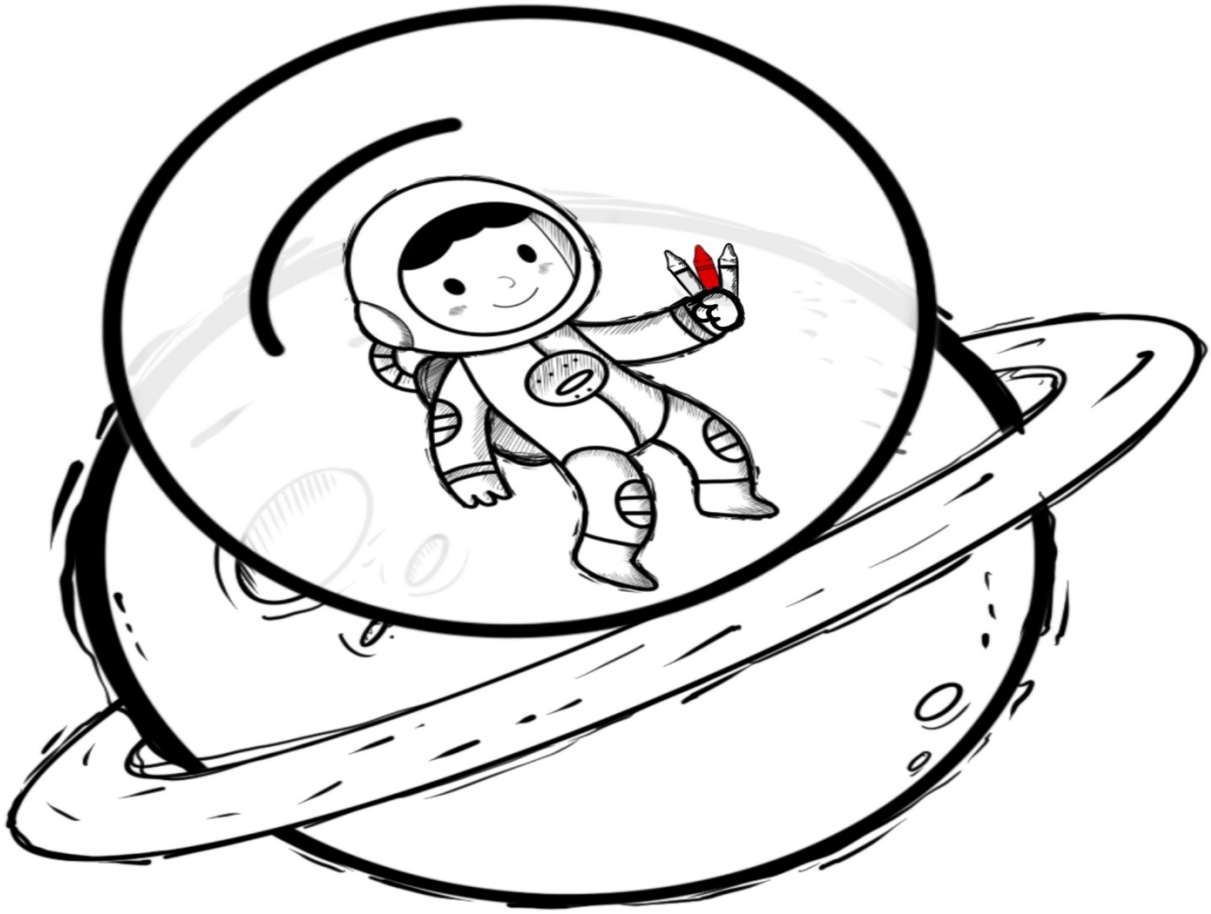
AUTISM, LEARNING and LANGUAGE



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1. Autism Spectrum Disorders

"Being autistic doesn’t mean we are not human, but just different. What is normal for other people is not normal for me and what I consider normal is not normal for others. In a way, I am poorly equipped to survive in this world, like a ufo who is lost without a manual and doesn’t know how to navigate. But my personality has remained intact. My individuality is not damaged. I find great value and meaning in life and I do not wish to be healed by myself. Grant me the dignity to find myself in the ways I desire; recognize that we are different from each other, that my way of being is not just a damaged version of yours. Ask yourself about your beliefs, and define your positions. Work with me to build bridges between us". (p.102).

Autism (Greek αὐτός (aütós)-itself) is a neurodevelopmental disorder with onset in the first years of life. It is characterized by: qualitative compromise of social interactions, qualitative compromise of communication, and limited and repetitive repertory of interests and activities. [APA 200017; WHO 1992].

Autistic disorder (or childhood autism) is included in the group of Pervasive Developmental Disorders (PSD) along with other diseases such as:

- Rett's sindrome.
- Childhood Disintegrative Disorder or Heller's Syndrome.
- Asperger's Disorder: later recognized, generally characterized by the presence of
- normal cognitive and linguistic skills but serious impairment of social
- functioning.
- Pervasive Developmental Disorder Not Otherwise Specified (PDD- NOS).

Currently, Autism, Asperger's syndrome, and DPS-NAS are also referred to as Autism Spectrum Disorders. In addition to the three main features (known as the "symptomatological triad") there are other aspects recognized as peculiar to autism spectrum disorders: the lateness and/or atypical development of various psychological functions; the multifactorial etiology in which genetic factors, still little known, interact with each other and with environmental factors; the change and frequent symptomatological attenuation during development; a chronic course with a significant persistence of disability over time. Autistic spectrum disorders represent an extremely heterogeneous clinical condition. Cognitive functioning and language skills are the factors that most determine clinical

diversity along with other factors such as age, the severity of the three main clinical features, and associated medical conditions (such as epilepsy).

These disorders are relatively frequent, affecting about 1 in every 150 children in all ethnic and social groups, with a higher incidence in males than females in a 4:1 relationship. In recent decades, considerable progress has been made in the interpretation of autism and pervasive developmental disorders. Data from the most recent literature suggest that Autism Disorder originates from organic factors that interfere with the developmental stage of the Nervous System (CNS). Underlying the complex behavioral and cognitive manifestations of these disorders would seem to be functional and structural abnormalities of the CNS, induced both by persistent static processes starting from development in utero and by dynamic processes that change over time and continue in the postnatal life period.

1.1 Historical notes

Until the middle of the last century, the notion of autism and autistic thinking remained a secondary or peculiar symptomatologic aspect of schizophrenia, mostly related to the adult patient. The first to coin the term Autism was the psychiatrist Eugen Bleuler in 191118 to indicate a peculiar attitude of schizophrenia and in particular the isolation of the schizophrenic individual from other people and the outside world, and the consequent closure in one's individuality.

The first descriptions of autistic disorder as it is defined today were divulged by Leo Kanner (1943) and Hans Asperger (1944). In 1943, Kanner (a child neuropsychiatrist of Austrian origin) with the publication of the article entitled "Autistic disturbances of affective contact" reported 11 cases of children, aged between 2 and 8 years, who shared a specific pattern of behavior never described before. He was the first to hypothesize the existence of the autistic syndrome and to describe its ever-present and visible characteristics, identifiable in mental isolation from reality, in a desire for repetitiveness, and the presence of particular 'islets of ability. He had the impression that the autistic had a basic inability, an innate emotional difficulty in maintaining contact with people. On this basis, he concluded that "we must accept that these children came into the world with a congenital inability to have emotional relationships with people, a capacity that is biologically determined."

Based on this mistake by Kanner, the initial hypothesis was developed: the autistic child was neurologically healthy, and the cause of autism could only be detected in a hypothetical "inadequate

relationship" with the mother. For about twenty years this hypothesis dominated the international clinical scene but was later denied.

Hans Asperger, almost at the same time as Kanner, used the term "Autistichen psychopathen" (autistic psychopathy) to define a disorder that involved a certain childhood population with symptomatology largely similar to the ones described by Kanner for his patients, but with much higher cognitive abilities. Asperger's subjects were characterized by a concrete form of thought, obsession with certain topics, excellent memory, and often eccentric behavior and relational modalities. Asperger also identified three important areas in which his subjects differed from Kanner's subjects:

1. Language: Asperger's subjects had fluent speech. In Kanner's subjects, however, there was no language or it was not used in a "communicative" way;
2. Motricity: in Kanner's opinion children were " uncomfortable" only about complex motor skills; according to Asperger they were in both, complex and not complex motor skills;
3. Learning ability: Kanner thought that children showed higher performance when they learned mechanically, almost automatically; Asperger described them as "abstract thinkers".

Initially, Hans Asperger's research was forgotten both because of the Nazi persecution of the clinical staff and due to the language in which it was published, German, which had
become a despised language at the end of the World War. Fortunately, Lorna Wing divulged her studies together with Hans Asperger's research in 1981 with the article "Asperger's syndrome: a clinical account" ("Asperger's syndrome: a clinical consideration"), honoring the author whose research she had finally translated and studied. At the same time, he proposed to abandon the terminology of H. Asperger's "Autistischen Psychopathen", adopting that of Asperger's Syndrome. Wing meets with Asperger's thesis on several fronts, for example, an identical specification of the syndrome in the biological gender: autistic Asperger's children were almost only males (only later there will be clinical reconfigurations of AS about gender, with the progressive emergence of what are now called asper girls).

However, despite the criteria observed by Asperger's and taken up by the Wing, the definition of the syndrome has been modified. Lorna Wing notes important elements that had not yet been observed by Asperger as:

- Poor/absent gestural communication.
- Poor attention to the reality that surrounds him. - Absent smiles and laughter.
- Absence of typical childhood manifestations.
- Absence of symbolic play.

But in addition to these new integrations, her Asperger's Syndrome differs from the original study in two even more important aspects: language and creativity linked to a high IQ. We can say that Lorna Wing expanding her studies on the syndrome has allowed her to give attention to Hans Asperger's discoveries favored by the widespread English language, creating great interest in the world of psychiatry and psychology. Today Asperger's syndrome is used by specialists to indicate those cases of very intelligent children with a highly developed language, while Kanner's syndrome indicates a child with a set of classical characteristics, similar to those indicated by the latter in his research. During these years also psychodynamic theories took hold, becoming the main reference point in the study of autism. The latest ones tend to identify the origin of
childhood autism in an alteration of the mother-child relationship. The psychogenetic theory was firmly supported by psychoanalysts, first of all, Bettelheim (1967), according to whom autism is largely due to the personality of the parents. Bettelheim coined the term "refrigerator mothers", which indicated those mothers whose distant and cold attitude would force their children to flee the surrounding world and build a "defensive fortress".

From the '60s, however, several criticisms were made of the psychodynamic model, accused of falsely blaming the parents. The confirmation that they were distancing themselves from the psychosis/schizophrenia thesis was evident at the end of the 70s when the main scientific journal changed its title from "Journal of Autism and Childhood Schizophrenia" to "Journal of Autism and Developmental Disorders". Many researchers began to propose more precise and categorical definitions of autism and consensus was reached on the validity of autism as a diagnostic category. Many of these developments in definitions were incorporated into the DSM-III (APA, 1980), which represented a breakthrough in categorizing disorders of psychological origin. The fundamental change in DSM-III (1980) is precisely the definitive distinction between the areas of autism and schizophrenia. The fundamental shift from DSM-III to DSM-III-R (1987) focused on the evolutionary perspective. The adjective 'childhood' was eliminated and 'childhood autism' became 'autistic

disorder', the equivocal notion of 'residual' autism disappeared as it alluded to the illusory hypothesis of a 'cure' from autism, and the diagnostic criteria were redefined (and broadened) and focused on the 'Wing and Gould triad'. The latter, in fact, in 1979 in England, defined a set of characteristics known as the aforementioned "triad" of autistic symptoms:

1. Qualitative disorder of social interaction skills.
2. Qualitative disorder of communicative, linguistic, non-linguistic abilities, and imaginative abilities.
3. Narrow and repetitive repertoire of interests and activities.

These characteristics give rise to three different profiles of people affected by autism:

1. Aloof (reserved). 2. Passive (passive). 3. Active but odd.

These three domains could be combined for the variety and weight of clinical phenomena related to different domains. This multiplicity of combinations determines the variations, even important ones, of a continuum. Since then, the "Wing and Gould triad" defined the main diagnostic criteria for autistic disorder and its variants. Today it is an outdated concept because the criteria and characteristics have been expanded.

1.2 Classification and diagnostic criteria

In the previous paragraphs, the DSM was often mentioned, but what is it?

It is the statistical and diagnostic manual of mental disorders; it is a text written by a commission of experts nominated by the APA: the American Association of Psychiatrists. The DSM lists the definitions of mental disorders that meet the consensus of psychiatrists and the international scientific community. Each disorder describes the symptoms and guidelines for making a correct diagnosis.

In the first two versions of the DSM, published in 1952 and 1968 respectively, autism was classified as a childhood version of schizophrenia. In DSM III (APA 1980) the expression "Pervasive Developmental Disorders (PDD)" was introduced, to indicate disorders characterized by atypical features in the development of simple social and communicative-linguistic skills such as attention, perception, and motor programming. The expression PDD has been translated into Italian as Generalized Developmental Disorders (DGS) in DSM-III; later, in DSM-IV-TR (2000) it is changed to Pervasive Developmental Disorders. This last version of the manual included in Pervasive Developmental Disorders:

- Autistic Disorder.
- Asperger's Disorder.

- Rett's Disorder.
- Disintegrative disorder of childhood.
- Pervasive Developmental Disorder not otherwise specified.

Very similar to the above-mentioned classification is the ICD-10 classification for global developmental disorder syndromes that adds other subtypes such as childhood autism and atypical autism. In 2013 the new DSM-V manual is published, and it makes further changes compared to the previous manual. The subtypes in the DSM-IV have all been grouped into a single category called Autism Spectrum Disorders (ASD), except for Rett's Syndrome, which is one of the neurological disorders. The new criteria proposed for the diagnosis of Autism Spectrum Disorders are:

A. Persistent deficits in social communication and social interaction in different contexts, not due to general developmental delays.

B. Restricted and repetitive behavior patterns, or activities that manifest themselves with repetitive language, excessive adherence to routines, and fixed and narrow interests.

C. Symptoms must be present in early childhood even though they may not occur until social demands exceed the limits of capacity.

D. Symptoms limit daily functioning.

The main changes from the previous classifications are related first of all to the new name of the diagnostic category: ASD, which includes Autistic Disorder and Asperger's Disorder; another significant aspect concerns the symptom triad reduced to a duo.

1.3 Etiology

The understanding of the cause of Autistic Spectrum Disorders has engaged several scholars over the years, each of whom, however, has failed to provide a theory fully shared by the entire scientific community. The exact etiology remains unknown in most cases, although strong scientific evidence supports the synergistic action of a neurological

substrate, a genetic component, and various environmental factors. Only in about 10-15% of cases is the disorder associated with known and rare genetic diseases; autism can be found, for example, in the context of fragile X chromosome syndrome, tuberous sclerosis, and Rett's syndrome.

1.3.1 Neurological factors

B. Rimland was the first author in 1964 to discover that the origin of Autism was an organic cause and not the influence of parents. To try to understand what kind of damage had occurred during the evolutionary disorder, researchers analyzed the possible anatomical differences between the encephalitis of patients with typical development and those of people with ASD. Many functional neuroimaging studies, carried out through positron emission tomography (PET) and nuclear magnetic resonance imaging (NMR), have highlighted direct evidence of brain pathology in a large number of subjects with ASD, however, were unable to focus attention on a specific brain area.

1.3.2 Genetic factors

"There are many genes and proteins for which a causal relationship with autism has been hypothesized, but there is still too little knowledge about their function or role in the context of brain development to develop a satisfactory pathogenetic model. What is certain is that the autistic phenotype is the result of an inconstant and varied complex of mutations, on the same gene or different genes, as it happens in other pathologies such as obesity and diabetes". (Lucio Cottini, 2010) One of the first studies to highlight the influence of genetic factors was the one conducted on monozygotic and heterozygote twins (Bailey et al., 1995). What emerged from the studies of Bailey et al. (1995), in monozygotic twins, there is about 69% concordance in the manifestations of the pathology, compared to 5% of the cases of dizygotic twins. In contrast, the risk of onset in the rest of the population is about 0.6%. Comparing the two data shows that the probability of onset is about 5-10 times higher in monozygotic twins than in the rest of the population. Some results on genetic factors also come from research conducted on the parents of autistic subjects. Piven (2001) states in his research that the parents of several children with autism tend to have typical characteristics of autism such as communication deficits, the tendency to isolation, and the lack of close and intimate friendships. The similarity of behaviors in the parents and children suggests a common genetic basis, although it is difficult to verify whether these characteristics have always been present, or whether they are a consequence of having an autistic child. Over the years researchers have tried to focus their studies and research on specific genes or genomic regions, identified through the analysis of the etiology of other neurological diseases or cytogenetic studies. Particular attention was focused on the Hoxal gene located on chromosome 7 and responsible for the development of the brain stem in the early stages of embryogenesis. Malformations such as brain stem shortening, and cranial nerve abnormalities, are attributable to the onset of the disorder in

the first 22 days after conception. All these works highlight the fact that subjects with autism suffered neurological damage in the very early stages of embryonic life.

1.3.3 Environmental factors

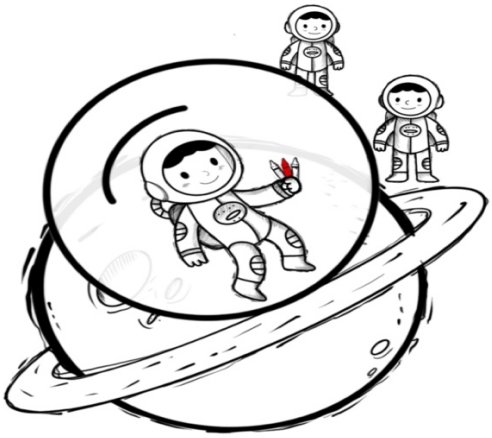
Any environmental risk factor that can cause early brain damage is to be considered as a potential non-genetic cause of autism, such as prenatal conditions and birth complications, as it is certain that chemical agents present in the intrauterine environment will influence the onset of autism. Prenatal viral infections have also been identified as possible causes of autism. Viral disorders attack the immune system of the mother, which in turn can infect the central nervous system of the fetus and cause permanent brain damage. In particular, the incidence of autism increases if the mother contracts a virus during the first months of life. The viruses that have been identified as a source of risk are cytomegalovirus and rubella, the latter being considered the most dangerous. In any case, however, it is important to stress the fact that even if a disease precedes the onset of symptoms, it does not prove that it is the cause of autism.

1.4 Epidemiology

In the last few years there has been an increase in estimates of the prevalence of pervasive developmental disorders, so marked that there has been talking of a kind of "autism epidemic".
Epidemiological studies can provide very different estimates. This variability is determined by various methodological factors, such as differences in the method of case detection and population sampling, in the size of the sample studied and therefore in the precision of the estimate, in the diagnostic category considered, in the age groups examined, and in the diagnostic procedures adopted. Discrepancies between studies can be attributed to changes in diagnostic criteria and tools, shifting diagnostic advances, and changes in socioeconomic factors.
The upward trend in prevalence estimates also seems to be partly linked to changes in nosography and social policies. In recent decades, in correspondence with important changes, it has been possible to observe frequent changes in prevalence estimates that are very substantial: it has been estimated that changes in diagnostic practices account for 26% of the increase in autism disorder diagnoses in California between 1992 and 2005. As far as Italy is concerned, the prevalence estimates are based on the findings of cases treated by the NHS with DPS diagnosis (F84 according to ICD-10 classification). These data are available in the regions of Emilia-Romagna and Piemonte in Italy. The most recent estimates indicate a total prevalence in the population up to 18 years of age

of 2.3/1000 in Emilia-Romagna (the year 2011) and 2.9/1000 in Piedmont (the year 2010), with estimates rising to 2.8/1000 and 4.2/1000 respectively in the primary school age (6-10 years). In conclusion, epidemiology is a fundamental discipline for the study of DSA it allows us to estimate the prevalence and incidence of these disorders, describe the variations of their distribution in time and space, and investigate their etiopathogenesis, as well as the role of individual genetic or environmental risk factors and their possible interactions.

2. The Theory of Mind



The term "theory of mind" was introduced in the late '70s by Premack and Woodruff, who had been studying the behavior of non-human primates for years. The ToM (Theory of Mind) is fundamental to understanding the behavior of others. Theory of Mind is the ability and ability to understand the thoughts, opinions, desires, and intentions of others and to use this information to interpret what they say, giving meaning to their behavior and predicting what they will do next (P. Howlin, S. Baron-Cohen, J. Hadwin, 1999). Possessing a theory of mind, therefore, implies (L. Camaioni, 2003):

1. The ability to recognize oneself and others as thinking entities.
2. The ability to recognize mental states (intentions, desires, and beliefs) in oneself and others.
3. The ability to refer explicitly to one's own and other's minds and to use these concepts to explain and predict what oneself or others can do or say.

The theory of mind develops in children with typical development between 2 and 5 years old. More specifically, between 2 and 3 years of age, children already know most of the mental states, they can manipulate cognitive situations different from the real ones, such as symbolic play, and they are already able to induce false beliefs in others to deceive them (L.Cottini, 2014). In their dialogues, the so-called "mentalistic" verbs such as pretending, wanting, and feeling appear more and more frequently, but the verb thinking does not yet appear so frequently. At the age of 4, they can easily solve the tests of the false belief of the first order and distinguish appearance from reality, skills that testify to the leap forward that at this age takes place in the understanding of mental states (M. Pinelli, E. Santelli, 2005). After childhood the theory of mind continues to evolve and enrich itself,

changing in all phases of individuals' lives. Although the age at which this theory begins to develop has been well established, there is still no univocal perspective that explains how this development takes place.

To Simon Baron-Cohen (1997) there are four fundamental mechanisms for the development of the theory of the mind. They reflect more or less four properties of the world such as volition, perception, attention sharing, and epistemic states.

1. The first mechanism is called the Intentionality Detector (ID) by this author. It is a perceptual device that interprets moving stimuli in terms of purpose and movement; it works through the senses of sight, touch and hearing and is activated wherever there is a perceptual input that identifies something as an agent. The ID, therefore, interprets almost anything that is endowed with self-determined movement, or anything that emits a non-random sound, as an agent endowed with purposes and desires whose identity must be sought.

2. The second mechanism is the eye direction detector or EDD (Eye-Direction Detector); it works only through sight, unlike the first mechanism which also works through touch and hearing. For Simon Baron-Cohen this mechanism has three functions:

- Detecting the presence of eyes.
- It detects whether the eyes are directed toward it or towards someone else.
- Conclude that if the eyes of another organism are directed towards a thing, then that organism sees that thing.

The first function of EDD detects eye-like stimuli, focus on these stimuli for relatively long pulses, begin to monitor what the eyes do, and then represent the various behaviors of the eyes. This function is already present in newborns: studies conducted by Daphne Maurer and others have shown that two-month-old children looked at the eyes for almost the same length of time as they looked at the whole face, demonstrating a preference to look at the eyes rather than the other parts of the face.

The second function is the identification of the direction of the eyes, the EDD must represent the relationship that exists between the eyes it has identified and the thing towards which the eyes are directed. When the eyes of another organism are directed towards the eyes of the child itself, the EDD records this fact.

There is a lot of evidence to support this argument: it has been seen that six-month-old children already look two or three times longer at the face of the person looking at them than at the person looking elsewhere. Studies have shown that the competence to identify eye direction is present in

children with typical three-year-old development. The two mechanisms of mind theory just described are not able to represent the fact that we and another person or Agent are both interested in the same object or event. This is what is necessary to be able to communicate about a shared reality and to feel that we and the other person are interested in the same thing or are thinking the same thing. From here we come to the third mechanism.

3. Simon Baron-Cohen (1997) calls the shared attention mechanism or SAM (Shared- Attention Mechanism) whose main function is to build triadic representations. Triadic representation is the representation of triadic relations, the relations that make explicit the relationship between an Agent, the Self, and a (third) object: the latter can also be another subject. In the triadic representation, there is an element that specifies that the Agent and the Self are both interested in the same object; e.g., the Agent and the Self are both interested in the same object.

2.1 The functions of the theory of mind

The theory of mind is the best way to give meaning to the actions of others (St. Baron-Cohen,1997); however, this is not its only function; the theory of mind is fundamental for communication, deception, and persuading and for a greater exploration of one's self.

As far as communication is concerned, many scholars over time have supported the idea that when we hear something said or read a sentence, what we do in searching for the meaning of words is to imagine what the communicative intention of the speaker might be. In communication, therefore, we focus not only on his words but also on the message that the speaker wants to be understood. We deduce from this that in decoding speech, we go beyond words to make assumptions about the mental states of the speaker. The same applies to non-verbal communication: when a person makes the gesture of reaching out with an open palm in the direction of a door, the recipient of that gesture immediately understands that he has to go out that door (St. Baron-Cohen, 1997).

The theory of mind also plays an important part in another aspect of successful communication: the speaker controls the listener's need for information, i.e., what information, according to the listener's evaluation, the listener may already know or not know, and what information the listener must provide so that the listener can understand the message. Furthermore, for successful communication, the speaker must check whether the meaning of an expression has been received and understood as he or she wished, or whether the sentence should be reworded to solve the problem. Dialogue becomes much more than a simple oral production as it also requires a certain

skill in reading the mind; moreover, with a correct activation of the theory of mind, the speaker will both delude and persuade the receiver of his communication.

2.2 Deficits of the theory of mind in Autistic Spectrum Disorders

Simon Baron-Cohen explains the deficits in the theory of mind. The detector mechanism of intentional states, which interprets movements in terms of purposes and desires, and the eye direction detector, are intact in children with ASD. Regarding intentional states, the word "want" is often found in these children's spontaneous discourses and when they have to describe illustrated stories involving agents: they say for example "she wants ice cream", recognizing desires and purposes. In addition, they can understand that desires can cause emotions. Correct activation of the eye direction detector is confirmed by the fact that children with Autistic Wraith Disorders can notice when a person in a picture looks at them, they can use the word "see" in their spontaneous speech and they answer correctly when it is asked them to guess what another person is looking at. As for the mechanism of shared attention, whose main function is to construct the triadic representations necessary to specify and verify that the self and another agent are paying attention to the same object or event, there is a lot of evidence indicating a strong deficit in its functioning. Children with typical developmental patterns show signs of the shared attention mechanism when they try to attract the visual attention of the person with whom they are having a relationship to the object or person they are interested in, simply by indicating it. This does not happen in children with ASD, which they can indicate, but they use this gesture with a different function such as to ask for objects out of their reach, etc.

In other words, if they bring an object to someone, or indicate an object, they only do so when they want the person to act on that object or take it for them. In these cases, we do not talk about shared attention because they are not caused by the desire to share an interest with another person but are simply instrumental gestures. The deficit of shared attention means that triadic representations cannot be constructed in any way and there is no output coming from this mechanism to activate the mechanism of the theory of mind; for these reasons, all aspects of the mechanism of the theory of mind would be compromised.

2.3 Consequences caused by the lack of theory of mind in patients with ASD

The lack of the theory of mind leads to the appearance of some typical symptoms of Autistic Spectrum Disorders, which particularly influence communication and social area.

- Communication: it is not spontaneous and fluid. The lack of the theory of the mind hinders their understanding of the communicative intentions that are normally intercepted in the course of communication thanks to the attribution of mental states to the interlocutor.

- Empathy: it requires the representation of mental states other than one's own and the understanding of how these mental states are related to the knowledge and expectations that a person has about the world; the lack of empathy is characterized by the fact that an individual does not take into account the reactions of another person to events with a significant emotional reach. This is not because the individual is "cold" or emotionally flat, but simply because he or she cannot understand emotions. Difficulties in developing empathic reactions due to the deficit of the theory of the mind exist especially if the mental states to be considered are complex emotions such as surprise, shame, and pride.

- Fiction game: children with ASD have many problems when they have to use objects to represent others. The symbolic or fictional game appears, according to Piaget, in children with typical development towards the end of the motor sense phase, when they can distinguish the "signifier", i.e., the present object or situation, from the meaning, object, or situation absent.

The results of many experimental types of research have confirmed the fact that in the majority of children with Autistic Spectrum Disorders there is no symbolic game and the one present in the minority of them takes on a repetitive and stereotyped nature, devoid of the innovation found in its normal development. Alan Leslie or scholars like Simon Baron-Cohen explain this absence of symbolic play as a lack of the theory of the mind that does not allow children with ASD to represent at the same time actions that they do not see directly and they perform those actions with a playful purpose. Another explanation was offered by Peter Hobson according to which children with Autistic Wraith Disorders cannot develop emotionally normal social relationships that compromise their normal development.

- Cognition: possessing a theory of the mind also means that the typically developed child understands that the brain is an organ that has mental functions. If the mechanism of the theory of mind is damaged, then children with ASD should have difficulty distinguishing reality from appearance. Some scholars have shown that when misleading objects were presented, such as a sponge painted to look like a pebble, children with typical development between the ages of 4 and 6 were able to tell not only what it looked like, but also what it was (a sponge). In doing so, they distinguished between their initial belief, based on perception, and their current knowledge of the

object. Children with Autistic Spectrum Disorders could not distinguish between reality and appearance when they were shown deceptive-looking objects.

3. Mirror Neurons

Studies made in the early 90s have shown, starting from the study of some anthropomorphic primates, the existence of neurons that are activated both when a subject acts and when he observes the same action performed by another subject. These neurons, called mirror neurons, are characteristically present in motor-premotor areas.

"But the interesting thing about the discovery of mirror neurons is that they have been observed in an area of the primate brain that seems to correspond to Broca's area in humans" (Kohler et alii, 2002: 848). Although today there is no experimental data on the number of mirror neurons possessed by every human being, there is now a general scientific consensus that the F5 area of primates (where the 92 active mirror neurons within a visual-motor system and the 63 actives in an audio-motor system were located) is homologous to the Broca's area (the posterior part of the lower frontal gyrus of the left hemisphere in humans): the development of the human brain region dedicated to language production is located within the long evolutionary process of the frontal cortex initiated in non-human primates. When we talk about mirror neurons, moreover, their function in imitative tasks immediately comes to mind. The classical example is a dancer observing a video of a ballet. However, a large number of studies (especially of neuroimaging) have revealed that these neurons are activated in almost all activities involving interaction with the other. They are at the basis of communication as they allow the understanding of other people's mental states, and are involved in many more or less automatic tasks that always concern the social sphere. Starting from this idea and from the fact that in autistic patients, as already mentioned, a series of social and linguistic deficits are observed, some theories concerning the neurobiological basis of autism have been developed. Among these, the most relevant is the so-called theory of " broken mirrors".

3.1 The 'shattered mirror theory'

The mirror system shows the following functions:

- control and production of your actions directed towards a goal (take a fork);
- understanding the purpose and meaning of observed actions and predicting future actions performed by other people;
- other social functions such as language, theory of mind, and empathy.

The social deficits of autism would be due to a malfunction of the mirror system and the emergence of such dysfunction in the earliest stages of development would give rise to a series of chain effects. The social incompetence in autism would derive from a deficit in the ability to simulate the actions of others and, consequently, to understand their actions, and to identify with them. The simulation mechanism occurs precisely thanks to the activation of mirror neurons and their malfunction would therefore lead to a gap in social behavior. People with ASD, have no difficulty in attributing intentions to others, but they fail in mentally recreating in themselves the behavior of another person, therefore in identifying themselves in it, and consequently in mentally projecting themselves in the other person's situation. Their problem is to replicate or mimic the mental life of another person. The theorization on the intentional world of the other, even if it is not a basic deficit (as sustained by Baron Cohen's theory of the mind) turns out to be instead the only strategy available to subjects with autism to give a sense to the world of the other.

By this thinking, Gallese states that the core of autistic mind problems concerns the disintegration of shared multiplicities. In the system of shared multiplicity, individual identities originate from the constitution of a shared interpersonal sense space, which is nothing more than the embodied simulation mechanism, which allows that state of active participation, thanks to the activation of the motor sensor system and which is crucial in intersubjectivity. The first evidence in support of a malfunction of the mirror system in autistic subjects was given by the absence of desynchronization of the m wave during the observation of actions performed by others. The m wave is an electrophysiological index indicating the activity of the mirror system; in subjects with

typical development shows desynchronization during the execution and observation of actions, while in subjects with ASD it is sensitive to the execution of the same, but not to the observation of actions performed by others.

Avikainenen reports a lack of tendency in autistic subjects, during face-to-face interactions, to automatically imitate the other. There is a basic inability to mirror that makes it impossible to "put oneself in the other's shoes" and get in tune with it.

Nishitani documents problems of connectivity between the lower parietal lobule and the lower frontal gyrus (brain areas with mirror properties). It was found that the information flow between these two regions travels more slowly than the speed observed in subjects with typical development. The same problem, an abnormal slowdown in the flow of information, is documented by Villalobos in the connection between the visual cortex and the lower frontal gyrus: the authors found activations of mirror neurons weaker and slower in the response of subjects with ASD than the control group. Theoret, recorded responses from the index finger while participants watched a video of index movements directed both to and away from the observer: in the healthy control group, both actions lead to measurable responses in the index and thumb muscles of the observer. Subjects with ASD show a response only to actions directed toward the observer. The researchers explain these results in terms of a deficit in the mirror neuron system.

Cattaneo shows, however, that the major deficits seem to depend on a compromise in the chain organization of motor acts. In conclusion, a morphometric investigation showed certain structural abnormalities of the involved brain regions: an abnormal thinning of the grey matter in the ventral premotor area, in the posterior parietal lobe, and the superior temporal furrow. Differences in the thickness of the cortical mantle of the lower frontal gyrus were also documented.

3.1.2 Deficit theory of "Broken Mirrors”

However, not all studies agree that autism is associated with mirror neuron deficits. From a behavioral point of view, the hypothesis that the social difficulties of the child with autism derive from a lack of understanding of the actions of others is not fully supported. Patients with lesions in areas containing mirror neurons, for example, are not able to solve simple tasks of understanding and reproduction of actions as compared to people with ASD. In addition, children with ASD can understand simple targeted actions, a skill theoretically made possible by mirror neurons. However, the fact remains that some studies have documented an abnormal response in areas of the mirror system and that the mirror system is involved in processes of understanding and learning about the actions of others that are crucial in mental development and interactions in everyday life. The theory of broken mirrors is at least incomplete.

3.2 Mirror neurons and language

The system of mirror neurons has fundamental importance at both ontogenetic and phylogenetic levels for the development of language. Starting from this mechanism involved in the observation-

execution of actions, it is plausible to consider the "phonetic gestures" of the speaker as the object of linguistic perception (Gallese et alii,1996). The physical structure of linguistic sounds as a stimulus for the activation of a population of mirror neurons establishes that linguistic sounds are perceived in the same way as they are produced: the population of mirror neurons activated for the production or comprehension of a given linguistic sound is the same (Williams et alii,2001). Therefore, given the activation of the population of mirror neurons, language is identified in an action, whose mechanisms are essentially the same regarding those underlying the planning, execution, and recognition of other motor actions (Steels, 2000). Since language is recognized as an action constituted by all phonetic gestures, they must be understood and reproduced. If a specific phonetic gesture produces the activation of a precise population of neurons, it will also be active during the reproduction of the gesture within an imitative mechanism. From the point of view of mirror neurons, imitative capacity is therefore a fundamental step for the ontogenetic development of language, and some experimental data from studies on individuals with autism spectrum syndrome, in which imitation is strongly compromised, support this hypothesis.

4. ASD Language and communication

The 'language' is to be understood as a communication system used to express information to the receiver. Using the terms 'language' or 'language' as synonyms are incorrect; 'language' is a system adopted by human beings to communicate information through the use of arbitrary symbols.

To become competent speakers and listeners, children not only need to discover the syntactic rules and semantic relationships characteristic of their language but also have to learn how to use it appropriately in the social context and with different interlocutors. This is called "pragmatic competence", which includes two aspects: the ability to converse and the ability to take the listener's point of view and communication needs into consideration. Since pragmatics deals with the ability to use language and non-verbal communication, it goes without saying that the development of this competence in the first months of life goes hand in hand with the evolutionary acquisitions that the child makes. It is only after several phases that the child reaches a maturation of the narrative skills, a greater ability to understand non-literal language speaking, adapt the contents to the conversation partner and he repairs any misunderstandings with the interlocutor. Therefore, pragmatic skills emerge in the more formal sense, which implies the ability to use common ground for linguistic purposes; skills that appear only between 7 and 9 years of age, will be fundamental for the whole social construction of reality.

4.1 Characteristics

Delays and abnormalities in language development are among the main symptoms of autism spectrum disorders. Speech impairment can be more or less severe and delays more or less significant. The inter-individual variability is in this sense very wide: in some cases, the child does not acquire language. Epidemiological studies indicate that about half of the autistic population remains non-verbal. Looking at the previous literature, there are numerous attempts to describe the linguistic profiles that characterize the autistic syndrome, unfortunately, no one has been able to find general characteristics that would respond and explain the numerous specificities through which the autistic disorder manifests itself. All studies see the autistic problem as a pragmatic and semantic

understanding deficit. From the experiments conducted and the results obtained, the autistic population has a deficit in the use of semantic competence, whose ultimate goal is the recovery of stored information.

As Marini (2008) indicates, deficits in language development are generally associated with a lack of alternative communication strategies, which suggests that the problem is not just a purely linguistic nature, but due to the lack of the desire to communicate and the inability to integrate contextual information to plan a communicative intention. Autistic children who acquire language demonstrate a rather zero desire to initiate or continue a conversation.

The linguistic production of autistic children is abnormal from a prosodic (e.g., inadequate intonation), lexical (e.g., use of unusual or rare words), pragmatic (e.g., inability to understand non-literary expressions and the needs of the interlocutor) and discursive (there is an abundance of irrelevant and tangential speech, probably due to the inability to formulate adequate mental models; Marini, 2008).

If we closely look at the various components of language, one can see that phonological development in autistic children, although slowed down, follows more or less the same trajectory as children with typical development, apart from the fact that there are more phonological errors (especially phonological paraphasia) than children with normal development and children with mental retardation (Marini, 2008). The most compromised aspect of autism is prosody, both in terms of comprehension and production: the speech of autistic children tends to be monotonous and it is characterized by a melodic trend that is often not in line with the meaning of the message: in the sense that a tragic event can be described in a joyful tone or vice versa (Marini, 2008).

Morphological and syntactical competence is on the whole less compromised. Although there may be delays in the development of morphological and syntactical competence, these are usually not particularly significant (Tager- Flusberg, 2004). Although the statements of autistic children tend to be shorter than those of their peers, there are no particular problems in phrasal structuring.

Lexical development: it seems that the autistic child has no difficulty in learning the meaning of words in those cases where there is a sufficient logical deduction and no need to integrate pragmatic information (Preissler and Carey, 2005).

On the contrary, when it is fundamental to integrate the pragmatic and interactional context, autistic children have difficulties, probably due to the inability to use pragmatic information adequately to deduce the communication intentions of the interlocutors (Baron-Cohen, Baldwin, and Crowson, 1997). The most compromised language component in autism is the pragmatic one: the autistic child is unable to use language in a context-appropriate manner. Besides having serious problems concerning respect to communicative shifts, the autistic child does not understand non-literal expressions, sarcasm, irony, metaphors, and humor (this is probably due to the inability to

understand the communicative intent of others; Tomasello, 2001). The autistic child also tends to use strange expressions unconnected to the context: speech is bizarre and anomalous both from the information point of view (with information irrelevant to the context) and from the point of view of conceptual coherence.

One of the most well-known and curious problems from a linguistic point of view is the anomalous use of personal pronouns and the pronominal inversion, the tendency to invert the pronoun referents: to refer to himself the child tends to use the pronoun of second/third person, while to refer to an interlocutor he tends to use the pronoun of the first person. These errors are due to a concept of the immature self, in the sense that the child does not understand the alternation between speaker and interlocutor, nor that the pronoun is relative to the person; according to the thesis "spatial perspective hypothesis", the erroneous use of personal pronouns is due to the inability to recognize the different spatial perspectives of different people.

4.1.1 Echolalia

Another peculiar characteristic phenomenon of autism, already noticed by Kanner, is echolalia. it consists of the repetition, with similar intonation, of words or phrases said by someone else. Among the theories that try to explain this phenomenon, the first interprets this deficit as a dysfunctional phenomenon linked to the rigidity of autistic behavior (Carluccio, Sours and Kolb 1964). The second theory, by Schuler and Prizant (1985), links echolalia to attention to detail and at the moment of enunciation, the autistic subject repeats only what he remembers. This is due to the inability and difficulty in understanding the general meaning. The last hypothesis is by Grossi and collaborators (2013) who explain the echolalic phenomenon in these terms: "[...] expressions of dependence on the environment and may occur in situations where the person with autism is participating in the communicative act and, having blocked the inhibitory control, repeats what the other said rather than selecting an answer" (Pennisi, [2016]:89).

Despite this, some scientists suggest that it is fundamental for the development of language. It has been observed that in this population echolalia is used for a longer period than the use of imitation by typically developing peers. For subjects with verbal autism, the use of echolalia is a strategy related to the inability to extract linguistic rules from spoken speech. (Arciuli and Brock, [2014]:55-57). This linguistic phenomenon was first noticed in 1825, with Itard's studies of the case of Victor of Ayeron, the boy who was found in the forest at about twelve years of age and where he had grown up until then. Later, it was noted that this 'phenomenon' appears in comorbidity with other

problems such as senile dementia, and some types of acquired aphasia but also in people with communicative and intellectual disabilities. At the time of Kanner and Asperger, psychoanalysis dominated and echolalia was interpreted as a hostile behavior that undermined the failure of ego development (Bettelheim 1967). With behaviorist theory, on the other hand, echolalia is seen as a self-stimulating behavior that interferes with learning. Later, Warren and Fray (1967,1969) tried to explain the phenomenon by combining these two hypotheses: in the case of autistic people, echolalia is to be considered as an attempt to participate in the discourse. Finally, since the 80s and 90s of the 20th centuries, the phenomenon of echolalia has been seen as a linguistic strategy used for different communicative purposes, including social and cognitive functions.

4.1.2 Different types of echolalia

From the literature received so far and following the classification drawn up by Prizant (1987) contained in the work of Arciuli and Brock (2014) we can distinguish between:

- immediate or exact echolalia': that is, an exact or slightly modified imitation of what the other person said. According to Fay and Coleman it can also be understood as a form of pre-categorical imitation and would have limited functions, such as a request or refusal by autistic people;
- mitigated or modified echolalia': what is reported has been slightly modified in its structure through the use of substitute forms. The term was first used by Pick in 1924 to describe the behavior of an aphasic patient.

Three specific modification patterns are noted:

- Repetition of a 'where did you sleep?' segment. → 'I sleep'.
- Repetition of a segment preceded or followed by a statement, denial, answer or comment 'I'll show you how it works' → 'How it works, okay.
- The last pattern can be a mix of the previous ones like 'You have a dog, don't you?'. → 'Yeah, I have a dog, don't I?' (Fay [1967]:308, quoted in Arciuli and Brock, Communication in Autism, [2014]:58-59).

The increasing use of this type of echolalia in the speech of autistic subjects suggests that autistic children develop skills to process speech from which to derive the rules underlying the production of language. The development of this ability would thus indicate the child's ability to transform what is repeated; it is important to add that when there is an improvement in language skills, echolalia tends to decrease both in normal language development and in the case of autism (Frith, 1989, 2003).

5. Autism, education, and school

Autism is not a learning disorder, however, the characteristics described in the previous chapters, especially the reduced tendency to observe and imitate others and the difficulty in social communication and interaction, greatly hinder learning processes in subjects with ASD from early childhood. This does not mean that they are not able to learn: they just need to be taught especially. However, applying conventional educational strategies (those that work with typically developed children) most children with autism learn very rarely. The consequences, of course, are often dramatic: the child is left behind, he or she feels excluded, his or her potential remains unexpressed and the educational experience that should be an opportunity for growth becomes an element of frustration for the child, his or her family and the educational staff.

The research on learning in autism is the starting point to change this state of affairs. The development of knowledge will lead to the construction and refinement of tailor-made educational strategies. However, due to the complexity of autism, putting this strategy into practice is very complicated. The first obstacle is the multiplicity of factors to take into account when assessing the learning style of people with autism. The different dimensions of learning cannot be traced back to a single, universal profile.

The second obstacle is the fact that, when we talk about educational intervention or any intervention in the field of autism, we are moving on an impervious path, which includes ideological conflicts and gaps. It is also important not to overlook the important role that educational policies play in terms of funding and personnel. Teaching takes time and resources and when pupils are children with special needs, necessities increase. Reduced hours, job insecurity in workplaces that fail to ensure a continuum in education, incomplete training, and poorly available suitable materials

are all explosive factors that undermine "the learning scaffolding. (Giacomo Vivanti, Erica Salomone). The data show that children with autism can learn new skills when the teaching is carried out in a structured context, i.e., when the information is presented in a way that is accessible even to those who do not understand verbal language and the environment is organized in such a way as to facilitate attention to the salient elements, thus limiting possible distractions. Children with autism can learn, in fact, they often surprise us with their unusual abilities in some areas. Think of the extraordinary development of eidetic memory or other skills that occur especially in high-functioning autism conditions such as Asperger's Syndrome because in this case there are no significant delays in cognitive and linguistic development, although there are difficulties of various degrees in the sphere of social interactions, understanding, and the manifestation of affections, in the ability to understand other people's mental states and to interpret non-verbal language. The resulting social isolation is often accompanied by a certain rigidity in habits and behavior and in the narrow range of interests and activities to which these people devote themselves with extreme obsessiveness and attention to detail, hence the extraordinary development of eidetic memory.

5.1 ABA

A key instrument for developing new strategies is the ABA. ABA stands for "Applied Behaviour Analysis". This treatment consists in teaching behaviors that will improve social aspects such as communication, reading, and social and motor skills that are problematic in autistic subjects. (Arciuli and Brock, [2014]:29-31). ABA tries to improve these aspects in autistic children through the application of strategies such as positive reinforcement, explicit instructions, and suggestions. The interventions promoted by ABA aim at individual language skills through the application of behavioral principles such as differentiated reinforcement. It has been noted that the education of additional components can reinforce the intervention and thanks to it, many autistic people have also gained enormous benefits on a behavioral level. The results obtained so far confirm that for children affected by "Pervasive Developmental Disorder" the ABA method is the most beneficial intervention, especially if it is used at an early age, around 4 years (Eikeseth, Smith, Eldevik, 2002) (Cervellin,2010/2011).

It is important to specify that ABA supports different methods aimed at managing behavioral problems and teaching skills, among the best known:

- DTT (Discrete Trial Training) methods, which aim at teaching elementary skills in functional routine. They are a procedure based on the "stimulus-response-reinforcement and repetition" chain in

which concepts are divided into tasks. In these procedures we start with basic concepts such as sitting at the table and then add other concepts/tasks that will help the child to develop his/her activities;

- In PRT (Pivotal Response Training) methods the context also plays an important role and helps the application of the task in everyday life. It is a system that is well connected to an approach based on functional routines (Volkmar and Wiesner, [2014]: 100-101).

In addition, ABA methods support various interventions such as PECS, which stands for Picture Exchange Communication System. PECS is a method based on image exchange, which will lay the foundation for working on oral communication development. Educational interventions aimed at improving the behavioral and linguistic areas in children with autism are many and all of them take into account the needs and problems of the child himself, adapting the methodologies in a long-term perspective that will serve the individual to be autonomous (Volkmar R. Fred and Wiesner A. Lisa, [2014]: 104).

5.2 Alternative Augmentative Communication (AAC)

The AAC is defined as "any communication that replaces or enhances verbal language" and is "an area of clinical practice that seeks to compensate for the temporary or permanent disability of individuals with complex communication needs".

The AAC tries to reduce, contain and compensate for the temporary and permanent disability of people with a serious communication disorder both on the expressive and the receptive side, through the enhancement of present skills.

Therefore, it is not a technique, but an intervention, and, as such, it can use different techniques that aim to support and increase the communication skills of people with complex communication needs (BCC), i.e., all the needs that concern the expression and reception of the message.

The adjective "Augmentative" indicates all the modalities that aim to increase and improve the natural communication already present including vocalizations, residual verbal language, gestures, signs, and communication through aids.

The adjective "Alternative" is used less and less because the situations in which the intervention is a substitute for verbal language (now only progressive neurological diseases) are very rare, and because it does not provide an adequate representation of the communication system that is in an integrative rather than alternative way. The objective of the intervention is not to replace language, but to support the expansion of communication skills through all the modalities and channels

available to the subject, proposing itself as a support to relationship, understanding, and cognitive development.

5.2.1 AAC instruments and strategies

A distinction is made between unassisted communication and assisted communication.

- Unassisted AAC systems require only the body and no external system or device; they include non-verbal communication modes (including facial expression, movements, gestures, and vocalizations, which accompany the word.
- Assisted (or aided) AAC systems are subdivided into non-electronic aided aids made of materials defined as "poor" that do not need batteries, such as symbol systems, communication tables; low-tech electronic aids that use voice output devices (VOCA) that reproduce pre-recorded messages activated by a specific command and high-tech electronic aids that use the support of complex communicators and dynamic displays.

The features of AAC and the educational needs of children with ASD are matched in many ways. Most of them have good visual processing skills and the aim is to help the child choose the most suitable communication channel.

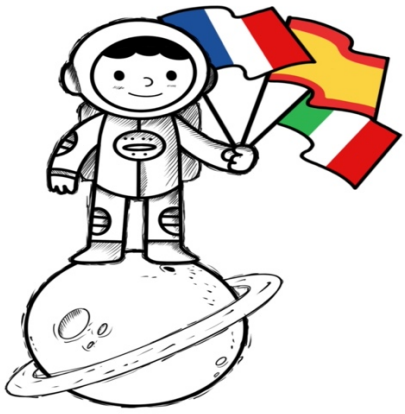
5.2.2 Sign Language and Autism

In the previous paragraphs, we have seen how AAc uses different forms of communication such as sign language. Sign languages are the visual-managerial means of communication used by deaf people to communicate with each other. We speak of language and not a language because, like all languages, Sign Languages have both a vocabulary and grammar. This 'gestural language input' has all the typical features of natural languages and is the primary channel used by deaf people to transmit information.

It has emerged that the linguistic development of deaf people is identical to that of hearing peers. The only difference is the communication channel used. However, we know that the use of gestures is also present in typical development, preceding and strengthening the language. Sign language in education is an additional and parallel channel to the oral language where there are both linguistic and non-linguistic problems. To date, numerous studies report the positive influence of sign language as a rehabilitation method alongside oral language with people with language disorders. The combination of sign and speech leads to several positive results, such as better attention, better visual memory, and greater development of some cognitive skills. The use of LIS as a rehabilitation

method or CAA has many advantages, both in comprehension and production. Sign language has been used to develop oral production. The use of LIS as a support for language development with autistic subjects is effective if we think about the nature of the disorder itself, where one of the most problematic areas is oral language. Therefore, offering an alternative based on a visual-managerial channel can be beneficial for language development. Among the advantages, for example, we find the possibility of being able to express one's needs directly. However, the poor motor skills of some autistic children have raised some doubts about its effectiveness of use but the data obtained from the studies conducted are positive. In fact, in children initially, we witness the use of single signs and then continue with the alternation between the Italian language and LIS structures. The objective of LIS in this field is not to replace the vocal language but to promote its emergence. The process is divided into three phases: in the first one the child sees the sign with the name of the object (modeling), in the second one the physical input is presented to the child to reproduce the sign and the word of the object considered (physical prompt) and in the last one the child is given the desired and expressed object. Two fundamental requirements for the use of this technique are the child's motor skills and obviously family involvement.

5.3 Autism and foreign languages



As seen above, autistic children tend to be more rigid, lack cognitive flexibility, and have a narrower focus, they do not react well to changes in plan or spontaneity, have rigid daily routines, and show repetitive speech or movements.

According to a recent study in Science Daily published in the journal "Child Development", it shows that learning a foreign language can improve several cognitive processes, including attention and behavior control, and can improve memory. The research team examined in particular 40 children

with ASD aged 6-9 years with a computer test; the test consisted of rearranging images on the screen. The result was unequivocal: children with bilingual ASD were able to work more effectively and quickly. It is believed that the increase in cognitive function of the brain occurs because the ability to communicate in two different languages leads to high cognitive control. With life-long learning, this transition between the two language systems can improve the cognitive performance of the brain as a whole. The brain's ability to respond more quickly between the two languages is very useful as a therapy for children with autism. Foreign language learning teaches children to understand and follow verbal instructions, respond to the words of others, describe an object, imitate the words and movements of other people, and teach them to read and write.

A concrete example of this is Rafael Mayer, a child just 7 years old who has been diagnosed with severe autism since the tender age of 2. Several paths have been taken, including language therapy, but without encouraging results. On the advice of some specialists, Rafael is provided with a tablet: the little one begins to spend a lot of time with the electronic device, watching a lot of videos on YouTube. After a few years, during a speech therapy session, it turned out that Rafael was able to speak English. According to doctors, the child's rapid learning of a foreign language was due to a phenomenon known as "hyper-concentration". It is a skill developed in 10% of ASD subjects that allows them to quickly absorb information of interest due to the total absence of other distractions. After only a year the child had also learned to handle Portuguese, although English was still his mother tongue. At the age of 7, Rafael could handle languages such as Spanish, Japanese, Russian, German, and Italian. Rafael's diagnosis has recently been changed from severe to moderate, and although he has never been given any medication, the progress in his interaction with the outside world has been extraordinary.

5.4 Autism and genius

Autism is diagnosed based on qualitative impairments in social interaction and communication, with limited and repetitive behavior and interests. All three aspects of what has been defined as the autistic "triad" of disabilities (social, communicative, and imaginative) must coexist to make a diagnosis.

And these are exactly the characteristics that would support the basis of talent in people with autism. Michael Fitzgerald, psychiatrist and professor at Trinity College Dublin, in his book "The genesis of artistic creativity," has no doubts: great writers, musicians, painters, actors, scientists, and entrepreneurs, were affected by forms of autism, particularly Asperger's syndrome. The

extravagant and obsessive behaviors resulting from the disease, of total concentration on a purpose, are the basis of genius and creativity.

5.4.1 The Savant Syndrome

According to more than one publication of the National Institutes of Health of the National Library of Medicine the "genius" is found in the Savants. The Savant Syndrome is a condition in which those who suffer from it have what are called 'islands' of very special abilities in strong contrast to the mental handicap of which they are affected which allow them to be true geniuses. It is a very rare condition, however, which affects one in ten autistic people and particularly affects males (6:1). Experts explain that about 50% of people with Savant syndrome also have autistic spectrum disorders and the remaining 50% have other forms of mental developmental disabilities and cognitive retardation. People suffering from Savant syndrome report damages to the left cerebral hemisphere and they show particular artistic and musical skills as well as calculation: in general, no symbolic, artistic, concrete, and directly perceptible abilities. According to experts, the development of skills typical of the right hemisphere could represent a response of the brain itself that, by reporting problems to the left hemisphere, reacts by making more use of the right one. The main skills of those who suffer from Savant syndrome are:

- Memory, so being able to store statistics, phone numbers, timetables, and other information beyond the average of any of us.
- Calculation, so being able to do operations with large numbers quickly and easily, as well as remember, for example, all prime numbers.
- Calculation, i.e., the ability to calculate any day of any year.
- Musical skills, like learning how to play instruments or play songs even after you've only listened to them once.
- Artistic skills, such as the ability to paint, sculpt or draw.
- Language skills, which are rarer, and which allow you to learn to read and write any language easily.

Savant's syndrome is a condition that can appear either due to congenital causes or brain damage, and the skills that characterize it can develop suddenly, just as they can suddenly disappear.

Savants can be divided into three groups:

- Splinter Skills, i.e., those who have specific abilities that are at odds with their general level of brain capacity.
- Talented Savants, are those who have a high level of skills that are at odds with their disability.

- Prodigious Savants, i.e., those who develop rarer forms of this condition in which their skills are not in sharp contrast to their disability and which would be extraordinary even if observed in non-disabled people.

The fact that Savants' abilities can be detected even in people with no ASD is generally recognized. An open question is whether savants have in common with autism the cognitive characteristic of the tendency to process details. Whether the latter is an important talent predisposition factor; regardless of autism, could help to orient studies on Asperger's differently.

The public's fascination with the unique skills of savants can have the dangerous consequence that their abilities are expected to affect everyone in the autistic spectrum. Draaisma (2009) explores the presentation of autism in fictional fiction, and concludes that Savant's abilities are greatly emphasized in this genre. For the parents of a child with low-functioning autism who does not show a developed talent, the equation of autism with savant abilities can be quite distressing. Hacking (2009) considers how the proliferation of autobiographies written by people on the autism spectrum can also inadvertently give a misleading picture of autism, as these writers are by nature exceptional in their ability to communicate their experience.

Why do most people with autism develop savant abilities?

One possibility is that all people with autism have the potential to develop savant abilities and that exposure and opportunity play an important role in determining the outcome. Heaton (2009) reports data from some musically untrained young people with autism and suggests that a substantial minority show the potential to develop skills in music perception and performance. Better tone and timbre discrimination seem to be widespread in autism. Grant and Davis, on the other hand, call for greater recognition of the value of autistic characteristics such as object discrimination, which then have a bearing on a future workplace. While it is unlikely that any child with autism will become an expert in mathematics, art, or music, even with hours of training, we hypothesize that everyone can develop an identifiable special ability. For example, great ease of programming, mechanical memory for an area of interest, absolute ear, and superior ability to detect grammatical and typographical errors are often observed. For example, some learn to read fluently before developing language, which is moderately common in autism. However, this is often not considered a savant skill because the absolute level of achievement does not exceed what older, normal children eventually achieve.

Similarly, anxiety about the slightest changes in the environment, insistence on taking the same route to a destination, or extreme reactions to seemingly mythical sensory stimuli are not

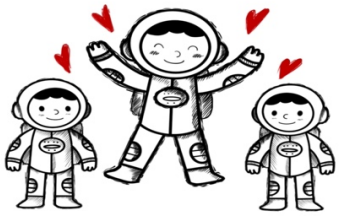
considered "talents" but could signal superior memory and discrimination. The challenge is to know how these skills could be channeled into useful skills that could bring personal satisfaction or professional success. Hence the importance of promoting any kind of talent. The adaptive value of promoting special interests and talents may seem obvious, but it is at odds with the tendency to see narrow, obsessive interests as maladaptive and limiting. Heaton (2009) argues in his article that learning

music, for example, benefits both social integration and the personal development of young people with autism. His work suggests untapped potential, especially in autism, which makes the task of teaching children with socio-communicative disabilities particularly important. For these children, music lessons should not be considered a luxury. The untapped potential in art, mathematics, or languages has yet to be documented, but both parents and caregivers often discover that they have a talent at home almost by accident.

Why are extraordinary special abilities much more common in autism spectrum conditions than in other groups?

Current cognitive accounts of autism are briefly examined concerning special abilities. Difficulties in the "theory of mind" may contribute to originality in autism because individuals who do not automatically read other minds may be more capable of thinking outside of prevailing trends and popular theories. However, originality alone does not confer talent.

Conclusions



The personal motivations that led to the writing of the thesis derive from a deep conviction that the colorful and varied world of autism is still a little unexpressed. Autism is a spectrum disorder and this means that autistic people have a wide variety of strengths and weaknesses, isolated abilities, and different learning styles. There are no two people with autism who have the same combination or the same degree of ability and difficulty, which is why it is not possible to adopt a standard approach. Still, instead, it is necessary to consider how the child relates to others and how he or she relates to the world around him or her. For these reasons, it is necessary to consider the child globally and to plan an intervention that is not limited to assessing individual skills/competencies, but that, starting from the observation of the child in the interaction with habitual and no habitual partners, in different life contexts, could meet his real communication needs. It is certainly not an easy path without pitfalls, on the other hand, every individual, both with typical development and developmental disorders, has a unique inner world, a personal way of perceiving, reading, and learning the external world around him. However, numerous studies on autism spectrum syndrome have shown how the inclusion of individuals with ASD in challenging contexts, with the professional help of a trained team but above all the support and involvement of the family, can lead to extraordinary improvements. The aim is for each child to find the most appropriate communication channel that allows them to experiment, improve and express their talents. The hope is that continued research progress will help make autism spectrum syndrome no longer a frightening disease but a different condition to work on. The winning solution to understanding this bizarre and at the same time alienating world is to build a strong and stimulating communication chain between the school environment and the family.

"We all have a world of things inside us: each one his world of things! And how can we understand each other, Lord, if in the words I say I put the meaning and value of the things that are within me;

while those who listen to them inevitably assume them with the meaning and value that they have for themselves, of the world as they have it within them? We think we understand each other, but we never do.” Luigi Pirandello