

Factors Affecting Syntax Comprehension in Turkish: Chronological Age or Receptive Language Skills?

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Abstract

The developmental literature contains studies that indicate disabilities limit verbal and nonverbal communication skills (Akoğlu & Acarlar, 2014; Miller & Paul, 2000). Owens (1984) suggested that syntax comprehension might underlie the challenges in language comprehension. There are also studies that show syntactic skills develop in parallel to vocabulary and other receptive/expressive language skills (Moyle et al., 2007; Tomblin & Zhang, 2006). Therefore, it is imperative to investigate the characteristics of syntax comprehension skills specific to different diagnostic groups. This study was aimed at identifying the possible differences in the syntax comprehension performance of individuals with typical development (TD), specific learning disability (LD) and mild intellectual disability (Mild ID) matched by chronological age. The participants of the study comprised 12 TD children (6 female, 6 male) attending elementary school, and 12 Mild ID children (5 female, 7 male) and 12 LD children (4 female, 8 male) attending special education and rehabilitation centers in Ankara city center. The participants matched by chronological age (Mean=133.64 months; S=24.66) had not been diagnosed with any physical, neurological and/or sensory disability. The Peabody Picture Vocabulary Test (Katz, Demir, Önen, Uzlukaya, & Uludağ, 1972) and the Complex Syntax Comprehension Skills Assessment Tool (Akoğlu & Acarlar, 2014; Akoğlu, 2014) were used in the assessment of receptive language skills and syntax comprehension performance, respectively. The Kolmogorov–Smirnov test was used to test the study data for normality of distribution ($p>.05$). Correlation analysis revealed a strong positive correlation of the TD children's syntax comprehension performance with both their chronological age ($r=.821$, $p<.05$) and receptive language raw scores ($r=.742$, $p<.05$), and a strong positive correlation of the Mild ID and the LD children's syntax comprehension performance with their receptive language skills ($r=.676$, $p<.05$; $r=.739$, $p<.05$; respectively). The results of the One-Way ANOVA test conducted for the comparison of syntax comprehension performance by diagnostic group indicated a statistically significant difference between the TD, the Mild ID and the LD children's mean scores ($F(2,33)=24.10$, $p<.01$). The results of the Dunnett-C test performed to identify the source of the difference showed that the TD children's mean score (Mean=29.16, S=2.36) was greater than the LD (Mean=28.58, S=2.46) and the Mild ID (Mean=20.25, S=5.04) children's mean scores, in order of magnitude. The study results are discussed in regard of the possible effects of intellectual disabilities on syntax comprehension.

Keywords: *syntax comprehension, receptive language, intellectual disabilities*

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Sözdizimini Anlama Üzerinde Etkili Olan Değişkenler: Kronolojik Yaş mı Alıcı Dil Becerileri mi?

Özet

Gelişimsel alanyazında sözel dili anlamaya ilişkin güçlüklerin karmaşık sözdizimini anlama ile ilişkili olduğu belirtilmekte (Owens, 1984) ve alanyazında dil becerileri normal gelişimden farklılık gösteren bireylerin yaşadıkları dili anlamaya dayalı güçlüklerin sözel ve sözel olmayan iletişim becerilerini sınırlandırdığını gösteren çalışmalar yer almaktadır (Akoğlu & Acarlar, 2014; Miller ve Paul, 2000). Bununla birlikte, sözdizimine dayalı becerilerin sözcük dağarcığı ve diğer alıcı ve ifade edici dil becerileri ile binişiklik gösterdiği belirtilmiştir (Moyle ve ark., 2007; Tomblin ve Zhang, 2006). Bu bağlamda, iletişimin niteliğini önemli ölçüde etkileyen sözdizimini anlama becerilerinin farklı tanı gruplarına özgü özelliklerinin incelenmesi büyük önem taşımaktadır. Bu noktadan hareketle yapılan çalışmada, kronolojik yaşa göre eşleştirilen normal gelişim gösteren (TD), özgül öğrenme güçlüğü olan (LD) ve hafif derecede zihinsel yetersizliği (Mild ID) olan bireylerin karmaşık sözdizimini anlama becerileri arasındaki olası farklılıkların belirlenmesi amaçlanmıştır. Araştırmanın katılımcılarını, Ankara il merkezinde bulunan Özel Özel Eğitim ve Rehabilitasyon Merkezlerine devam etmekte olan Mild ID 12 (5 kız, 7 erkek), LD 12 (4 Kız, 8 erkek) ve TD 12 (6 kız, 6 erkek) çocuk olmak üzere toplam 36 çocuk oluşturmuştur. Kronolojik yaşa göre eşleştirilen katılımcıların (Ort.133.64 ay; S=24.66) , nörolojik ve/veya duyuşal herhangi bir yetersizlikleri bulunmamaktadır. Katılımcıların alıcı dil becerilerinin değerlendirilmesinde Peabody Resim Kelime Testinden (Katz, Demir, Önen, Uzlukaya, & Uludağ, 1972), sözdizimini anlama becerilerini değerlendirilmesinde "Karmaşık Sözdizimini Anlama Becerilerini Değerlendirme Aracı"ndan (Akoğlu ve Acarlar, 2014; Akoğlu, 2014) yararlanılmıştır. Elde edilen verilerin normal dağılıma uygunluğu Kolmogorov Smirnov testi kullanılarak belirlenmiştir ($p > .05$). Korelasyon analizinden elde edilen sonuçlar, TD çocukların sözdizimini anlama becerilerinin kronolojik yaş ($r = .821, p < .05$) ve alıcı dil ham puanları ile ($r = .742, p < .05$) yüksek düzeyde ve pozitif yönde ilişkili olduğunu, Mild ID olan ve LD olan çocukların ise alıcı dil becerileri ile pozitif yönde ve yüksek düzeyde ilişkili olduğunu göstermiştir [sırayla ($r = .676, p < .05$); ($r = .739, p < .05$)]. Katılımcıların sözdizimini anlama becerilerine ilişkin performanslarının karşılaştırılması amacıyla One-Way ANOVA kullanılmıştır. Sözdizimini anlama performansları bakımından TD, Mild ID ve LD olan çocukların ortalamaları arasındaki fark istatistiksel olarak anlamlı bulunmuştur, $F(2,33)=24.10, p < .01$. Farkın kaynağını belirlemek amacıyla yapılan Dunnett C testi sonuçları, TD çocukların ortalamalarının (Ort=29.16, S=2.36) sırayla LD (Ort=28.58, S=2.46) ve Mild ID (Ort=20.25, S=5.04) çocuklardan daha yüksek olduğunu göstermiştir. Araştırmadan elde edilen sonuçlar, zihinsel yetersizliklerin sözdizimini anlama üzerindeki olası etkileri ekseninde tartışılacaktır.

Anahtar kelimeler: *Sözdizimini anlama, alıcı dil, zihinsel yetersizlik*

INTRODUCTION

Language comprehension, production and use are critical for social and academic development. Language comprehension skills are one of the most frequently researched subjects in recent developmental literature. In essence, comprehending and using a language requires the ability to combine words to form sentences and utterances that express our thoughts (Otto 2006). Each language system has grammatical structures and rules that explain how words are combined to construct phrases and sentences. *Syntax* is the component of language that represents the system of rules that govern word order, sentence structure and word relationships (Owens, 1984). In general, a language's

syntax designates phrase structure rules (i.e. noun or verb phrase) and involves the rules for the grammatical sequence of words within an utterance (Topbaş, 2005). While the fundamental questions of past studies, particularly in the field of psycholinguistics, were which type of syntactic information was appropriate for the processing system, how this system produced the syntactic structures necessary for understanding and how these structures took form, contemporary studies also discuss the interaction between meaning and syntax (Friedmann and Gvion, 2003). *Meaning*, in general, originates from the interaction of every sentence part with each other, contextual information, and the comprehender's general knowledge (McKoon and Ratcliff, 2007). Research conducted since the 1970s has demonstrated that the meaning and the production of language did not always display a consistent and simultaneous development and that, in some cases, difficulty in sentence comprehension might be experienced when sentences that are appropriate in syntax and grammar are used by another person in the same or a different context. Therefore, the traditional notion that "comprehension follows production" is said to be invalid for at least some developmental periods and some structures (Miller and Paul, 2000). Wlotko and Federmeier (2012) postulated that multiple mechanisms at various processing levels are engaged at different times during sentence comprehension that requires decoding word-level information from spoken or written input, and that this influences normal language comprehension and the resulting linguistic processes are affected by the amount and type of information from the environment and the linguistic context. In the majority of the studies on language comprehension skills, written language, in other words, reading and comprehension skills are evaluated and the possible developmental contribution of linguistic components are discussed, as well as, chronological age and other demographic characteristics. Syntactic knowledge is the most frequently emphasized of these components. Various studies that indicate syntactic knowledge directly affects especially reading comprehension (Brimo, Apel and Fountain, 2017). In addition, Gertner and Fisher (2012) researched the effects of syntactic knowledge on reading comprehension and spoken language comprehension. They suggested that syntactic knowledge acts as a guide in inferring meaning from sentences and learning verbs, and therefore requires analytical skills and provides useful information for new learning. A review of the literature on syntax development revealed that the studies generally focused on two dimensions: syntactic production and comprehension. The association of both dimensions with future reading skills is among the most frequently discussed subjects. Particularly the studies on typically developing children investigated the longitudinal effects of children's ability to comprehend and use syntax. For instance, a study by Tunmer (1989) examined sentence processing and reading skills in school-age children with typical development. In the study, controlling for phonological awareness skills

revealed that syntactic skills in the first grade was a powerful predictor of nonword pronunciation accuracy in the second grade. The study by Wassenberg, Hurks, Hendriksen, Feron, Mejis, Vles and Jolles (2007) carried out with typically developing children aged 5-15 concluded that complex language comprehension continues to develop until early adolescence. In the developmental literature, languages skills such as syntactic complexity and vocabulary size in 2-3-year-old children were important predictors of pronunciation accuracy and comprehension (Scarborough, 1990). Moreover, various studies stressed the significance of syntax knowledge, as well as, of syntax itself and indicated that the processing speed of syntactic knowledge was an important factor. Poulsen and Gravgard (2016) suggested that slow processing of syntactic information could restrict the integration of propositional information in sentences and that syntactic knowledge could lead to individual differences in language comprehension skills. Several studies on the subject have revealed the presence of various specific syntax comprehension problems in developmental differences such as specific learning disabilities and intellectual disabilities (Akoğlu and Acarlar, 2014; Bishop and Snowling, 2004; Dermanais, Roeber, Smith and Pollak, 2012; Pike, Swank, Heather, Landry and Barnes, 2013).

The studies conducted with special needs groups were generally in-depth investigations of the association of the variables underlying the differences in language profiles and the different dimensions of language comprehension skills with processing skills. Whereas the majority of past studies focused on the variations in language components in comparison to typical development, contemporary studies discuss language disorders from a different perspective and inquire about the possible causes of these variations. In this context, specific learning disabilities is the most frequently researched subject in the developmental literature. The most prominent characteristic of specific learning disabilities is the presence of normal or above-normal intellectual abilities. The DSM-V indicates that specific learning disability can only be diagnosed during formal education and that symptoms should have continued for at least 6-7 months. According to the DSM-V, learning difficulties are not better accounted for by intellectual disabilities, uncorrected visual or auditory acuity, other psychological and neurological disorders, psychosocial adversity, lack of proficiency in academic language and inadequate educational instruction. Children with learning disabilities/disorders is a quite heterogeneous group and display within-group variation with respect to learning and behavioral style (Emerson and Heslop, 2010; Şahin and Akoğlu, 2011). For instance, some students with learning disabilities experience difficulty in mathematics and reading while others do not have any problems in these areas. A similar case is observed for orientation skills, some motor skills and conceptual skills during the preschool period (Lerner, 2000). Although, in the past, deficiency in visual skills was considered to underlie

reading difficulties, there are contemporary studies that indicate deficiency in processing phonological information as the source of the problem (Vellutino, Fletcher, Snowling and Scanlon, 2004). Albeit the limited amount of research on mathematical disabilities/difficulties, there are studies that indicate memory deficits might interfere with the ability to learn mathematics (Geary, 2004). The sample of the study conducted by McArthur, Hogben, Edwards, Heath and Mengler (2000) comprised 110 children with specific reading disability. The study results showed that the majority of the children's performance was at least one standard deviation below the average for children the same age in syntax comprehension, production and vocabulary assessed with standardized tests. Rispen and Been (2007) compared the sentence comprehension skills of children with typical development, specific language impairment and developmental dyslexia. In the study, the children with developmental dyslexia performed more poorly than the typically developing children while outperforming those with specific language impairment, and the problems in sentence comprehension were associated with limited working memory capacity. Robertson and Joanisse (2010) showed poorer sentence comprehension performance in children with developmental dyslexia or language impairment in comparison to age-matched typically developing children, with a significant relationship between verbal working memory and sentence comprehension performance for both groups. Asbjornsen and Helland (2006) examined language comprehension in normally achieving and reading-impaired children, and found a positive and significant relationship between reading skills and language comprehension where reading comprehension skills increased with language comprehension performance.

Language comprehension skills are critical particularly for the inclusion of individuals with intellectual disabilities into society and are perhaps among the prerequisite skills in this respect. As mentioned above, syntax comprehension plays a critical part in language comprehension. The majority of the literature on syntax comprehension in individuals with intellectual disabilities focuses on diagnostic groups such as Down, Fragile X and Williams syndromes, and how these diagnostic groups differ from their typically developing peers and/or other diagnostic groups like autism spectrum disorder in syntax comprehension skills (Akoğlu and Acarlar, 2014; Bartak, Rutter and Cox, 1975; Bellugi, Marks, Bihle and Sabo, 1993; Chapman, Hesketh and Kistler, 2002; Riches, Loucas, Baird, Charman and Simonoff, 2010). For example, syntactic comprehension performance is in parallel to (Chapman et al., 1991) or behind (Rosin et al., 1988) nonverbal cognitive skills (as cited in Chapman, Seung, Schwartz and Bird, 2000). Miolo, Chapman and Sindberg (2005) also reported syntax comprehension as proportional to nonverbal comprehension. The study by Price, Roberts, Vandergrift and Martin (2007) investigated language comprehension skills in

individuals with Fragile X or Down Syndrome and found that the participants with Down Syndrome performed more poorly in syntax comprehension than both typically developing individuals and those diagnosed with Fragile X Syndrome. Various studies indicated the possible role of the different components of working memory on the difficulties in syntax comprehension and discussed the role of cognitive factors on syntax comprehension performance (Jha and Kiyonaga, 2010; Laws, 2004; Montgomery, 2002; 2003; 2004; Montgomery and Evans, 2009). The role of factors such as vocabulary and IQ, individually or in the company of other factors, on syntax comprehension is also emphasized (Conners, 2003; Facon, Facon-Bollengier and Grubar, 2002). The studies investigating the effect of chronological age on syntax comprehension indicated that chronological age could affect the development of syntactic structures, however, as syntax comprehension requires extensive storage of partial and final products of complex sequential computations, cognitive skills such as working memory might limit the effect of chronological age in individuals with intellectual disabilities (Gathercole and Adams, 2000; Facon, Facon-Bollengier and Grubar, 2002; Miolo and Chapman, 1999; Montgomery, 2000). In this context, the researchers believe comparing the syntax comprehension skills of individuals who experience difficulties in various domains of language and typically developing individuals would provide an insight into their language skills and the possible role of cognitive factors.

This study aimed to evaluate syntax comprehension skills in individuals with typical development, specific learning disability and intellectual disability, and to determine the possible relationships of these skills with receptive language and chronological age. As the study group participants differed with respect to cognitive characteristics, the study results could shed light on the relationship between cognitive skills and syntax comprehension.

1. Data, Methodology and Analysis

1.1. Participants

The study was aimed at determining the possible differences in the syntax comprehension skills of the individuals with typical development (TD), specific learning disability (LD) and mild intellectual disability (Mild ID) matched according to chronological age. The participants of the study comprised 12 TD children (6 female, 6 male) attending elementary school, and 12 Mild ID children (5 female, 7 male) and 12 LD children (4 female, 8 male) who attended special education and rehabilitation centers in Ankara city center. The 36 children who were matched by chronological age (Mean=133.64 months; SD=24.66) had not been diagnosed with any physical,

neurological and/or sensory disability. Turkish was the only language spoken at the children's homes.

1.2. Materials

The study employed the Peabody Picture Vocabulary Test (Katz, Demir, Önen, Uzlukaya & Uludağ, 1972) in the determination of receptive language age, and the Complex Syntax Comprehension Skills Assessment Tool (Akoğlu and Acarlar, 2014) in the assessment of complex syntax comprehension skills, as well as, the demographic information form developed by the researchers in gathering demographic data on the participants.

- i. *Peabody Picture Vocabulary Test* (Katz, Demir, Önen, Uzlukaya & Uludağ, 1972): The Peabody Picture Vocabulary Test is a performance test developed by Dunn et al. and adapted into Turkish in 1972 by Katz et al. to evaluate the development of children's vocabulary knowledge. It comprises two sections on receptive and expressive vocabulary knowledge. The test can be administered to children aged 2-12 and consists of 100 cards, each with 4 pictures, and a record form. The test has no time limitation for administration and uses two different sets of verbal directives for children younger or older than 8 years of age. During administration, children are asked to, with respect to their age, either say the number of or point at the picture corresponding to the spoken word. Answers are recorded on the record form by marking "1" for each correct answer.
- ii. *Complex Syntax Comprehension Skills Assessment Tool* (Akoğlu and Acarlar, 2014; Akoğlu, 2014): For each sentence of the list comprising simple and complex syntactic structures, there are 4 pictures illustrated by a professional artist. One of these pictures depicts the spoken sentence while three are distractors in which the act, the person(s) performing the act and the way the act is performed is different. In the determination of sentence and picture order, sentences with the same structures were not listed successively and the pictures that represent the spoken sentences were not placed in the same order (i.e. choice). The assessment tool consists of 34 assessment sentences and 2 practice sentences with syntactic variations. During administration, children are expected to identify the picture that represents the sentence spoken by the administrator from among the 4 pictures given on the relevant page and correct and wrong answers are recorded on the record form.

1.3. Procedures

In the study carried out to investigate syntax comprehension performance in children with typical development, mild intellectual disability and specific learning disability, simple sampling was used in the selection of the participants. The parents of all the participants agreed to participate in the study voluntarily. Demographic data on the participants were gathered with the demographic information form developed by the researchers. The instruments used to evaluate receptive language and syntax comprehension were administered individually to each participant by the researchers and the order of administration was changed for each participant to eliminate sequence effect. The researchers did not give any feedback to the children regarding their answers during assessment. Each administration took approximately 30 minutes and was completed in a single session.

1.4. Data Analysis

A Kolmogorov Smirnov test was performed to test for normality of distribution of the study data ($p>.05$). Pearson correlation coefficient was computed to determine possible relationships between the study variables in each group, a one-way analysis of variance (ANOVA) was performed for the comparison of complex syntax comprehension performance by diagnostic group, and a Dunnett-C test was conducted to identify the source of the difference between diagnostic groups.

2. Results

Table 1 shows the mean and standard deviation distributions, as well as, the minimum and maximum values for chronological age, Peabody receptive language raw score and syntax comprehension performance.

The average age of the TD children was 133.67 months ($SD=7.76$) while the means for their Peabody receptive language raw score and total syntax comprehension performance were 78.2 ($SD=10.05$) and 29.16 ($SD=2.36$), respectively. The youngest and the oldest TD children were 102 and 124 months old, respectively. Their minimum/maximum scores for receptive language raw score and syntax comprehension performance were 57.00/92.00 and 25.00/32.00, respectively.

The average age of the Mild ID children was 149.50 months ($SD=26.43$) and the youngest and the oldest Mild ID children were 86 and 187 months old, respectively. The means for their Peabody receptive language raw score and total syntax comprehension performance were 49.5 ($SD=16.2$) and 20.25 ($SD=5.04$), respectively. Their minimum/maximum scores for receptive language raw score and syntax comprehension performance were 18.00/77.00 and 14.00/28.00, respectively.

The average age of the LD children was 147.75 months ($SD=21.19$) and the

youngest and the oldest LD children were 102 and 185 months old, respectively. The means for their Peabody receptive language raw score and total syntax comprehension performance were 59.50 (SD=9.13) and 28.58 (SD=2.46), respectively. Their minimum/maximum scores for receptive language raw score and syntax comprehension performance were 24.00/89.00 and 22.00/31.00, respectively.

Table 1: Mean and standard deviation distributions, and minimum and maximum values for chronological age, Peabody receptive language raw score and syntax comprehension performance

		Chronological Age (months)	Peabody Receptive Language Raw Score	Total Syntax Comprehension Performance
TD	Mean	133.67	78.2	29.16
	SD	7.76	10.05	2.36
	Min.	102	57.00	25.00
	Max.	124	92.00	32.00
Mild ID	Mean	149.50	49.5	20.25
	SD	26.43	16.2	5.04
	Min.	86	18.00	14.00
	Max.	187	77.00	28.00
LD	Mean	147.75	59.50	28.58
	SD	21.19	9.13	2.46
	Min.	102	24.00	22.00
	Max.	185	89.00	31.00

The correlation analysis results for the TD children's chronological age, receptive language raw score and syntax comprehension performance are presented in Table 2.

Table 2. Correlation Analysis Results for TD children's study variables

Variables	1	2	3
1. Chronological Age	-	-	-
2. Receptive Language Raw Score	.686*	-	
3. Total Syntax Comprehension Performance	.821*	.742*	

** p<0.01, * p<0.05

The analysis results revealed a strong, positive and significant relationship ($r=.686$, $p<.05$) between chronological age and receptive language raw score in the TD children. In addition, syntax comprehension performance strongly, positively and significantly correlated with both chronological age and

receptive language raw score in the TD children ($r=.821$, $p<.05$; $r=.742$, $p<.05$).

The correlation analysis results for the Mild ID children's chronological age, receptive language raw score and syntax comprehension performance are given in Table 3.

Table 3. Correlation Analysis Results for Mild ID children's study variables

Variables	1	2	3
1. Chronological Age	-	-	-
2. Receptive Language Raw Score	-.289	-	-
3. Syntax Comprehension	.430	.676*	-

** $p<0.01$, * $p<0.05$

There was no statistically significant relationship between receptive language raw score and chronological age ($r=-.239$, $p>.05$) and, similarly, syntax comprehension performance did not correlate with chronological age ($r=.430$, $p>.05$) in the Mild ID children. However, there was a strong, positive and significant relationship between syntax comprehension performance and receptive language raw score in the Mild ID children ($r=.676$, $p<.05$).

The correlation analysis results for the LD children's chronological age, receptive language raw score and syntax comprehension performance are presented in Table 4.

Table 4. Correlation Analysis Results for LD children's study variables

Variables	1	2	3
1. Chronological Age	-	-	-
2. Receptive Language Raw Score	.248	-	-
3. Syntax Comprehension	.357	.739*	-

** $p<0.01$, * $p<0.05$

Parallel to the Mild ID children's results, there was no statistically significant relationship either between receptive language raw score and chronological age ($r=-.248$, $p>.05$) or between syntax comprehension performance and chronological age ($r=.357$, $p>.05$) in the LD children. However, there was a strong, positive and significant relationship between syntax comprehension performance and receptive language raw score in the LD children ($r=.739$, $p<.05$).

The ANOVA results for syntax comprehension performance by diagnostic group are given in Table 5.

Table 5. ANOVA results for syntax comprehension performance by diagnostic group

		Sum of Squares	df	Mean Squares	F	p	Post-Hoc
Between groups		597.167	2	298.583			
Total Comprehension Performance	Syntax Within groups	408.833	33	12.389	24.101	.000*	TD>LD>Mild ID
Total		1006.000	35				

* p<.01

The results of the analysis of variance carried out to investigate the variance in syntax comprehension performance revealed a statistically significant difference between the TD, the Mild ID and the LD children [$F(2,57)=24.101, p<.01$]. The Dunnett-C test results showed that the source of the difference was the higher mean score of the TD children in comparison to those of the LD children and the Mild ID children, in order of magnitude.

Discussion and Conclusion

The results of the study conducted to investigate the possible differences in syntax comprehension performance between children with typical development, mild intellectual disability and specific learning disability revealed significant differences between the mean scores of the participants with respect to diagnostic groups. The correlation of syntax comprehension performance with the other variables differed for each group and syntax comprehension performance strongly correlated with either receptive language or chronological age.

The Mild ID children had the highest mean chronological age. The fact that the Mild ID children had the lowest mean score in both syntax comprehension and receptive language suggests that, in addition to the variables indicated to be effective on receptive vocabulary such as life experiences (Chapman, 1998), various other factors affect receptive language and syntax comprehension skills. The existence of significant differences in syntax comprehension between groups supports this finding. The post-hoc analysis results showed a between-groups difference in favor of the TD children but the Mild ID children, who had the highest mean chronological age, was the group with the poorest performance. This finding corroborates the idea that intellectual skills, rather than chronological age, might be effective on syntax comprehension. The literature emphasizes the complexity of listening comprehension skills and indicates that it requires the acquisition of linguistic knowledge such as

vocabulary or grammar as much as non-linguistic knowledge (e.g.; knowledge of the world) (Buck, 2001; Vandergrift and Baker, 2015; Wang, Treffers-Daller, 2017). Furthermore, syntax comprehension performance in the TD children strongly correlated with both receptive language raw score and chronological age while syntax comprehension performance strongly correlated with receptive language raw score rather than chronological age in the LD and the Mild ID children, which suggests the possibility that receptive language skills might be more effective on syntax comprehension skills in special needs individuals than chronological age. The literature indicates an overlapping of syntax comprehension skills with vocabulary and other receptive/expressive language skills (Moyle et al., 2007; Tomblin and Zhang, 2006). The study by Akoğlu (2014) conducted to investigate syntax comprehension performance of native Turkish-speaking children aged 4-7 in relation to receptive language and chronological age in the context of the structural characteristics of Turkish yielded similar results and reported the order of relative significance of the variables that predicted syntax comprehension for the study sample as receptive language age and chronological age. In the present study, syntax comprehension was found to be strongly correlated with both chronological age and receptive language in the TD children, which indicates that syntax comprehension skills were based on receptive language and/or vocabulary skills as much as chronological age. Moreover, a recent study that utilized structural equation models reported that working memory, grammatical knowledge, inference and theory of mind directly predicted oral language comprehension in first graders, and listed attention and vocabulary as indirect predictors (Kim, 2016). A study by Akoğlu and Acarlar (2014) conducted with Turkish-speaking children matched children with Down Syndrome, Autism Spectrum Disorder and typical development by nonverbal intelligence age and evaluated verbal working memory (the phonological loop) and syntax comprehension performance. The study results revealed the association of variables such as chronological age, nonverbal intelligence age, mean length of utterance with verbal working memory and syntax comprehension skills. In the study, the mean scores of the Down Syndrome and the Autism Spectrum Disorder groups were lower than those of typically developing children. This finding supports the results of the present study. In this context, the researchers consider that the assessment of especially verbal working memory, i.e. the phonological loop, and the identification of its possible relationship with receptive vocabulary and syntax comprehension skills would be greatly beneficial.

Asbjornsen and Helland (2006) investigated language comprehension in normally developing and reading-impaired children, and found a positive and significant relationship between reading skills and language comprehension where reading comprehension skills increased with language comprehension

performance. In the present study, the ability of the LD children to read more fluently than the Mild ID children might have contributed to their higher scores in syntax comprehension performance. However, more comprehensive studies that control for reading skills would permit more realistic inferences.

The lack of contemporary norms of the instrument used in the assessment of receptive language skills in the present study could be considered an important limitation. In addition to the assessment of receptive vocabulary, reiterating the assessment process performed in this study by utilizing contemporary measures that characterize other linguistic components more comprehensively would indubitably contribute to the achievement of more extensive and realistic results. Although one of the fundamental objectives of this study was to identify the possible differences between the groups, syntax comprehension performance was based on the calculation of the number of correctly answered items and no error analysis was performed. Carrying out an error analysis would reveal not only how both diagnostic groups differed from typically developing children but also whether or not an error pattern specific to the diagnostic groups existed. Furthermore, an error analysis would also help identify the major structures that the children had difficulty comprehending. In other words, determining the structures that the participants had difficulty in syntax comprehension evaluated through the presentation of pictures might enable the identification of the problematic structures specific to the diagnostic groups and thus an inquiry as to the causes of these problems. Therefore, it is important to conduct an in-depth investigation of the errors in syntax comprehension in future studies. In addition, some studies adopt different approaches such as object manipulation in the assessment of syntax comprehension (Miller and Paul, 2000; Tanenhaus, Spivey-Knowlton, Eberhard and Sedivy, 1995). Comparing the current results with those of other approaches utilizing methods that match daily life (e.g.; object manipulation) would greatly contribute to both assessment and intervention.

The investigation of nonverbal intelligence as one of the factors affecting language skills in individuals with intellectual disabilities is one of the points of emphasis in the literature. Recent studies indicated that phonological working memory predicted vocabulary in children with intellectual disabilities especially at age 4-5. However, controlling for nonverbal intelligence yielded no correlation, which suggested that the role of nonverbal capacity in the language development of children with intellectual disabilities was greater than that of typically developing children (Schuit, Segers, Balkom and Verhoeven, 2011). The present study matched the participants by chronological age and did not perform an assessment with respect to nonverbal intelligence scores. In this context, conducting a similar study with groups matched by nonverbal intelligence age would facilitate the clarification of the possible role of cognitive factors.

In conclusion, the LD and the Mild ID children matched by chronological age differed from their TD peers in syntax comprehension performance. The correlation of syntax comprehension performance with receptive language skills for both groups other than the TD children indicated that syntax comprehension was associated with receptive language skills rather than chronological age in the presence of developmental differences. In view of the study limitations, conducting a similar study by controlling for nonverbal intelligence age and/or score, and evaluating working memory capacity and speed would facilitate the acquisition of a more comprehensive understanding of the role of cognitive factors on syntax comprehension in groups with developmental differences.

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