

A REVIEW OF THE LITERATURE ON LANGUAGE ACQUISITION IN CHILDREN WITH AUTISM

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Abstract

The autistic spectrum disorders are generally defined in literature as developmental disorders of a neurobiological origin. From Kanner's first description until now autism has remained a challenge since there is not yet a clear answer to what causes autism and how we can treat it. However, individuals with autism show impairments in three directions: social interaction, communication and imagination. Given that the main aim of the current paper is to review studies which focus mainly on language acquisition in autism spectrum disorders, it reports findings from the domains of pragmatics; discourse functions; syntax; prosody; morphology and pronouns acquisition. The information on the paper is organized so that it covers a general review of the most dominant language and communicative difficulties reported in this population which are represented in a chronological review of the main language domains. Many studies conducted on different groups of children with autism such as high-functioning autism and Asperger who are characterized by different levels of language impairments and social deficits, are reviewed. A description of the impairments reported from the area of pragmatics and discourse functioning is followed by the deficits observed in ASD prosody which of course has an impact on their pragmatic performance. Finally, studies on the area of syntax and morphology are also reviewed. Different hypotheses and assumptions explaining the language deficits observed in children with autism are contrasted and compared with findings coming from studies that report conflicting results.

Keywords: *Autism, acquisition of pronouns, syntax, morphology, prosody, impairments.*

1. Introduction

The autistic spectrum disorders are generally defined in literature as developmental disorders of a neurobiological origin (Frith, 2008). Within the autistic spectrum disorders five groups of diagnoses are identified: Autism Disorder, Asperger Syndrome, Rett Syndrome, Childhood Disintegrative Disorder and the Pervasive Developmental Disorder not otherwise specified or atypical autism (Paul, 2006). Despite the large number of researchers done on autistic spectrum disorders and the improvements from childhood to adolescence, more contribution is needed in the area of intervention. From its first description (Kanner, 1943) until now autism has remained a challenge since there is not yet a clear answer to what causes autism and how we can treat it. Unfortunately, the rate of children affected by autism has been growing over time from 1 in 150 in 2000 to 1 in 68 children in 2010 (CDC, 2014). Autism is still considered as not entirely curable.

The core problems in autism can be described by "the triad of impairments" developed by Lorna Wing in 1993. People with autism show impairments in three directions: social interaction, communication and imagination. The symptoms manifesting themselves in persons with autism are described as of biological (brain), psychological (the mind) or behavioral origin (Frith, Morton, Leslie, 1991). Given that the main aim of the current paper is to review studies which focus on language acquisition in autism spectrum disorders, we

will draw our attention mainly on those studies which report findings from the domains of pragmatics and discourse functions; syntax; prosody and morphology. Studies conducted on different groups of children with autism such as high-functioning autism and Asperger who are characterized by different levels of language impairments and social deficits will also be reviewed.

2. Language impairment in ASD

Language deficits in children with autism are well documented. Although the deficits in language vary from individual to individual, language impairments are present in all children. At the bottom of the spectrum line stay individuals with ASD who are characterized by the absence of verbal abilities. Prizant (1996) reported that 50% of the children with autism never acquire speech as a primary mode of communication although other studies reduce this number to 25% (Tager-Flusberg et al., 2005). The absence of speech is observed in those children since at the first year of their life. They produce no babbling and they do not use vocalizations for social engagement. At the top of the spectrum stay those children with ASD who succeed in acquiring the spoken language, including even high-functioning individuals whose IQs are within the normal range, but that still fail to develop it normally. For this reason language delays are often considered as diagnostic criteria for autism. A delay in language acquisition is observed since at the very first stages of language production. Children with autism produce the first word when they are 38 months old that is 27 months later than the typically developing children (Howlin, 2003). The first combinations of words observed in children with autism are at the age of 52 months i.e 35 months later than TD children.

The most reported features that characterize language production in ASD are echolalia and jargon. Echolalia which is the repetition of unanalyzed utterances or interactions has very often been a research topic in autism. Kanner (1943) described communication in children with autism as a 'parrot-like repetitions of heard word combinations'. He reported that word combinations are sometimes echoed immediately but more often they are stored in child memory and uttered at a later time which is known as delayed echolalia. Kanner concluded that echolalia is the result of limited communicative competence in children with autism. McEvoy et al., (1988) studied the use of immediate echolalia at different stages of language development in eighteen children with autism and concluded that the amount of immediate echolalia used by children with autism vary with the level of language development. Although echolalia is used as a primary strategy for the acquisition of language and social skills by children with autism its use is dependent on language development.

The use of echolalia is explained on the account of the disproportionate rates of growth observed in certain cognitive abilities (Siegel, 1996). It is a known fact that echolalia depends on the processes of verbal short-term memory which requires the ability to remember streams of acoustic signals and produce them. Children with autism lack the ability to comprehend the acoustic sounds for that reason they compensate their inability relying on auditory memory thus echoing what is stored there. The function of echolalia in the speech of children with autism is not yet clear. In addition to be a tool of holding information in the memory the use of echolalia might be a familiar verbal ritual or a tool to cope with cases of insecurity in conversation (Eigist et al., 2011). The role of echolalia in syntactic skills of children with autism is also obscured. Bartak and Rutter (1974) reported that pronoun reversal in children with autism is a net consequence of echolalia. On the other hand in a longitudinal study of children with ASD and Down syndrome Tager-Flusberg and colleagues (1990) reported that echolalia might have a partial effect in communicative function. The speech in children with autism contained longer utterances and more advanced grammatical constructions than imitated utterances.

Furthermore, children with autism are known for their idiosyncratic use of language. Very often they use idiosyncratic expressions which are not understandable for their listeners. The use of jargon is closely related to the emergence of delayed echolalia. Kanner (1943) reported the case of the child who after acquiring the phrase ‘don’t throw the dog off the balcony’ uttered by his mother gave it a meaning based on his own experience. Therefore, understanding the jargon used by children with autism requires an understanding of their experience. Siegel (1996) reports the case of Samuel, five-year old boy with PDD, who scared his parents by saying ‘soon I will die and go to heaven’ a phrase he memorized from the movie *All good dogs go to heaven*. The production of jargon and the obscure meaning that accompanies it is considered as result of a failure in communication (Frith, 1989). Children with autism do not take into account what their listeners should know in order to comprehend their utterance since they lack the theory of mind.

In the next sections we will discuss two of the most important areas of communication in ASD: (1) pragmatics as a use of language and (2) syntax as knowledge of grammatical elements that carry grammatical meanings in words. Prosody will be considered as part of the discussion on pragmatics.

3. Pragmatics

Many studies report pragmatic impairments in children with autism, notwithstanding the severity in language which varies from mild to severe. Children with autism show deficits both in linguistic and non linguistic functions which are included within the term pragmatics. By linguistic functions are meant the choice of referential expressions, turn-taking, register and semantics, while non linguistic functions include eye contact, gestures, body language and facial expressions. Discourse which connects longer streams of speech is also considered as closely related to pragmatics. Pragmatics and discourse require that users of language respond to the level of education, social status, knowledge of topic of discussion and other qualities of their listeners.

In many studies discourse and pragmatics are reported as the most impaired domains in children with autism (Kelley et al., 2006). Deficits in language pragmatics are often referred to as semantic-pragmatic deficit (Siegel, 1996). Children who lack the understanding of certain words and the context they are used, tend to make up for this lack by using more nonverbal forms of communication. The areas examined in Kelley et al, (2006) study cover morphology, syntax, lexical semantic, the relation between grammar and vocabulary and of course pragmatic functioning. Fourteen grade-school-aged children with autism were tested over the course of two sessions. Different tasks such as the understanding of complex syntax consisting of structures with ‘wh movement’ and verb argument structures which tested the understanding of ungrammatical sentences with too many or too few noun arguments etc., were used for the grammar part. Theory of mind tasks designed to test children understanding that people can have a false belief and narrative capability tasks were used to test children pragmatic functioning abilities. Each of the tasks was recorded on a videotape. Data from this study showed both strengths and weaknesses in the ASD group. For example, while children with autism did not differ from the TD group on the vocabulary assessments and complex syntax tasks, they performed more poorly than the TD group on the verb argument structure task. Children with autism who had severe autistic features performed more poorly on the false belief task. Also, the autistic group experienced pragmatic difficulties. They provided more incorrect and redundant information in story telling task than the TD group. Therefore, the study conclusion was that the areas of impairment in ASD are semantic and pragmatic while syntactic knowledge seems to be intact.

As mentioned above another area of impairment in ASD is the ability to decode emotions through facial expression, prosody and verbal content (Lindner & Rosen, 2006). The inability to understand emotional expression is considered as one of the reasons why individuals with AS have difficulty to interact socially with others. Lindner et al., (2006) tested fourteen children with Asperger's Syndrome (AS) between 5 and 16 years old for their ability to decode emotions such as happy, anger, sad and neutral. Both AS and TD groups demonstrated higher than average receptive language abilities. In terms of the abilities to decode emotion the two groups differed in their results: children with AS had more difficulties decoding emotions from static facial expression, dynamic facial expression and tone of voice than TD children. Also findings indicated specific emotional processing deficits in facial expression and tone of the voice for children with AS. In conclusion, the accuracy to understand emotion in social interaction in children with ASD is affected by their overly reliance on verbal cues. The results from this study was a good start to find ways to improve perception of emotion in children with AS through facial expression and tone of voice.

Another noticeable pragmatic impairment in ASD is the interpretation of figurative language. Very often children with autism interpret the figurative language (metaphor, metonymy, hyperbole, irony etc) in a literal way. Most of the studies on figurative language are done on the interpretation of metaphors and irony concluding that understanding of metaphors and metonyms in children with autism is impaired (Rundblad & Annaz, 2001). Testing the comprehension of metaphors and metonyms by using picture stories Rundblad and Annaz (2001) reported that children with autism performed worse on both metaphor and metonymy when compared with TD controls. While TD groups understanding of metaphors and metonymy improved with increasing age this was not the case for the autism group. This study did not find any correlation between theory of mind and children performance on figurative language or between comprehension and severity of autism. Therefore, theory of mind hypothesis cannot explain the delay and impairment reported in this study for metonymy and metaphor. Instead Rundblad and Annaz hypothesized that TD children and children with autism used different mechanisms and strategies to complete the tasks. The conclusion from this study is that the interpretation of metonymy was done by using atypical cognitive strategies and brain activities. However, the study suggested that in addition to carry out longitudinal studies with both autism and Asperger syndrome individuals more brain imaging investigations are required to prove their hypothesis right or wrong.

Pragmatic inferences necessary for successful communication seems to be also impaired in children with autism (Ozonoff & Miller, 1996). Denis, Lazenby & Lockyer (2001) tested eight high-functioning children with autism on both intentional and non-intentional tasks. Findings from the study showed that children with autism were able to identify multiple meanings for ambiguous words and make inferences from mental state verbs but failed to understand what these verbs implied in context. The failure of children with autism to understand the mental state words in a context was explained on the account of the theory of mind development hypothesis (Baron-Cohen, Leslie & Frith, 1985). According to this theory at a certain age children develop their ability to explain and predict their own and others' mental states. Children with autism fail to understand deceit, beliefs and mental entities because they lack this development.

Another possible explanation for the core deficits in ASD is the 'executive functions' (EF) theory which suggests that the functional circuitry of the frontal lobes of the brains in ASD is impaired. As the results, children with autism fail to simultaneously consider and respond to multiple sources of information coming from other people or themselves or to inhibit inappropriate responses. However, none of these theories, the Theory of Mind and the Executive Functions theory, seems to explain the symptoms of ASD across the three domains (social interaction, communication skills and repetitive behaviors).

4. Prosody

In addition to echolalia and jargon speech in children with autism is marked by suprasegmentally qualities which are not found in typically developing children. Studies show that individuals with ASD have difficulties with both prosodic comprehension and production. Speech and prosody-voice profile in 15 high-functioning autism (HFA) and 15 Asperger syndrome (AS) were compared to each other and to the profiles coming from 53 typically developing speakers, in Shriberg et al., study (2001). Few significant differences in the speech and prosody- voice profiles of speakers with HFA and AS were reported. The study reported articulatory errors at allophone level, inappropriate or nonfluent phrasing, a pedantic style of speech and unusually fast or slow speech rates. These findings are in line with the deficits in prosody reported in literature. The deficits in prosody found in autistic and Asperger groups were explained as associated more with pragmatic and affective processes rather than with deficits in the grammatical function of prosody.

The perception and production of a certain prosodic elements in the spontaneous speech of children with ASD between 14 and 21 years old were compared with the prosodic elements recorded in the speech and perception of a typically control group as reported in Paul et al., study (2005). The data from this study reported the same results as in Shriberg et al., study (2001) that stress is difficult for children with ASD. The children had difficulties not only to understand but also to produce appropriate stress patterns regardless of stress functions (grammatical, pragmatic or affective). On the contrary, autistic group did not show any difficulty in the production of pragmatic/effective intonation. Similarly, the pragmatic/affective production and perception of phrasing was intact. In conclusion, all aspects of stress examined in this study appeared to pose difficulties for children with autism. To cope with the difficulties of identifying and producing agitated affects children with autism adapted the ‘talk fast/talk slow’ strategy instead of a more holistic approach of understanding and expressing prosodic cues.

5. Syntax

Contrary to pragmatic skills, language deficits in children with autism are little investigated. This is partially due to the fact that children with autism, in particular those affected by severe autism, are reluctant to speak. However, studies on syntactic abilities in children with autism report contradictory conclusions. There are studies which conclude that syntax is not impaired in ASD. According to them language acquisition in children with autism follows the same course as in typically developed children but delayed (Tager-Flusberg et al, 1990). On the other hand, there are studies which report specific deficits in children with autism in regard to syntax acquisition considering language in children with autism not as a delay but instead a deviance (Eisgiti et al., 2009). More research is needed to prove whether language deficit in children with autism is a delay or a deviance and whether it is pragmatic or syntactic in nature.

Tager-Flusberg et al (1990) reported that acquisition of grammatical and lexical aspects of language in children with autism follow the same path as in Down syndrome and typically developing children. Six children with autism were match on IQ and chronological age with a group of six children with Down syndrome and typically developing children. The three groups were compared on the basis of mean length utterances measured (MLU) in

morphemes, index of productive syntax, lexical diversity and the distribution of vocabulary among the nouns, modifiers and verbs. Data from this comprehension longitudinal study of language acquisition shows that the majority of children with autism showed uniform growth in MLU. On the other hand, data from the index of productive syntax indicated that children with autism acquire specific grammatical structures in the same order as children with Down syndrome and typically developing children. Similarly, children with autism did not differ from the Down syndrome and TD controls in the pattern of vocabulary growth. However, some differences were found between the Down and autistic groups. Down syndrome children relied more on closed class forms than on specific nouns while children with autism relied more on the later rather than the former. While the first relied mostly on pronouns, children with autism used proper nouns. The main conclusion coming from this study was that language acquisition in children with autism is not characterized by a fundamental impairment in grammatical abilities.

In a study by Allen and colleagues (2011) children with autism took turns describing unrelated pictures showed a strong tendency to use the same syntactic structure either passive or active as their conversational partner but with a distinct lexical content. The tendency of children with autism to imitate an abstract component of language suggests that the delays in language acquisition cannot be explained only by impairment in mechanisms underlying convergence on linguistic choices. The results from this study do not support the explanation that difficulties in effective communication of children with ASD can be attributed to linguistic deficits, in particular at the level of syntax. Preservation of the ability to imitate abstract components of language also ruled out the claim that communicative breakdown in ASD is explained by impairments in language imitation.

On the other hand, Prior and Hall (1979) reported that children with autism are severely retarded in their comprehension of language rather than different in their approach to language. The study found that children diagnosed with infantile autism had more difficulties in comprehending transitive verb phrases than the control groups. Twelve children with autism were matched on IQ with twelve children with Down syndrome and a group of typically developing children. Pictures containing two-word intransitives and three-word transitive phrases such as, *man waving* and *girl rides horse* were presented to the children. Prior and Hall reported that children with autism made more errors in identifying the target phrases in all conditions. This means that children with autism had difficulties to comprehend the relation between the predicate and its arguments (agent-action-theme). However, the pattern of performance in children with autism was the same in all conditions which does not support the hypothesis that these children use abnormal strategies in task solution. Neither did the study report any significant effect of word position or word type in the performance of children with autism.

Eigist and Bennetto (2009) found that children with autism in comparison to typically developing children use a reduced set of syntactic structures. Three groups of children: (i) children with autism 3-6 years old; (ii) 5 years old children with non-specific developmental delays, and (iii) 3 years old typically developing children matched on non-verbal IQ and gender were recorded in a 30-minute free play session in the lab. The mean length of utterance in morphemes which is often used to describe changes in grammatical development was calculated on a set of 100 utterances. Transcriptions were analyzed on a variety of dimensions such as grammar errors, type-token ratio for lexical items, jargon production, turn-taking as a measure of pragmatic discourse ability and of course syntactic assessments. The autistic group produced language that was significantly less complex than was expected for their developmental level. Contrary to syntactic development, the lexical knowledge in ASD was not impaired. Furthermore, syntactic abilities in children with autism showed an atypical development path in comparison to typically developing children. The main

conclusion coming from the study was that children with autism when compared to typically developing children matched for chronological age and non-verbal mental age exhibited obvious delays in syntactic knowledge.

In conclusion, syntactic development of children with ASD seems to be one of the most discussed domains of language acquisition. Studies on syntax development in ASD report different findings which have resulted in contradictory conclusion. The majority of studies agree that a clear delay in syntax domain of language is present at ASD. Most of the studies conclude that social and cognitive factors contribute significantly to language development.

6. Morphology

Morphology refers to the understanding and use of the morphemes which are the smallest meaningful units of language and to the way such units are combined into words. For example, the verb *play* and the noun *boy* in combination with other morphemes such as *s*, *ing*, *ed* or *s*, *'s* change not only their form but also their meaning: *play*, *plays*, *playing*, *played* or *boy*, *boys*, *boy's* etc. Studies on morphological development in typically developing children (Marchman, 1997) have shown that morpheme production of past tense is the result of a complex combination of rule-based and probabilistic constraints such as item frequency, phonological characteristic and neighborhoods. Marchman tested the productive use of English past tense morphemes in 74 pre and elementary typically developing children at the age of 3; 8 to 13;5. Children produced few past tense errors including regular and irregular patterns showing that their ability to produce past tense is not limited to over regularizations of irregular verbs. The most common errors were suffixations and zero-markings and vowel change. The study concluded that the connectionist model provide a better insight into the possible factors which influence the acquisition of a system like the English past tense than the dual-mechanism model since the data showed that children production of past tense regular and irregular morphemes was related to phonologically-based constraint.

Bartolucci et al., (1980) found a delay in morpheme production in children with autism when compared to mentally retarded children and typically developing children matched for non-verbal MA. The three groups were compared for their use of morpheme rules. The fourteen grammatical morphemes analyzed in this study followed the Brown's criteria (1973) and were considered as the earliest morphemes that emerge in the speech of typically developing children. A corpus of 50 sentences for each subject was analyzed. Data from the study report that children with autism omitted morphemes significantly more frequently than the normal group. The performance of children with autism was similar to that of mentally retarded children. No significant difference was reported in the performance of these two groups. However no correlation was found between children with autism and typically developing children in the rank-ordering of morphemes. In other words, the morphological development in children with autism and mentally retarded is atypical but in a consistent fashion. Given that no correlation was found between the measures of grammatical complexity and rates of omission of morphemes in children with autism the study suggests that semantic and cognitive variables may be assumed to be the factors which cause such an atypical morphological behavior in children with autism rather than the grammatical structure.

Findings from Howlin' study (1984) are in lines with the results reported in Bartolucci et al (1980) study in regard to the correct use of morphemes. The correct use of 13 morpheme rules in the language of sixteen boys diagnosed with infantile autism was assessed on the data collected during unstructured interaction of the child with the mother. The analysis was limited to the morphemes use. Howlin found a significant correlation of the morphemes used correctly in her study and Bartolucci et al,'s study (1980). This means that children with autism are able to apply some linguistic rules and that they show consistency in the way the

morphemes rules are acquired. However, the conclusion of Bartolucci and colleagues that children with autism show a deviant pattern of morpheme acquisition is questioned by Howlin for the following reasons: (1) Bartolucci et al., draw their conclusion based on the frequency of incorrect morpheme usage which cannot be considered as a valid information for the correct acquisition; (2) acquisition of morphemes is related to development of mean length of utterances, but children in Bartolucci et al., study were match for mental age (3) the range of correct usage scores in TD and language impaired children is very restricted, so the relative rankings cannot be used to infer the order of acquisition, (4) problems were found in the interpretation of cross-sectional data which might be misleading.

7. Conclusion

Autism spectrum disorder is defined as a neurodevelopmental disability. Very often it is considered as a disorder of brain function which might have different causes. Deficits in ASD cover a multiple areas of functioning which are classified in one of the following domains of behavior: (1) social interaction where an inability to infer what other people think or experience is obvious, (2) communication and imaginative play, and (3) cognitive impairments. Communication impairments range from the most severe cases of mutism to speech with poor conversational skills in high-functioning autism. For a long time the main domain of research investigation were the social aspects of language in ASD since it was believed that language skills in children with autism were intact. This was because social skills were proved to have some effects on communicative abilities. However, many recent studies have provided evidence in favor of the hypothesis that children with autism have deficits in other aspects of language learning.

In this review we focused mainly on the early language acquisition in children with autism. Findings from different studies have showed that language and communicative difficulties in ASD are of great importance since language impairments are found in all individuals with ASD including even individuals with Asperger's syndrome. Results from different studies showed that language acquisition in ASD is characterized by severe delays. Some studies concluded that language in children with ASD follows the same trends as in typically developing children but delayed. This means that in some area of grammatical development the production of grammatical structures in ASD might be predictable. However, other studies showed that language production in ASD is characterized by features which are not viewed in typically developing children. For example, echolalia is not present that late in language acquisition of TD children as it is found in children with autism and neither does it appear that often as it does in ASD.

Investigating the atypical development of language acquisition in children with autism is of great importance for two reasons. First, studies on language deficits in children with autism and the investigation of their developmental impairments help to shed lights on the nature of language acquisition process in typically developing children. Second, understanding language acquisition in children with ASD can lead to the development of better language interventions and treatments for these children. The main issue in understanding language development in ASD is the question of what are the 'universal' impairments in ASD which in turn hold the status of the core deficits within the disorder and as the result become the main concern in diagnosing and treatment. Despite the large number of studies that have recently focused on the study of language deficits in ASD more longitudinal studies are required to uncover the relationships between language domains and the constraints on specific linguistic and pragmatic functions.

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