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Research Article

Pattern of Syntactic Profile in Children with Autism: A Study on the Relation between Reception and Expression of Syntax

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ARTICLE INFORMATION

Article Chronology:
Received: 25.08.2016
Revised: 18.09.2016
Accepted: 18.10.2016

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ABSTRACT

Introduction: Language impairment is a primary characteristic of children with autism spectrum disorder (ASD). However, findings of language deficits in these children have been inconclusive, and many researchers believe that in such children the pattern of language profiles is different from normal children. To determine this pattern, comprehension and expression of syntax were examined in 10 Persian speaking children at ages 6-9. Children with autism were compared to normal groups on the basis of their age and language.

Material and Methods: In this study, research data were collected of 10 children with autism and 20 normal cases (10 age-matched and 10 language-matched). Gilliam Autism Rating Scale- 2 and the Autism Spectrum Screening Questionnaire were used for diagnosis of children with autism, and test of language development was used to determine their language scores. Afterward, reception of syntactic structures was assessed using the Persian syntax comprehension test, and expression of it was also evaluated using a Persian photographic grammar expression test. Finally, the data were analyzed by Kolmogorov–Smirnov, Mann–Whitney, and Wilcoxon tests.

Results: Comparing the total scores shows that in normal groups, there was a significant difference between receptive and expressive of syntax both in terms of the number of correct tasks and number of correct structures. However, in the study group, such a difference was only seen in the number of correct tasks. Comparison of reception and expression of different structures in all groups showed that there was a significant difference between receptive and expressive tasks of subject relative clause in children with autism and language-matched group. However, in age-matched group, such a difference was not noticed. As to the grammatical relations such as aspect, tense and superlative adjectives, there were no significant differences between receptive and expressive tasks of any groups. Finally, there was a significant difference in terms of using of independent pronouns just in group of children with autism.

Conclusion: Overall, it can be concluded that comparing total scores of difference between reception and expression does not suffice for making a hypothesis that in ASD comprehension of all structures is more difficult than their expression because their performance in different structures of syntax is variant.

Keywords: Autism spectrum disorder; Expression; Comprehension; Syntax

Citation: Ahadi H, Mokhlesin M, Mahmoodi-Bakhtiari B. **Pattern of Syntactic Profile in Children with Autism: A Study on the Relation between Reception and Expression of Syntax.** J Mod Rehab 2016; 10(3): 98-103.

Introduction

The Diagnostic and Statistical Manual 5 lists persistent deficits in social aspects of communication, interaction and restricted, repetitive patterns of behavior as characteristics of autism spectrum disorder (ASD) (1). The Centers for Disease Control have reported that one

in 68 children is diagnosed with ASD in the United State (2).

Impairment in communication is a central feature of ASD (1). Impairment in the understanding and use of language is common among this population (3). For example, a previous study found about 57% language impairments in autistic children with normal non-verbal intelligence. Although in many studies on children with autism, the receptive and expressive language have been measured, less attention has been paid to the relation between these two (4). Some researchers believe that in normal children, reception is superior to expression, but some other researchers such as Chapman and Miller (5) have found that depriving the subject of the normal contextual expression will exceed reception. Hence, they have successfully shown that comprehension without contextual support may be inferior to production. Many articles have indicated that children with autism have an atypical language profile in which expressive language is better than receptive language (4, 6-11). Hence, we can suppose that children with autism do not use contextual support (due to their pragmatic disability), so they will have opposite pattern in language profile. If this pattern is a sign of ASD, this atypical language profile can lead to a differential diagnosis of children with autism from other developmental disorders (6). In addition, it shows that children with autism may pursue a different direction in their language development in relation to other disorders, and knowing this difference can be very helpful in their intervention (7). A few studies have directly studied the impairment in receptive and expressive language in children with autism. Some of them have supported the presence of an expressive-better-than-receptive pattern in children with autism.

In their study, Kover et al. (8) characterized the receptive vocabulary profiles in children with autism on the basis of their age, nonverbal cognition, and expressive vocabulary. They assessed Receptive vocabulary with the Peabody Picture Vocabulary Test and expressive vocabulary with the Expressive Vocabulary Test. They found that the receptive vocabulary increased at a lower rate for children with autism. They concluded that by using the vocabulary test they can distinguish autistics from typical developments (TDs).

Ellis et al. (2010) conducted the receptive and expressive part of three different tests to the same group of the children with autism. Their achievements on two of the tests revealed a convincing difference between the receptive and expressive language abilities for the children with autism in comparison with the normal group, whereas the third one confirmed the opposite pattern (9).

In the study done by Volden et al. (2011), children were assessed by a battery of developmental measures. They showed that scores were higher in more intellectually autistic children, and overall, expressive communication was higher than auditory comprehension. However, their overall advantage was not stable across the developmental levels. Expressive skills were significantly better than receptive skills at the youngest levels, whereas children with advanced developments showed converse patterns. The researchers found that these tests may be used to achieve an index of early syntax and semantic skill in young children with autism (10).

Maljaars et al. (2012) compared language profiles of autistic children with intellectually disabled children and typically developing children. They found that the group of the low-functioning children with autism achieved a higher mean score in expressive than on receptive language, but the other groups showed the reverse pattern. They found that nonverbal mental age was a very important factor in language proficiency (11).

Hudry et al. (7) examined relative delay in the receptive and expressive language skills within a sample of preschoolers with autism. They found that the language ability of the children with autism was lower than normal group and receptive ability was more impaired than expressive ability.

Some other studies found a receptive advantage over expressive (9, 12). Luyster et al. (13) used three tests for examining receptive and expressive abilities in the same group of autistic people. The result showed that in two of the tests their expressive was better than their receptive skills, whereas the third one implied the opposite pattern.

Ellis et al. (9) carried out the receptive and expressive part of the three different tests to the same group of autistic their achievement on two of the tests revealed a convincing difference between receptive and expressive language abilities for autistic children compared to the normal group, whereas the third one confirmed the opposite pattern.

Some other studies failed to find a discrepancy (4, 14, 15). Kjelgaard and Tager-Flusberg (4) investigated language working in a group of 4-14 years old autistic children between the ages of 4 and 14 years who were evaluated by standardized language test. Their major findings revealed a significant inconsistency in language skills of autistic children. Some children with autism have normal language skills, but others language proficiency was significantly delayed.

Jarrold et al. (14) investigated the profile of language abilities in autistic children by different standardized language assessments. They evaluated the comprehension and production of their vocabulary and grammar and found that their performance was at similar level in both tests. They found no confirmation of different language profiles in any of them. Kwok et al. (2015) found no evidence that an expressive advantage is common in ASD (15).

The results of these studies suggest that there are many factors such as the domain of language measurements, source of language data, and age may affect the results. Kwok et al. (15) found that there is not enough evidence to give any explanatory hypotheses in this respect. For example, we do not know of any research done in reception and expression of syntax in the same group of autistic children. Furthermore, some research projects have been done to investigate the linguistic characteristics of the Persian autistic (17-19), but there is no research about pattern of their syntactic profile, so the purpose of this study was investigating the expressive and receptive syntax, to find their syntactic profile pattern.

Materials and methods

Typically developing children were classified into two groups. 10 typically developing children were age-matched and 10 typically developing children were language-matched. All these children were selected simple randomly from three kindergartens and three primary schools in three districts of Tehran (north, center, and south). The other participants were 10 children with autism (males, age 6-9 years), who were selected from the schools for exceptional children.

The Gilliam Autism Rating Scale (GARS-2), a revision of the popular GARS, is a norm-referenced instrument that assists teachers and clinicians in identifying and diagnosing autism individuals aged 3-22 years and in estimating the severity of the child's disorder (20).

The Autism Spectrum Screening Questionnaire (ASSQ) is a questionnaire which was filled out by the parents or teachers of children or adolescents (6-17 years of age). It stands for screening ASDs. Each question had three possible answers; No, somewhat, and yes, and each question has a score from 0 to 2 (21).

Test of language development (TOLD-P:3) is a test designed for accessing children's receptive and expressive language competence in children ages 4-0 through 8-11. It has six essential subtests for the evaluation of semantics and syntax. It has also some supplementary subtest in phonology. Adaptation and standardization of test TOLD-P:3 for Persian language children has already been done (22).

Children's understanding of structures was assessed by the use of syntax comprehension test. 24 syntactic structures and 96 items are assessed by this test, which has a good content validity. The criterion-related and construct validity were also adequate, and the test has a strong internal consistency. Therefore, it seems that the syntax comprehension test can be used by the researchers and speech and language pathologists as a valid and reliable tool in the evaluation of the syntactic features of the children 4-6 years old and diagnosis syntax comprehension disorders in children aged 5.5 years and older. Content validity index (CVI) of the syntactic comprehension test was 0.81. It should also be noted that 61.4% of the items had a difficulty index between 0.30 and 0.70. The items' discriminative index ranged from 0.20 to 0.53. The correlation between the test of syntax comprehension and the subtest of grammar understanding of the language development test was estimated about 0.57. The gradual increase incomprehension of syntactic structures with age, the significant differences in total score of the syntax comprehension test across four age groups ($P > 0.010$), the significant differences between normal children and those with specific language impairment ($P > 0.010$) and the low correlations among syntactic structures, provided enough evidence of construct validity. A significant correlation between the test scores was observed, in two rounds ($r = 0.56$). Internal consistency of the test was 0.89 (23).

Children's expressive grammar was measured using the Persian Photographic Grammar Expression Test. It is the first reliable and valid test that exclusively and accurately evaluates grammatical characteristics of Persian-speaking children. It concludes 32 grammatical structures it has good content validity (CVI > 80). Comparing the results of studied test with the grammatical complement subtest of TOLD-P3 showed convergent validity of two test ($r P = 0.500$). Results related to test-rest and inter-rater reliability showed a correlation coefficient equal to 0.91 and > 0.9, respectively. Furthermore, the test has a good internal consistency ($KR21 = 0.82$) (24).

To assess the relation impairment in reception and expression of syntax in children with autism, we measured the reception and expression of language ability in autistic children and compared it with normal children. First, we chose the verbal autistic children. Then, the forms of ASSQ and GARS-2 were given to the parent of selected autistic children. After analyzing the forms, we chose 10 autistic children whose scores in GARZ were 60-79 and in ASSQ higher than 19 and then syntax comprehension test and grammar expression test were taken by the speech therapist to evaluate their receptive and expressive ability. Finally, 10 age-matched and 10 language-matched normal children were selected, and to choose the language-matched children, we used the TOLD-P:3 (24) and evaluated the total language proficiency of normal and autistic children. The collected data were analyzed by Kolmogorov–Smirnov, Mann–Whitney, and Wilcoxon tests. Kolmogorov–Smirnov was used to decide about the normality of data. The test rejected the normality assumption for data because the P value of the test was below the 0.050. Hence, we used the nonparametric tests, and Wilcoxon and Mann–Whitney were used for data analysis.

Results

Table 1 shows that in ASD, age-matched and language matched groups the mean of receptive syntax was

higher than the mean of expressive syntax both in percent of correct structure and the percent of the correct tasks.

Table 1. Scores of reception and expression tests in ASD and normal groups

Tasks	Minimum	Maximum	Mean ± standard deviation
Autism			
Reception			
Structures	0.04	0.58	0.24910 ± 0.17129
Tasks	0.42	0.83	0.58000 ± 0.11165
Expression			
Structures	0.03	0.31	0.1590 ± 0.08987
Tasks	0.10	0.52	0.33000 ± 0.16865
Age-matched			
Reception			
Structures	0.58	0.96	0.79830 ± 0.16449
Tasks	0.83	0.99	0.92500 ± 0.06775
Expression			
Structures	0.40	0.59	0.49830 ± 0.07360
Tasks	0.70	0.97	0.86830 ± 0.10265
Language-matched			
Reception			
Structures	0.17	0.67	0.35860 ± 0.19920
Tasks	0.59	0.82	0.69860 ± 0.08435
Expression			
Structures	0.19	0.41	0.31570 ± 0.07829
Tasks	0.32	0.80	0.59790 ± 0.17430

ASD: Autism spectrum disorder

Table 2 provides the results of Wilcoxon test on comparing the general receptive and expressive syntax in the autistic group and the age-matched and the language-matched groups.

Table 2. Wilcoxon test for comparing total score of receptive and expressive structure within different groups

Groups	Correct structures		Correct tasks	
	P value	Z	P value	Z
Autism	0.285	−1.070	0.005	−2.805
Age-matched	0.042	−2.032	0.027	−2.206
Language-matched	0.018	−2.366	0.018	−2.371

Table 2 shows that in age-matched language-matched group, there was a significant difference between receptive and expressive syntax both in percent of correct structure and percent of correct tasks. In ASD group, we can see this difference only in number of correct tasks.

For an in-depth understanding, we compared this relation in specific structures, which turned out to be the same in both tests.

Table 3 provides the results of Wilcoxon test for comparing some receptive and expressive syntax in the autistic group and the age-matched and the language-matched groups.

Table 3 shows that in ASD group and language-matched, there was a significant difference between receptive and expressive tasks of subject relative clause, but in age-matched group, such a difference was not witnessed. In relation to the grammatical issues such as aspect and tense tasks and superlative adjective, there was no significant difference between the receptive and expressive task in both groups. As to the independent pronoun, there was no difference in autistic group, but there was a significant difference between receptive and expressive task in both normal groups.

Table 4 shows that there was a significant difference between ASD group and age-matched peers in terms of the percent of correct structures and percent of correct tasks, both in reception and expression.

Table 5 shows that there was no significant difference between ASD and language-matched groups in percent of correct structure, but there was a significant difference in correct tasks of syntax comprehension test. There was also a significant difference in correct tasks and structures in grammar expression test.

Discussion

This is the first study to present a detailed set of data on relative impairment in reception and expression of syntax in Persian autistic children, who were all between 6 and 9-year-old. The results of this study show that in normal groups; there are significant differences between the receptive and expressive syntax, both in terms of the number of correct tasks (the structures in which all tasks are done correctly) and number of correct structures (when the correct task is the only one to be done correctly), but in autistic group, we can see this difference only in number of correct tasks. For an in-depth understanding, we compared this relation in specific structures that are the same in both tests. Comparing the reception and expression of different structures in all groups shows that there is a significant difference between the receptive and expressive tasks of subject relative clause in autistic and language-matched groups. However, in age-matched group, this difference was not noticed.

Table 3. Wilcoxon test for comparing some syntactic receptive and expressive structure in different groups

Groups	Subject relative clause		Aspect and tense		Superlative adjective		Independent pronoun	
	P value	Z	P value	Z	P value	Z	P value	Z
Autism	0.027	−2.212	0.645	−0.460	0.221	−1.24	0.221	−1.224
Age-matched	0.109	−1.064	0.066	−1.841	0.343	−0.948	0.0343	−0.948
Language-matched	0.024	−2.264	0.933	−0.085	0.221	−1.224	0.0351	−1.265

Table 4. The result of Mann-Whitney test between ASD and age-matched groups

Variable	Reception		Expression	
	Correct structure	Correct tasks	Correct structure	Correct tasks
Mann-Whitney	0.500	0.500	0.000	0.000
Wilcoxon	55.500	55.500	55.000	55.000
Z	−3.207	−3.207	−3.268	−3.259
Significancy	0.001	0.001	0.001	0.001

ASD: Autism spectrum disorder

As to grammatical issues such as aspect, tense and superlative adjectives, there are no significant differences between receptive and expressive tasks between the two groups. Finally, with respect to the use of the independent pronouns, there is a significant difference in autistic group but in the others there is not.

By comparing total score of correct task and correct structure between different groups, we found that the performance of autistic children is significantly lower than their language-matched peers in their total score of correct task and correct structure score, both in terms of reception and expression. Children with autism performed at a significantly lower level than their age-matched in their total score of correct task only in reception, but in correct structure score, their performance was at a significantly lower level than their age-matched both in terms of reception and expression.

Clinical reports have suggested that it is common to observe an unusual language profile of expressive-better-than-receptive language in the autistic children. Although several empirical studies supported this observation and confirmed unusual language profile of a receptive and expressive language were directly compared in autistic children, some other similar studies have failed to find this pattern. To explore the direction and consistency of receptive-expressive language gaps in the ASD population, and to compare the levels of impairment in receptive versus expressive language abilities in children, reception and expression of syntaxin 10 autistic children with TD children was studied in our research. Results revealed an expressive advantage to receptive in ASD, which conforms with the results of Ellis et al. (9), Kover et al. (8), Volden et al. (10), Maljaars et al. (11), and Hudry et al. (7), but contrasts with results of Kjelgaard and Tager-Flusberg (4), Jarrold et al. (14), Luyster et al. (12), and Ellis et al. (9).

In our study, the difference between receptive and expressive syntax in autistic group was more than the difference of normal groups. Therefore, our findings in syntax are almost the same as those of Kover et al.'s (8) in terms of vocabulary. The result of research in Volden et al. (10), Maljaars et al. (11), and Ellis et al. (9) in the domain of total language skills was consistent with our research result in syntax domain. As it was mentioned before, Hudry et al. (2010) analyzed the linguistic ability of the autistic children with two-parent report measurements and the directed clinician assessments. Their research results were consistent with those of ours (7). However, our results contrast with those of Luyster et al. (13) and Ellis et al.'s (2010) (9). They have found that the receptive skills of the autistic children are better than their expressive skills. Both researcher groups have reached this result through the same test (Vineland Adaptive Behavior Scales). As it is known, the kind of the test has an important effect on the results. Therefore, given the fact that our measurement device was different from theirs, our result is normally different.

Conclusion

In this study, we compared total scores of syntactic tests and found no differences between perception and expression of ASD group but by comparing the scores of different subtest, which include evaluating different syntactic structures we found that there was a significant difference between perception and expression of subject relative clause in children with autism. Therefore, it seems that the comparing the global measures of linguistic ability and even the total score of every linguistic domain is not enough to make the hypothesis that children with autism have more difficulty in their comprehension than their expression.

Conflict of Interests

We have seen and approved the manuscript being submitted. We warrant that the article is our original work. We warrant that this article has not received prior publication and is not under consideration for publication elsewhere. On behalf of all co-authors, I bear full responsibility for the submission.

Table 5. The result of Mann–Whitney test between ASD and language-matched groups

Variable	Reception		Expression	
	Correct structure	Correct tasks	Correct structure	Correct tasks
Mann–Whitney	26.000	11.500	6.500	7.000
Wilcoxon	81.000	66.500	61.500	62.000
Z	−0.880	−2.299	−2.804	−2.738
Significancy	0.379	0.022	0.005	0.006

ASD: Autism spectrum disorder

Acknowledgement
We would like to thank all the dear staffs of exceptional children schools for their cooperation in this study.

REFERENCES
1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013.
2. Centers for Disease Control and Prevention. Autism spectrum disorder [Online]. [cited 2016 Jul 11]; Available from: URL: http://www.cdc.gov/ncbddd/autism/data.html
3. Bishop DV. Which neurodevelopmental disorders get researched and why? PLoS One 2010; 5(11): e15112.
4. Kjelgaard MM, Tager-Flusberg H. An investigation of language impairment in autism: implications for genetic subgroups. Lang Cogn Process 2001; 16(2-3): 287-308.
5. Chapman RS, Miller JF. Word order in early two and three word utterances: does production precede comprehension?. J Speech Hear Res 1975; 18(2): 355-71.
6. Mitchell S, Cardy JO, Zwaigenbaum L. Differentiating autism spectrum disorder from other developmental delays in the first two years of life. Dev Disabil Res Rev 2011; 17(2): 130-40.
7. Hudry K, Leadbitter K, Temple K, Slonims V, McConachie H, Aldred C, et al. Preschoolers with autism show greater impairment in receptive compared with expressive language abilities. Int J Lang Commun Disord 2010; 45(6): 681-90.
8. Kover ST, McDuffie AS, Hagerman RJ, Abbeduto L. Receptive vocabulary in boys with autism spectrum disorder: cross-sectional developmental trajectories. J Autism Dev Disord 2013; 43(11): 2696-709.
9. Ellis WS, Lord C, Esler A. Early language patterns of toddlers on the autism spectrum compared to toddlers with developmental delay. J Autism Dev Disord 2010; 40(10): 1259-73.
10. Volden J, Smith IM, Szatmari P, Bryson S, Fombonne E, Mirenda P, et al. Using the preschool language scale, fourth edition to characterize language in preschoolers with autism spectrum disorders. Am J Speech Lang Pathol 2011; 20(3): 200-8.
11. Maljaars J, Noens I, Scholte E, van Berckelaer-Onnes I. Language in low-functioning children with autistic disorder: differences between receptive and expressive skills and concurrent predictors of language. J Autism Dev Disord 2012; 42(10): 2181-91.
12. Luyster RJ, Kadlec MB, Carter A, Tager-Flusberg H. Language assessment and development in toddlers with autism spectrum disorders. J Autism Dev Disord 2008; 38(8): 1426-38.
13. Luyster R, Lopez K, Lord C. Characterizing communicative development in children referred for autism spectrum disorders using the MacArthur-Bates Communicative Development Inventory (CDI). J Child Lang 2007; 34(3): 623-54.
14. Jarrold C, Boucher J, Russell J. Language profiles in children with autism: theoretical and methodological implications. Autism 1997; 1(1): 57-76.
15. Kwok EYL, Brown HM, Smyth RE, Oram Cardy J. Meta-analysis of receptive and expressive language skills in autism spectrum disorder. Res Autism Spectr Disord 2015; 9: 202-22.
16. Dunley K. Sentence comprehension and phonological memory in boys with fragile X syndrome and autism spectrum disorder [MSc Thesis]. Washington, DC: University of Washington; 2015.
17. Ahadi H. Analyzing the comprehension of active and passive structures in Persian autistic children. Language and Linguistic 2016; 11(22): 77-100. [In Persian].
18. Ahadi H. Comparing expressive grammar in children with autism and typically developing children. Language Related Research 2016; [Epub ahead of print]. [In Persian].
19. Roohparvar R, Karami M, Madadi M. Comparing phonetic, phonologic, morphologic and syntactic features of speech in children with autism and typically developing children. J Mod Rehabil 2014; 8(3): 62-8.
20. Ahmadi SJ, Safari T, Hemmatian M, Khalili Z. The psychometric properties of Gilliam Autism Rating Scale (GARS). Research of Cognitive and Behavioral Sciences 2011; 1(1): 87-104. [In Persian].
21. Kasechi M. Validity and reliability of Persian version of Autism Spectrum Screening Questionnaire [MSc Thesis]. Tehran, Iran: University of Social Welfare and Rehabilitation; 2011. [In Persian].
22. Hasanzadeh S, Minaei, A. Adaptation and standardization of language development test TOLD-P: 3 for Persian language children (Part 1). Journal of Exceptional Children 2001; 1(1): 35-51. [In Persian].
23. Mohamadi R. Development and standardization of a syntax comprehension test for Persian 4-6 year old children [PhD Thesis]. Tehran, Iran: University of Social Welfare and Rehabilitation Sciences; 2014. [In Persian].
24. Haresabadi F. Design and validation of Persian Photographic grammer expression test for 4-6 years old children [PhD Thesis]. Tehran, Iran: University of Social Welfare and Rehabilitation Sciences; 2014. [In Persian].