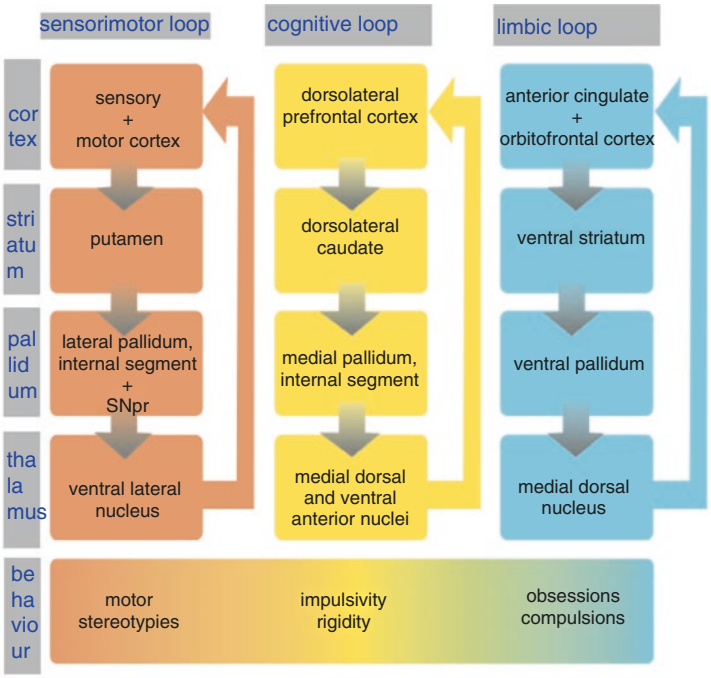
Along with these studies, it became obvious that individuals with autism lacked a sense of *central coherence.* This relates to one's capacity to focus on relevant clues and ignore irrelevant details. The focus on details was described both by Kanner and Asperger, and neurophysiological studies made it clear that the impaired information processing in individuals with autism implies that they are not able to process well-known information automatically, leading them to focus again and again on details to understand the whole, whereas in typically developing individuals as from the seventh year of life, a global appraisal of a (new) situation makes it possible to orient oneself quickly, details being only processed, if relevant, later. Thus, the finding that a different development of *theory of mind* and *central coherence skills* hampers individuals with autism in their understanding of others, as summarized by Simon Baron-Cohen (1995) as "*mind-blindness*", helps us to understand how people with autism are handicapped by their defective understanding of social situations. The third finding in the field of neuropsychological research was on the complex topic of *executive functioning* (Happé et al. 2006). This refers to the activities within the frontal areas of our brain that help us to choose how to act and then plan and execute our actions in consequence. Here again it appeared that individuals with autism have greater difficulties when it comes to smoothly and flexibly acting and reacting in social circumstances.

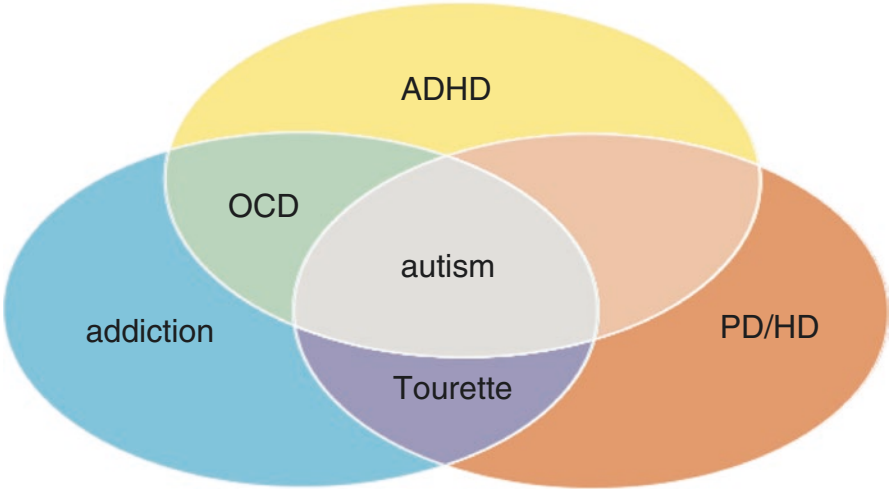
Thus, empirically based neuropsychological theories elaborated in the 1980s and 1990s of the past century have greatly contributed to our understanding of why individuals with autism are "different". But it soon appeared both in neurophysiology and in neuropsychology that the findings for autism were by no means specific. Very similar findings of aberrant arousal, deviant theory of mind and difficulties with executive functioning were found in clinical conditions as diverging as schizophrenia and depression, amongst others. This poses a fundamental question when it comes to the construct validity of clinical syndromes such as they were conceived in the twentieth century and that form the backbone of our classifications in psychopathology.

1.7.3 Findings on Neurotransmitters

A beginning of an explanation or augmentation of our confusion was given by studies combining (dis)functional pathways in the brain linked to certain neurotransmitters, e.g. dopamine. In an extensive review of animal and human studies on fronto-cortico-striatal pathways related to patterns of rigidity, Langen et al. (2011) were able to discern three different loops and relate them, if dysfunctional, and with regard to abnormal dopamine release in the striatum and prefrontal cortex, to conditions as different as "addiction" (in the case of limbic dysfunctioning, leading to rigid skewedness on substances and habits), Parkinson's (in the case of sensomotor dysfunctioning, leading to rigid patterns of motor functioning) or on the contrary disinhibition in the case of attention deficit disorder when the cognitive fronto-cortico-striatal pathway is functionally impaired. This explains the behavioural overlaps between these disorders and autism that can exhibit more or less all of these different expressions of dysfunction:

"addiction" like obsessions and preoccupations, the "active but odd" behavioural disinhibitions and emotional swings in, e.g. Asperger's and Multiple Complex Developmental Disorders (McDD), whereas many individuals with autism also show motor rigidity and stereotypies, as illustrated in the figures here below.





OCD=Obsessive Compulsive Disorder – PD= Parkinson's disease – HD= Huntington's disease (Langen et al. 2010)

How far have we moved from the very accurate clinical pictures by Kanner, wrongly attributed to bad parenting and autism, as underlying brain dysfunctioning becomes more evident, and from a condition very distinct to other forms of psychopathology and normality? What about heredity, which Asperger supposed to be in play?

1.7.4 Findings from Genetics

The first study relating to genetics and autism (Folstein and Rutter 1977) was on concordance of the condition in monozygotic twins. Monozygotic twins are by definition genetically identical. Thus, if a condition has "a" genetic cause, the concordance in identical offsprings should be 100 %. In first instance, focussing only on very strict Kanner criteria, Folstein and Rutter found only a concordance in infancy of 30 %. From their clinical point of view, they interpreted it as proof that genetic factors played a limited role in the aetiology of autism. Geneticists perceived this very differently: if a condition only occurs, at the most, in 0.3 % of the general population, and if 30 % of the cases in monozygotic twins are concordant for the disorder (i.e. a hundredfold increase in incidence), then there must be a high degree of heritability! Rutter later admitted his mistake, when 10 years later, the twins were reassessed, taking into account the broader phenotype, and the concordance raised to 90 %, by far the highest in psychopathology (far higher than in cancer, diabetes, cardiovascular diseases, depression, schizophrenia, etc.). But the fact that concordance never reaches 100 % means that it is not the disease that is inherited but the vulnerability to develop the disease! And where on the human genome would that vulnerability to developing autism be located? Admitting that it is only a vulnerability to develop the condition that is indeed inherited, which external factors then could be in play and which can trigger that predisposition?

The answer to the second question is yet to be resolved, but there are clear indications for prenatal adversity in the form of infections (e.g. rubella), toxins (medication, alcohol, etc.) and stress. Whereas no clear evidence has been found for a relation between perinatal hazards and autism, the postnatal environmental factors that could contribute to developing autism still have to be identified.

With respect to the specific genetics of autism, much was expected from the mapping of the human genome. Unfortunately here again the heterogeneity of autism is huge. Correlations between functional defects (e.g. polymorphism, deletions, inversions) on all chromosomes and autism have to date been established, with a higher number of positive findings involving chromosomes 7, 15, and 22 and the X chromosome (Staal et al. 2015). Moreover, there is evidence that parental inheritance may only account for part of the genetic risk, with a higher frequency of de novo mutations than previously thought.

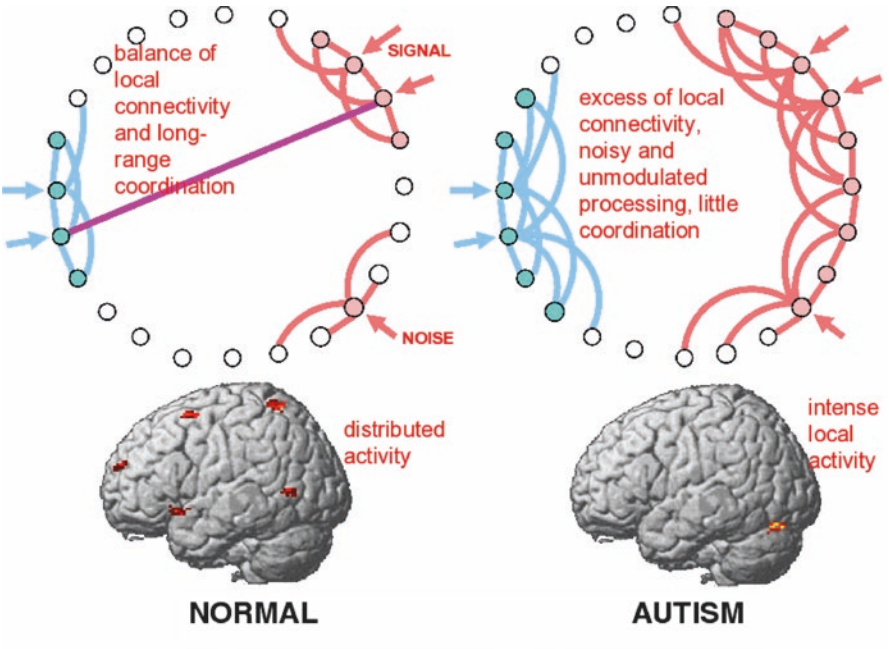
So for the time being, there are clear-cut indications for genetic involvement in the aetiology of autism, but here again there appears to be not one cause but a huge

variety of genetic vulnerabilities leading to heterogeneous phenotypic (clinical) expressions within the autism spectrum. Do they lead to clinical expression through anatomical and functional brain abnormalities? If this is the case, the tremendous technical advances in neuroimaging could provide us with some answers.

1.7.5 Findings from Neuropathology and Neuroimaging

There is in fact one abnormal feature that seems to characterize autism as a whole and that is the fact that, statistically, individuals with autism have bigger brains (macrocephaly) than not only typically developing individuals but also individuals with other developmental disorders such as schizophrenia or ADHD. It has been hypothesized that this could be due to deficient pruning of irrelevant brain connections, a process that normally takes place in the second year of life. This in turn could explain the information processing difficulties that we have described previously. Post-mortem studies of brains of individuals who had autism confirm this finding. Moreover, Kemper and Bauman (2005) found evidence of developmental brain immaturity in autistic brains, such as aberrant patterns of cell density, with increased cell packing density and reduced numbers of axons, as well as reduced cell sizes in regions that are crucial for information processing, namely, the hippocampus, the amygdalae and the cerebellum. Specifically in the latter, Kemper and Bauman found fewer Purkinje cells, pointing at reduced efficiency of the normal relaying, by the cerebellum, of primary sensory information to the frontal cortex for further processing. These findings point at vulnerabilities in those brain networks that enable humans to rapid and flexible adaptation to varying (social) circumstances. In the absence of any global indications for anatomical differences between typical brains and those of individuals with autism (Verhoeven et al. 2010), the (preliminary) neuroanatomical findings tend to point at functional deficits or abnormal functional patterns of information processing. This hypothesis (functional differences in individuals with autism) gained support from neuroimaging studies using newer techniques. Chris Frith (2003), for instance, using PET and functional MRI, showed that individuals with autism involve far more brain regions when solving theory of mind problems than neurotypical individuals. The latter tend to show increased BOLD signal in regions such as the fusiform cortex when appraising social situations, which they do much faster than individuals with autism. These findings were confirmed using the even newer DTI (diffuse tension imaging) technique that makes it possible to visualize interconnected brain networks involved in specific tasks. Just et al. (2004) found – and this has been extensively replicated – that individuals with autism have different connectivity patterns when compared to typical individuals: where typical individuals develop so-called “long range” connectivity networks, people with autism tend to stick to the far less mature “short range” local connectivity patterns as seen in very young children. This is an appealing theory because it helps to explain a great number of peculiarities in autism that Kanner and Asperger had already signalled from a clinical point of view, such as

excessive focus on details, excellent rote memory and hypersensitivity to "noise" that they cannot inhibit in order to focus on the signal. The following figure illustrates these connectivity differences between individuals with autism and neurotypical individuals.



But here again the connectivity differences are not "the biological marker" for autism, as there is not such a marker yet. The question is will we ever find one? Not really and that is because we still tend to perceive autism as a distinct category, whereas Wing (1988) already pointed at autism as a continuum.

At this point we need to open a small parenthesis. DSM III proposed to rename autism into "pervasive developmental disorder". Yet as you noticed, the authors tended to revert to the "inadequate" terms autism and autistic, inadequate as individuals with "autism" are far from all being aloof and autonomous, whilst the term autism tends to reflect a condition rather than a developmental disorder. The reason seems to be twofold: the first one is of a linguistic nature. In English the adjective "pervasive" has the connotation of "existing in all parts" of "spreading to affect all parts", which differentiates poorly from a "general" developmental disorder, which would refer to intellectual backwardness such as in "learning disability". Secondly, parents and users preferred the term autism, because they had grown used to it over the years. Thus, "pervasive developmental disorder" was gradually changed into the currently common denomination of "autism spectrum" (disorder).

So what has changed over the years?

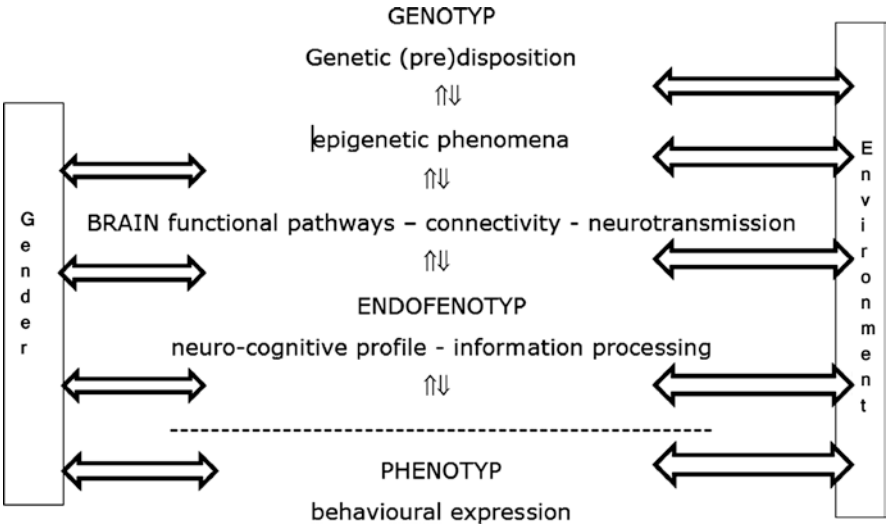
1.8 In Conclusion: From Autism to PDD to Autism Spectrum Disorder (DSM V), Where Are We Currently?

Quite a lot has changed, frankly speaking, since the seminal papers in the 1940s and the DSM revolution in the 1980s. In sum and to conclude, let us look at the current situation and hypothesize on what may happen in the (near) future:

1. Epidemiology:
   - "Autism" has evolved from a very rare condition with a high overlap with learning disability towards a quite common condition. The current estimated prevalence (Baird et al. 2006) of autism spectrum disorder is 1 % of the population worldwide. This figure refers to the prevalence of individuals presenting symptoms on the autism spectrum and impairments in functioning as a result.
   - There could be different reasons why the prevalence of autism has increased to such a degree:
     – One of the obvious reasons why ASD prevalence is on the rise is that more is known about it and thus it is better acknowledged in clinical practice.
     – Another one is that ASD is diagnosed far more often in "high functioning" individuals. Subsequently, the core group of 30 years ago – those with a co-occurring learning disability – is now a minority.
     – Another reason could be that individuals with lesser forms of ASD that could maintain themselves pretty well in predictable well-structured societies are at loss in the current culture that requires great flexibility and fast information processing from many sources.
     – A final reason could be the benefits that come along with a diagnostic label in terms of access to services, special education and social security. Somehow, "medical classifications" serve nowadays as a passport to gain access to these services in most countries worldwide.
2. A changing view on ASD as the ill part of a form of intelligence to be seen as a societal asset:
   - "Autism spectrum disorder" points at the group of individuals with autistic features who are impaired by them, in contrast with a larger group of individuals who have a so-called autistic condition but do not suffer and even sometimes benefit from being so.
   - Simon Baron-Cohen (2012) estimates that the prevalence of an "autistic condition" amounts to 5 % of the population. Not everyone who has "an autistic intelligence" – i.e. a skewed, systematic, strictly logical way of thinking, with a strong perseverance – suffers as a result. It has become clear that much of the scientific and technical progress of mankind has come from highly gifted individuals with this kind of intelligence (from middle age monks through Newton and Einstein to all those involved in the development of computer technology). Thus, many of the scientists and engineers (male and female) have more than a touch of autism. In other words, next to a lot of impairment and consequent difficulties and suffering, autism over the years has undoubtedly been an evolutionary asset.

- This new perspective on autism has surely been of great advantage for the self-awareness and pride of individuals with ASD.

3. Autism as a developmental condition:
   - There is consensus on the fact that ASD is a developmental condition that evolves as age progresses.
   - In other words it is sometimes difficult, in clinical practice, to differentiate between developmental effects and progress that results from treatment interventions.
4. Gender:
   - "Autism" is not merely a "male" condition though it appears to be more common amongst boys and men than in girls/women, but there are clear indications that this could be caused by a "criterion" bias, as the defining criteria for ASD are still very much focussed on male characteristics.
5. Diagnosis, treatment and guidance:
   - Where autism was, historically, more or less synonymous with a poor outcome and lifelong (institutional) dependency, nowadays an educational approach to treatment and guidance can help to foster meaningful societal participation and high degrees of independence.
   - Unfortunately, oftentimes the classification ASD is equated with the individual diagnosis.
   - As we have seen, autism is a highly heterogeneous condition at very different levels. A comprehensive assessment of the individual case should take all these different levels, aspects and interactions into account (see figure by van Wijngaarden-Cremers et al. (van Wijngaarden-Cremers et al. 2014) below) in order to tailor an individualized treatment/guidance plan.



- When it comes to treatment, it must be noted that to date no "cure" for autism has been found, despite claims in that direction. Schopler et al. (Schopler et al. 1982) elaborated the TEACCH program (*Treatment and Education of Autistic and Related Communication Handicapped Children* www.teacch.com) to date the

most effective and best validated approach to educate individuals with autism and those most near to them both personally and professionally to learn and cope with the difficulties that autism presents to the person himself and those in his near environment. In that sense Schopler and his team set the pace to a modern concept of dealing with chronic diseases and handicaps, that is, not to seek to cure them but far more to help handicapped individuals develop skills that will help them to live a most independent and worthwhile life in the community.

- Though TEACCH is a structured program based mainly on working with visual cues and prompts, the program also taught users that it should be tailored to the individual's profile of strengths and weaknesses and thus adapted to individual needs. This augmented the tension between individual assessment (in English "diagnosis" knowing thoroughly) and classification (in American diagnosis). The illusion created by the classification DSM was and is that autism is a distinct disorder and that "one size fits all" when it comes to treatment and guidance. So how has DSM coped with this dilemma in the long years that lead from DSM IV to DSM 5?
- DSM 5 (2015) has opted for a "lumping" approach to the category "autism spectrum disorders", with dimensional aspects as indicators of severity of the symptoms and impairment. Interestingly, the two first characteristics from the triad of Wing – social and communicative impairment – have been merged into one, whereas some of the characteristics signalled by Kanner and Asperger, for instance, hypersensitivity, have been "reintroduced".
- The "classification" ICD 10 criteria are

Autism Spectrum Disorder 299.00 (F84.0)

Diagnostic Criteria

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive; see text):
   1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation to reduced sharing of interests, emotions or affect and to failure to initiate or respond to social interactions
   2. Deficits in nonverbal communicative behaviours used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication to abnormalities in eye contact and body language or deficits in understanding and use of gestures and to a total lack of facial expressions and nonverbal communication
   3. Deficits in developing, maintaining and understanding relationships, ranging, for example, from difficulties in adjusting behaviour to suit various social contexts to difficulties in sharing imaginative play or in making friends and to the absence of interest in peers

Specify current severity:
Severity is based on social communication impairments and restricted repetitive patterns of behaviour.

B. Restricted, repetitive patterns of behaviour, interests or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):
   1. Stereotyped or repetitive motor movements, use of objects or speech (e.g. simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
   2. Insistence on sameness, inflexible adherence to routines or ritualized patterns or verbal nonverbal behaviour (e.g. extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat food every day).
   3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g. strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).
   4. Hyper- or hyporeactivity to sensory input or unusual interests in sensory aspects of the environment (e.g. apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

Specify current severity:
Severity is based on social communication impairments and restricted, repetitive patterns of behaviour (see Table 1.1).

C. Symptoms must be present in the early developmental period (but may not become fully manifested until social demands exceed limited capacities or may be masked by learned strategies in later life).
D. Symptoms cause clinically significant impairment in social, occupational or other important areas of current functioning.
E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level.

Note: Individuals with a well-established DSM IV diagnosis of autistic disorder, Asperger's disorder or pervasive developmental disorder not otherwise specified should be given the diagnosis of autism spectrum disorder.

Individuals who have marked deficits in social communication, but whose symptoms do not otherwise meet criteria for autism spectrum disorder, should be evaluated for social (pragmatic) communication disorder.

Table 1.1 Severity levels for autism spectrum disorder

Severity level	Social communication	Restricted, repetitive behaviours
Level 3 "requiring very substantial support"	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches	Inflexibility of behaviour, extreme difficulty coping with change or other restricted/repetitive behaviours markedly interfere with functioning in all spheres. Great distress/ difficulty changing focus or action
Level 2 "requiring substantial support"	Marked deficits in verbal and nonverbal social communication skills, social impairments apparent even with supports in place, limited initiation of social interactions and reduced or abnormal responses to social overtures from others. For example: a person who speaks simple sentences, whose interaction is limited to narrow special interests, and how has markedly odd nonverbal communication	Inflexibility of behaviour, difficulty coping with change or other restricted/repetitive behaviours appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action
Level 1 "requiring support"	Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions and clear examples of atypical or unsuccessful response to social overtures of others may appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-fro conversation with others fails and whose attempts to make friends are odd and typically unsuccessful	Inflexibility of behaviour causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence

Specify if:

With or without accompanying intellectual impairment.
With or without accompanying language impairment.
Associated with a known medical or genetic condition or environmental factor.
(Coding note: Use additional code to identify the associated medical or genetic condition.)
Associated with another neurodevelopmental, mental or behavioural disorder.
(Coding note: Use additional code[s] to identify the associated neurodevelopmental, mental or behavioural disorder[s].)

With catatonia (refer to the criteria for catatonia associated with another mental disorder, pp. 119–120, for definition). (Coding note: Use additional code 293.89 [F06.1] catatonia associated with autism spectrum disorder to indicate the presence of the comorbid catatonia.)

6. Outcome and stigma:
   - Understandably with the broadening of the definition, the outcome has changed too. Nevertheless ASD remains a very chronic condition that requires a lot of guidance and lifelong support, especially in periods of transition: adolescence, moving from school to work and, in old age, coping with retirement.
   - Many individuals with ASD suffer unnecessarily from the stigma that results from widespread stereotyped ideas about what ASD is like (e.g. being like "Rain man") and from the fact that most people do not understand the immense difficulties "good-looking" individuals with ASD encounter in everyday life.

Future Directions

The concept of autism has greatly evolved since the first descriptions, under this name, of a clinical syndrome characterized by social and communicative developmental impairments and rigid and restricted patterns of behaviour and interest. Yet it has become evident that there is not one cause for this heterogeneous syndrome. There is certainly a genetic vulnerability in play, but the external triggers and causal pathways are certainly different and remain yet to be elucidated. Despite the causal and clinical heterogeneity, there is enough in common to speak of a spectrum of disorders. But for treatment and guidance, despite the fact that an educational approach shows the best evidence in terms of developmental outcome, a thorough individual assessment is of the uttermost importance in order to tailor treatment and guidance at the individual's and his environment's needs. In this respect, too often the diagnostic classification "ASD" leads to a "one-size-fits-all" therapeutic approach based on the wrong supposition that all individuals with autism would benefit, for example, from visual cues to prompt their behaviour.

For research it is likewise a relevant question whether the category ASD is useful when trying to unravel the underlying causal pathways that lead to the clinical impairments. At this stage of our knowledge, it seems more appropriate to take endophenotypes within the autistic spectrum at a neuropsychological, neurophysiological or connectivity level to understand why in those individuals (e.g. in contrast with their healthy siblings) the interaction of genetic vulnerability and environmental factors has led to a certain clinical profile. These more individually skewed approaches may contribute greatly to the amelioration of individual profile-oriented assessment and diagnostics in order to provide well-adapted treatment and guidance.

Finally as we have seen all along this chapter, most of the research in autism has been performed in children and mostly boys. Too little is known about autism in adults. And that is what this book is about.

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