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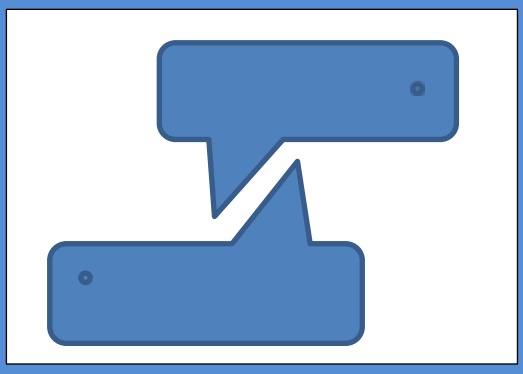

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Development of a Screener to Identify Specific Learning disability

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Abstract

Learning disabilities are neurological-based processing difficulties. These processing difficulties can interfere with learning basic skills such as reading, writing and/or arithmetic which can also interfere with higher level skills such as organization, temporal planning, abstract reasoning, long or short-term memory and attention. According to the National Institutes of Health (NIH), fifteen percent of the U.S. population, or one in, seven individuals have some type of learning disability. These disorders are heterogenous in nature and are caused due to central nervous system dysfunction. Learning disability may occur concomitantly with other impairments (e.g., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient/inappropriate instruction, psychogenic factors). Learning disability is a longstanding condition hence early detection and immediate intervention plays a very important role. This study aims in developing a screener which could be administered by the teachers to delineate the imperiled targets of learning disability at a very early stage.

Keywords Screener, Teacher, Children, Specific Learning Disability, Identification

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1. Introduction

Learning disabilities are a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities (Hammil D 1987) The conditions like dyslexia, dysgraphia, auditory processing deficits, language processing disorder, nonverbal learning disabilities and visual motor difficulties are associated with Learning disability (Learning Disabilities Association of America, n.d.). A study was done to evaluate whether the level of a spinal lesion is associated with variations in anomalous brain development and neurobehavioral outcomes in children suffering from the meningomyelocele form of spinal bifida and hydrocephalus (SBM-H). The results revealed that a higher level of spinal lesion in SBM-H is a marker for more severe anomalous brain development, which is in turn associated with poorer neurobehavioral outcomes in a wide variety of domains that determine levels of independent functioning for these children at home and school (Fletcher, 2005). A study was performed to examine learning disabilities among low birth weight (<1500 g) and also to document the possible sex differences in the effect of low birth weight and assessed risk across the entire range of low birth weight. The effect of low birth weight on learning disabilities appears to be specific to male children. Although this sex-specific effect is consistent with previous findings of a greater vulnerability of male children to pregnancy and birth complications, it remains to be replicated and clarified (Johnson, 2000). Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge (International Dyslexia Association, 2015). Functional imaging studies have shown reduced regional cerebral blood flow (rCBF) in temporal and inferior parietal regions and lesions in left angular gyrus causes dyslexia (Rumsey, 1999). Dysgraphia is a writing disability in which a person finds it difficult to form letters or write within a defined space. The demand to combine the complex mixture of tasks needed for a satisfactory written result may be difficult which is manifested by difficulties with spelling, Poor handwriting, trouble establishing thoughts and poor organization of writing on the page. Many studies have been attempted to discern the site of lesion for dysgraphia which was found to be in the left hemisphere (predominantly the left parietal and the left temporo parietal regions) (Balasubramanian, 2005). Auditory processing deficit or the Central

Auditory processing deficit is defined as impaired ability to process the auditory signal in the presence of a normal peripheral hearing (ASHA Taskforce 2002). A study was done to tap on the behavioral discrimination skills of the speech stimuli and to correlate it with diminished magnitude of an electrophysiologic measure that is not dependent on attention or a voluntary response which revealed that children with learning disability had significant difficulty in discriminating rapid acoustic changes that occur in speech and results indicate that discrimination deficits originate in the auditory pathway before conscious perception (Kraus, 1996). According to the National Survey of Children's Health(NSCH) the estimate for current learning disabilities among children of ages 3–17 years in 2007 was 7.8 percent, with 3.7 percent rated as mild and 4.0 percent rated as moderate or severe. The estimate for learning disabilities in 2011–2012 was 8.0 percent for children of ages 3–17, with 4 percent rated as mild and 4 percent rated as moderate or severe (National Academies Press(US), 2015). Statistics Canada reports in 2006 Participation and Activity Limitation Survey (PALS), measuring the prevalence of learning disabilities among Canadian children and adults which revealed more children in Canada to have a learning disability than all other types of disabilities combined. Among the children with disabilities in this country, more than half (59.8%) have a learning disability (Learning Disability Association in Canada). A prevalence study on learning disability was done by Nayana Mariya Kuriyan, & Justine K James which revealed 10% of children in India had learning disability and have delayed access to early identification and intervention (Kuriyan 2018). There are several Western tools like Language Awareness in reading readiness test (LARR), Dyslexia Screening Test-Junior (DST),Wechsler Individual Achievement Test III and Indian Tools like Early Literacy Screening Tool (ELST), Dyslexia Assessment Profile for Indian Children (DAPIC), Dyslexia Assessment for Languages of India (DALI) are available to identify the children who are at risk of Learning Disability. It includes comprehensive screening and assessment procedures to identify various Learning, reading, and writing deficits which could be administered by various professionals like Speech Language Pathologist and Psychologist. Most of the tools that are currently used in the screening and assessment of Specific Learning Disability are developed and validated for children from other countries and could only be administered by Health Care Professionals. Teachers are professionals who play a very important role in identifying the children who exhibit symptoms of Specific Learning Disability during the Language acquisition stage. The screener that is developed in this study will contain 15 statements which is the common red alert signs and symptoms exhibited by children when they have characteristics of Specific Learning Disability which could be

administered by the teachers to facilitate Early Identification. Thus, this study aims to develop a screener to identify children who are at risk of Specific Learning Disability which could be administered by the subject teachers handling them.

The aim of this study is to develop a screener to identify Specific Learning Disability for the teachers handling the children.

2. Methodology

1.1. Participants

The participants to this study are 531 children between the age range 6-10 years with normal sensory motor development. Children with developmental anomalies were excluded from the study. The screener was administered by 45 teachers, who completed their teacher training program (B Ed), to the primary class children they taught.

1.2. Data collection and processing

A self -rating screener was prepared for the teachers. This screener consisted of a set of 15 highlighting aspects to identify the children at risk of Specific Learning Disability which was based on the Diagnostic statistical Manual for Mental Disorders (DSM V) criteria for diagnosing the Specific Learning disability and World Health Organization (WHO). Content validation of the questionnaire was done by four Speech language pathologists and a psychologist. The data was collected from Government aided schools with State board syllabus and English as their mode of instruction and the children belonged to the upper and lower middle-class families. Dyslexia Assessment Profile for Indian Children (DAPIC) was administered to correlate the findings of the screener and to document the child's reading and writing abilities at alphabet, word and sentence level for children who obtained a score of 15 and above in the screener administered by the teacher. Counseling was given to the parents of children who had the score of above 15 regarding Learning disability and the management options available for treating the same based on the performance of the various subtest in the DAPIC and the behaviors exhibited in the class as marked by the teacher in the screener.

1.3. Data analysis

Statistical analysis was performed using the SPSS software version 20. Cronbach's alpha test was administered to judge the internal consistency and the overall reliability of the screener.

3. Findings

Data accumulated from children between the age range of 6-10 years. The teachers were given the screener to administer on each child and the scores were obtained. The results revealed that on administering the screener, 81.35% (n=432) of the children were not at the risk of Specific Learning Disability and 18.64% (n=99) of the children were at the risk of getting Specific Learning Disability. Out of the 99 children 72.72% (n=72) of them were at Mild risk of Specific Learning Disability and 21.21% (n=21) of them

were at moderate risk of Specific Learning Disability and 6.06% (n=6) of them are at severe risk of Specific Learning Disability.
The overall reliability of the screener is 0.98 which indicates that the screener has very high accuracy.

Table 1
The Internal consistency of the screener

Items	Total correlation
Poor eye contact	.730
Following steps/commands	.749
Day dreaming, inappropriate word usage	.714
Sitting aloof	.634
Talent in Non -Academic areas	.229
Reversal/Jumbling of letters	.861
Effortful reading	.887
Difficulty with multi syllabic words	.894
Difficulty with reading and following lines	.778
Difficulty with sounds to letter association	.884
Difficulty remembering	.845
Poor age matched performance	.731
Illegible handwriting	.850
Difficulty copying from the board	.832
Difficulty with mathematics	.838

Table 1 shows the Internal consistency of the screener which reveals that the screener has acceptable correlation for the contents including the child's maintenance of poor eye contact (.730), inability of the child to follow steps or commands given by the teacher (.749), tendency of the child to day dream and use inappropriate words to answer (.714), difficulty of the child to follow lines and read (.778) and substantially poor age matched performance which causes problems in school and every day work (.731). The screener has good correlation for the contents including the child's nature of jumbling the letters while writing in the notebook or board (.861), slow, inaccurate and effortful reading that is exhibited by the child (.887), difficulty to produce multisyllabic words and the increased frequency of mispronouncing those words (.894), difficulty to associate sounds to letters and connecting them (.884), difficulty in remembering what the parent or the teachers say (.845). Good correlation was also obtained for the aspects regarding the illegible handwriting portrayed by the child which makes it difficult for the teacher to correct (.850), difficulty faced to copy from the board (.832) and the perplexity to solve simple mathematical problems (.838). Questionable correlation was seen for the content of the child's nature to sit aloof in the class (.634) and poor correlation was seen for the child's tendency to be extremely talented in other non-academic domains (.229)

4. Conclusion

According to theories of Language Acquisition there is an interplay of organic and in-organic factors that is responsible for the acquisition of language.

Similarly, learning is the process of acquisition of knowledge or skills which occurs due to the interaction of multifactorial component from a very early age. Elements that hinder the process of acquiring the language might range from various significant components that is concerned to the child or the surrounding in which the child develops. Functionally, a disability will hamper the competence and the performance of the child in the acquiring language. This screener is developed as a potential solution to facilitate Early Identification in children who are at risk for Specific Learning Disability by the teachers. Teachers should be provided with sufficient training regarding the signs and symptoms of identifying Specific Learning Disability, management options available for treating the condition and the strategies that could be implemented to overcome the hurdles that are present to teach children with Specific Learning Disability. Parental contribution in learning as well as motivating the child plays a vital role in improving the child's knowledge of learning concepts. The effective usage of this screener with good validity will help the teachers in the delineation of the children who are at risk for Specific Learning Disability. This will promote and encourage the holistic learning of various concepts, competence and performance in the language acquiring and will improve the overall quality of life.

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Appendices

Appendix I
Introduction:
This screener is administered to assess risk for Specific Learning Disability. This screening tool was prepared on the guidelines based on the Diagnostic statistical Manual for Mental Disorders (DSM V) criteria for diagnosing the Specific Learning disability and WorldHealthOrganization(WHO).This screener will consist of 15 statements which should be scored by the teacher on a Likert scale of 5. This will be administered within 5-6 minutes and will help the teachers in identifying the children who are at risk of Specific Learning Disability. This will further help in early detection & early intervention.

Instructions to Teachers:

- Step 1: Fill in the demographic data.
- Step 2: Read the statements carefully and provide appropriate ratings considering the child.
- Step 3: Total the scores obtained from the rating.
- Step 4: If the child falls under substantial risk then inform the parents and the higher authorities and refer for a detailed evaluation.

Scoring:

- 46-60: Severe risk-The child has to be sent for detailed evaluation and complete support and modification of the syllabus might be required. Counseling the parents regarding the child's conditions and the acceptance to improve the child as a whole.
- 31-45: Moderate risk-The child has to be sent for a detailed evaluation and substantial support has to be given at the domains the child lacks excellence. Regular follow up to be given to check for the progress.
- 15-30: Mild risk-The child is at mild risk for getting a specific learning disability. Attention has to be given to the child by the teachers and parents. Follow up to be given if necessary.
- Below 14: No risk- No further action required unless surveillance indicates risk for Specific Learning Disability.

Appendix II

Demographic Data

Name :

Age / Gender :

Standard :

Fathers Name : Contact Number :

Mothers Name : Contact Number :

Mother Tongue :

Medium Of Instruction :

Academic Performance :

Appendix III

Specific Learning Disability Screener

This screening tool has to be administered for children within the age range 6-10 years by the teachers who are handling them.

Time taken to administer: 5-6 minutes

Statements	Always (4)	Mostly(3)	Frequently(2)	Sometimes(1)	Rarely(0)
1. The child has poor sitting tolerance, eye contact and inattentive in class.					
2. The child has difficulty in following steps or commands given by the teacher.					
3. The child seems to be day dreaming and answers using inappropriate words.					
4. The child prefers to sit aloof.					
5. The child is extremely talented in one non-academic area.					
6. There is reversals and jumbling of letters and numbers seen in the notebooks or in the board.					
7. Slow, Inaccurate and effortful reading is seen in the child.					
8. The child has trouble producing multi-syllabic words and often mispronounces the words.					
9. The child has difficulty in reading and following the lines.					
10. The child has difficulty in Matching sounds to letters and trouble connecting letter and sounds.					
11. The child has difficulty in remembering what the teacher/ parent says.					
12. The child has academic skills that are substantially below what is expected for the child's age which causes problems in school, work and /or every day activities.					
13. The child's handwriting is illegible and difficulty while correcting the child's classwork.					
14. The child has difficulty in copying from the board.					
15. The child has difficulty in solving simple mathematical problems.					

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The accessibility of the depth of Turkish relative clauses by Turkish monolingual children from 2 to 9 years of ages

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Abstract

This study investigates the comprehension and production of Relative Clauses (henceforward RC) structures by monolingual Turkish speaking children from 2 to 9-year-olds. Participants of this study were 150 children, and 10 adults took part in the study as the normative group. This study aims to reveal the order and depth of RCs in children's development and to find out the most complex structure of RCs that children can comprehend or produce within the determined age groups.

This is a descriptive study and the data were obtained from participants concerning their current status. Piloting was conducted before the real experiment to check the feasibility of the study. As the data collection tools, pictures were presented to participants for each depth together with a relevant scenario. All responses were video/audio recorded and the recorded data were transcribed on a word document.

Results showed that children can comprehend RC structures as early as 2-year-old and they start producing RCs at the age of 3 and the rate of production increased with the age. The production of RCs stabilized between ages 6 to 8. Lastly, at the age of 9, the proportion of RC production decreased suddenly. The findings of this study confirm that comprehension and production of RCs require cognitive maturity, knowledge of usage of the language and time to internalize that knowledge.

Keywords FLA, depth of relative clauses, RC in Turkish, RC acquisition

1. Introduction

In Relative clauses (RC) are complex structures that modify and give either essential information or clearance about the noun. "Relative clauses seem to be essential for the linguistic expression of complex concepts, and it comes as no surprise that practically every language uses relativization in one way or another" (de Vries, 2013, p.3). Constructions of RCs require cognitive ability and language competency to comprehend and produce these complex structures. Children need to combine particular meaning with the grammatical form of the RC. Their understandings and productions reflect their language and cognitive development. "Relative clauses constitute a network of related constructions that children acquire in a piecemeal bottom-up way, starting with relative clauses that are only little different from simple sentences which are gradually extended into more complex grammatical patterns" (Tomasello and Diesel, 2005). Investigating the

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understanding and production of RCs would give a deeper insight into language acquisition and cognitive development. Although several studies were held on the development of comprehension and production of RC structures, most of them focused on European languages primarily, English and German (Diessel and Tomasello, 2005; Brandt, Kidd, Lieven and Tomasello 2009). There are also several studies conducted on RCs in Turkish to provide a full understanding of these structures. In Turkish, these studies are mostly descriptive and mainly focused on either comprehension (Slobin, 1982; 1986; Kornfilt et al.2012) or production (Sarılar and Küntay, 2011) of the RCs by foregrounding semantic (Bulut, 2012), syntactic (Paluluoğlu, 2017) or morphologic (Altınkamış and Altan, 2016) properties of these structures. The first study about Turkish RCs is carried out by Slobin (1982). He conducted a descriptive study on Turkish monolingual preschoolers and English monolingual preschoolers. He concluded that Turkish RCs are harder on comprehension than English RCs. In 1986, Slobin carried out another research on RCs of Turkish and English. He engaged children in a conversation and extracted RCs from their everyday language. He found that Turkish speaking children use RCs less than half of the number compared to their American counterparts. Most of the RC studies in Turkish refer to Slobin's studies (1982; 1986). Slobin proposed that "the mastery of relative clauses in Turkish must take place later than 4; 8 (1986, p. 277).

In another study, Kornfilt et al. (2012) examined the acquisition patterns of RCs of Turkish monolingual children. They aimed to confirm the asymmetry of the subject and object RCs and find out the reasons for the differences via investigated production experiments. Twenty Turkish speaking children participated in the study at the age of 4; 1 and 6; 2 and randomly chosen pictures were presented to participants. After each picture was presented to the child, a related question was asked to check the comprehension of RC. The result revealed that "Turkish speaking children are able to produce both subject and object relative clauses at much younger ages than generally claimed in the literature" (Kornfilt et al., 2012, p, 300).

There are some other studies that analyzed the syntactic properties of RC structures. Çağrı (2009) held a descriptive study and proposed that most of the RCs in Turkish can be rated as Minimal in terms of syntactic properties. In his research, he analyzed Minimality in Turkish. 'kamyon geçen köprü': 'the bridge that trucks go on' is actually

> Ø üzer-in-den kamyon geç-en köprü
> on-Gen.-Abl. truck pass-SubjP. bridge
> the bridge that trucks go on top of' (p, 368).

Subject RC helps to form the meaning of non-subject RC by reducing the number of words in the sentence. The sentences which he analyzed were composed of RC structures. As a result, he was able to explain the acceptability of subject relatives to form the non-subject relatives by Minimality. Although his study is mainly linguistic, it is related to the production of the RC structures.

A recent study was held by Ketrez (2007) who examined the acquisition of RCs in Turkish and held a descriptive study. She particularly focused on relation to Parallel Function Hypothesis (Sheldon 1974), and Accessibility Hierarchy (Keenan and Comrie, 1977) in Turkish RCs. The Parallel Function Hypothesis suggests that it is easier to understand the meaning if the "head" and the "gap" have the same syntactic roles. For example:

A. The dog that jumps over the pig bumps into the lion (parallel function)
B. The lion that the horse bumps into jumps over the giraffe (non-parallel function).

According to Parallel Function Hypothesis, the sentence (A) is easier to understand because the parts of the RC have the same function. Both of them are subjects of the sentence. However, in sentence (B) they have different functions. In (B), the lion is both a subject (bumps) and an object (the horse bumps the lion).
To investigate the Parallel Function Hypothesis, Ketrez collected data using the story; Frog, where are you? She also included TV news programs and adult speech in her study. She found that in terms of Accessibility Hierarchy and Parallel Function Hypothesis, adult speech order and children's speech order had common results, and subject RCs were higher in the ranking than object RCs. Based on these two hypotheses Ketrez built a hierarchy and concluded that "While AH seems to be a stronger and a more dominant strategy in the relative clause production and use frequency in Turkish, Parallel Function also has an essential and explanatory role in the production preference of some relative clauses" (Ketrez, 2007, p. 21).
The research focusing on the accessibility of RCs was initiated by Keenan and Comrie (1977). They studied 50 languages and tried to build a universal hierarchy for the comprehension and production of relative constructions. They opened the way to organize hierarchically the depth of RCs in particular languages. They argue that languages vary in terms of their RC structures and this variation is not incidental rather relativizability of the structures is dependent on the position of each part of a sentence. They proposed a graphic and placed easier RCs on a higher position and harder RCs on the lower positions. Positions of the graph are called "depth". It is as follows;

Accessibility Hierarchy (AH) SU > DO > LO > OBL > GEN > OCOMP
*SU: subject, DO: direct object, LO: indirect object, OBL: oblique case GEN: genitive, OCOMP: object of comparison (Keenan and Comrie, 1977, p. 66).

Just as the case in other languages, Turkish has its nature of utilizing RCs. Turkish "exhibits a more complex pattern in terms of the form of relative clauses, the kinds of predication they can express, and their stacking possibilities" (Larson and Takahashi, 2018, p.5). There are three common RC participles in Turkish; -(y)An, -DIK, and -(y)AcAk. The -(y)An participle is not inflected by a person or case. It consists of a verb and the -(y)An participle. Past and present times are represented by the same morpheme in Turkish. This participle is also named as a Subject participle and reflects the aspect

of the verb. Aspect is a grammatical category associated with verbs that express a temporal view of the event or state expressed by the verb (Glossary of Linguistic Terms). The -DIK participle mostly refers to past events or ongoing situations. It has accusative-possessive construction. The -(y)AcAk participle has identical structural properties with the -DIK participle. However -(y)AcAk participle mostly refers to present or future situations.
This research differs from the previous researches in terms of investigating the comprehension and production of RCs in Turkish in different age groups of monolingual children.
This research aims to find the depth of comprehending and producing RCs by monolingual Turkish speaking children at different ages. It also aims to reveal the most complex RCs in these age groups.

2. Methodology

As the research method, a quasi-experimental design was used. A comparison group took part in the study. The data were analyzed qualitatively; however, quantitative analysis was also done to support the qualitative analysis. Descriptive study researchers work with fewer participants intensively; therefore, the number of participants of this study was sufficient to determine the depth of RC production and accessibility among the same and different age groups.
In this study, a picture-cued elicitation task was used. Comprehension and production of RC structures in Turkish were explored via pictures. While designing the pictures, the semantic properties of RCs in Turkish were considered. Every picture was designed to investigate the depth of RC construction. Turkish has the following RC structures.
-Subject items: –An, -DIK, -(y)AcAk.

Object items: –An, -DIK, -(y)AcAk
-Direct Objects
-Indirect Objects
-Auxiliary -ol
-Passive constructions: –Il,-In

For this study, children were oriented to use RC constructions by presenting them with relevant pictures together with a relevant scenario. The questions and the scenario did not include any RC structures to not dictate children to use similar expressions. One of the considerations of the study was to lead children to produce RC structures naturally

1.1. Participants

The piloting phase was carried out by 18 participants. They were divided into two groups; the study group and the normative group. The study group consists of 8 children aging from 4;03 to 7;07 and the normative group is made up of 10 adults aging from 18;05 to 36;10.
The second phase was the experimental stage. All children were chosen randomly from a public elementary school and a preschool with the permission of the National Education Directorate and the consent of their families. A total of 150 children (age range 2;01 to 9;08) took part in this

study. Participants were divided into 8 different age groups. The number of children was not enough for the groups containing 2 and 3-year-old children. For this reason, 15 students were involved instead of 20, in 2 and 3-year-old children's groups. All the other groups except for 2 and 3 had 20 participants.

1.2. Data collection and processing

The complexity of RC structures differs in terms of accessing and producing them. This study tried to juxtapose the hierarchical conditions of RC structure from more complex to less complex, regarding their accessibility. The following items are examples of the RCs in Turkish. The first line of the items represents the type of RC and its function in the clause. The second line is the example of the Turkish structure of that type. The third line is a morphological analysis of the given Turkish RC and the last line is the semantic translation of that RC. Since it is not a verbatim translation, determiners were added to the sentence which are not common in Turkish but highly used in English.

(1)
[Subject, Factive Nominal]
Kırmızı şapka-lı çocuk
Red hat-Pos. child
The boy with a red hat

(2)
[Subject, Action Nominal]
Yürü-y-en kadın
Walk-Buf.-SbjP woman
The woman who is walking

(3)
[Future Subject, Passive]
Oku-n-acak kitap-lar
read-Pass-Fut book-pl
The books which are going to be read

(4)
[Comparative, Subject]
Uzun ol-an çocuk
Tall be-SbjP child
The child who is tall

(5)
[Possessive, Factive Nominal]
Saç-ı beyaz ol-an adam
Hair-3.sg white be-SbjP man
The man whose hair is white

(6)
[Dative, Indirect Object]
[kendi-si-n-e] Kitap ver-diği-m oğlan
[self-3.sg-Buf.-Dat] book give-ObjP-1.sg boy
The boy whom I gave a book (to)

(7)
[Direct Object]
Yol-da gör-düğü-m adam
Road-Loc see- ObjP-1.sg man
The man whom I saw on the street

(8)
[Accusative, Indirect Object]
Kalem-i-n-i kullan-dığı-m kız-
Pen-3.sg.-Buf.-Acc. use- ObjP-1.sg girl
The girl whose pen I used

(9)
[Ablative, Agent]
Araba-sı-n-dan in-en adam
Car-3.sg.-Buf.-Abl. Get out-SbjP man
The man who gets out of his car

(10)
[Subject of Comparison]
Kendi-si-n-den uzun ol-duğu-m çocuk
self-3.sg-Buf.-Abl tall be- ObjP-1.sg child
The boy than whom I am taller.

Functions of the morphemes of the "kalemini" in depth (8) Acc.-Ind. Obj. has been on the debate by the linguists (Başdaş, 2014). This word could be analyzed morphologically in two different ways as follows;

a. Kalem-i-n-i
Pen-3.sg.-Buf.-Acc.
b. Kalem-in-i
Pen-Gen.-3.sg.

Since there is not a consensus regarding the morphological analysis of this morpheme, it will be treated as it is in the Kornfilt's convention (1997).
Applied parts of the study were conducted in two phases. The first phase was piloting. Several pictures, regarding the related item, were presented to the participants to determine the best possible picture which serves to produce the expected answer from the participants. The pictures which did not serve our purpose were eliminated based on the answers of the piloting group. Because of the irrelevant answers, all of the pictures used in this study were revised several times for modification.

1.3. Data analysis

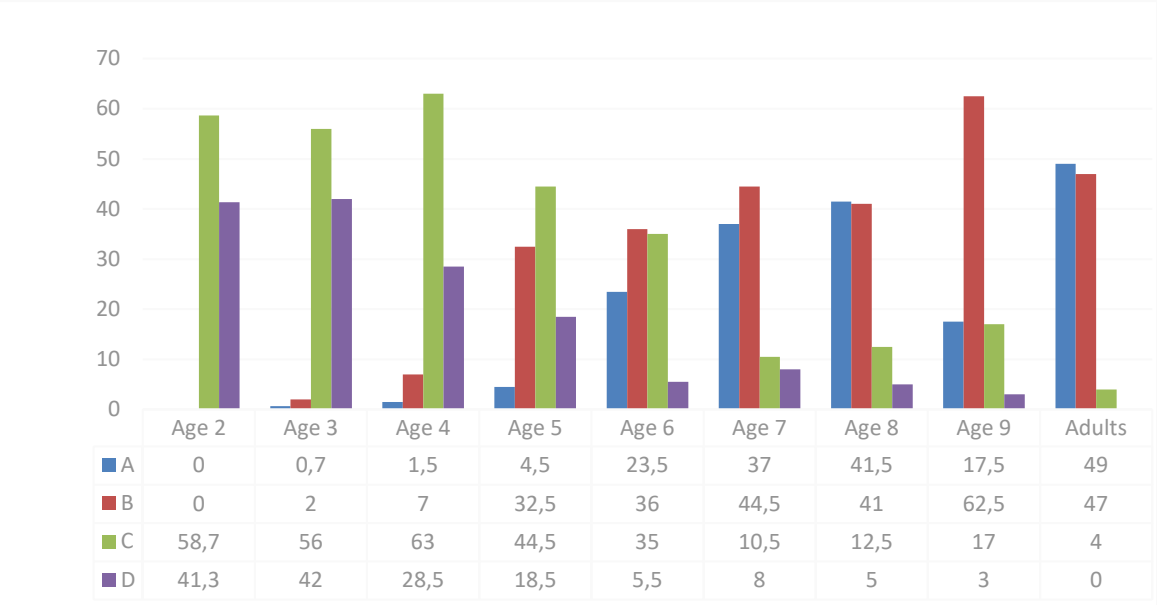
All responses were video/audio recorded and the recorded data were transcribed on a word document. Based on children's responses, all the answers were classified into four groups as follows;

A: the participant produced relevant answers.
B: the participant responded to the question with an RC structure, but this structure is not relevant to the expected answer.
C: the participant understood the scenario and question and pointed to the relevant picture, but s/he did not produce any RC constructions.
D: the participant did not understand the scenario and the prompt question.

The categories A and B are related to the production of RC structures, while C and D categories are related to the comprehension of these structures.
All codes have been gathered in an excel file. Each type of code has been calculated. Based on the number of the codes, graphics were created for each depth of RCs and each age group.
In the study, ages 2 and 3 have 15 participants in each age group. Since there are 10 different RC depths presented to participants, the expected response was 150 for each age group of 2 and 3. All the other age groups, from 4 to 9, have 20 participants in each age group. The expected response for each age group is 200. Ten adults took part in the normative group. In total, 1600 responses were recorded and analyzed throughout the whole study.

3. Findings

Concerning the comprehension and production of RCs, Figure 1. demonstrates the total responses of all age groups and adults. As was expected, as early as 2 years of age, children succeeded in understanding most of the RC structures but they did not produce any of them. The first RC production was observed at the age of 3; 04. The proportion of the expected RC production increased by age. At the age of 9, there was a decrease in the production of the expected RC structures while the production of RC structures other than expected was increased. As it is seen in Figure 1, the answers of the normative group are similar to those of age 7 and 8.



	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Adults
A	0	0,7	1,5	4,5	23,5	37	41,5	17,5	49
B	0	2	7	32,5	36	44,5	41	62,5	47
C	58,7	56	63	44,5	35	10,5	12,5	17	4
D	41,3	42	28,5	18,5	5,5	8	5	3	0

Figure 1. The distribution of all answers by all participants.
A: expected correct answer
B: answer with an RC structure other than the expected one
C: no RC production but understands the RC structure
D: no understanding.

The data reveal that 2-year-olds could listen and understand some of the RC structures, but they were not prolific in RC production. They produced simple pointing words such as; here and there, but they did not produce any RC structures.
First RC production was observed in the age of 3. Even though only one child produced an expected answer and only 3 RC structures were generated out of 150 answers, it was a starting point for children to utilize speaking skills and produce RC structures. At the age of 4, comparing the ages 2 and 3, the proportion of children who understood the RC structures increased 13% by the age of 4. Five-year-old children started to produce RCs; however, they are likely experiencing a struggle when they produce them. For example;

(5; 02 m): kitap.. şu ders yap-ma-sı adam
book.. that do-ANom-3.sg. man
(The) book that man needs to do

This answer indicated that participant (5;02 m) understood the prompt question and tried to utter a response. However, his response was not an RC structure nor a full sentence. One of the important findings emerged from depth (8) Acc. Ind. Obj. When the prompt question "Kalemini kullandığın kız hangisi?" "Which girl is the one whose pen you used?" directed to participants none of them produced Accusative- Indirect Object RC structure; instead they produced a full sentence with no RC (5;08 f), or Subject RC (ex: 5;05 f; 5;10 m).
(5;08 f): çocuk ders çalış-ı-yor-du
child lesson study-Buf.-Pr.Prog.-Past.

(The) child was studying (her) lesson.

(5; 05 f): ödev çalışan kız
homework study-Sbj.P. girl
(The) girl who is doing (her) homework.

Participant (5;11 m) produced a minimal form of the subject RC. He said: " ver-en kız" "(the) girl who gives". This answer is unsatisfactory in terms of semantic and syntactic features of the particular depth. The participant preferred subject RC and did not utter any indirect objects and avoided using the full structure and the indirect object together in one phrase. This answer does not make any sense without context. Since the context was given with the scenario, the participant (5;11 m) uttered the minimal phrase to answer the question.
Concerning the RC production, the age of 6 is a turning point for children, because at the age of 5, expected RC structures were recorded in 3 depths, but for the age of 6, expected RC structures were recorded for all 10 depths.
There were no significant differences between ages 7 and 8. All of the depths were produced except for the depth (3) Fut. Pas. RC structure. When pilot studying was held, this depth had the lowest proportion of production by adults (3 out of 10). The usage of this depth seems to be uncommon.
Even though the proportion of RC production increased with age, there is a sudden decrease (24.5%) in the proportion of the production of the expected structures by the age of 9. They responded almost all the questions and produced a number of sentences; however, the proportion of the expected RC structure was quite low (17.5%). Some of the participants produced several sentences instead of producing the expected RC structure. Some of the participants preferred to produce an easier way of expressing the same meaning and produced subject participle instead of object participle.

3.1. Distribution of Comprehension and Production of RCs

Comprehension and production of RC structures require cognitive maturity and knowledge. Children differ in terms of acquiring the RC structures. Not all children comprehend or produce RC structures at the same time. Therefore, revealing the sequence of comprehension and production of RC structures may unveil the hierarchical order of the RC structures in the language development process.
The RC structures are placed in the table based on the responses of the participants. Table 1 demonstrates the distribution of the acquisition of RC structures, whereas Table 2 demonstrates the distribution of the production of RC structures in each age group. The percentages of the acquisition were calculated together with all expected answers, relevant RC productions and any responses that indicate an understanding of the particular depth. The calculations of the percentage of the acquisition and production of the depths were held for each age and each depth; henceforth every depth is juxtaposed in the table from the highest to lowest percentage of acquisition and production. If the percentages are the same, the aforementioned sequence is kept in the table.

Table 1

Distribution of the Acquisition of RC Structures in Each Age Group

order/ ages	1	2	3	4	5	6	7	8	9	10
2	Sbj.Fac.Nom	Sbj.Act. Nom	Abl. Agent	Comp. Sbj.	Dir. Obj.	Poss.Fac.Nom	Acc.Ind.Obj.	Fut.Sbj. Pas	Dat.Ind. Obj.	Sbj. of Comps.
	100%	93.3%	80%	73%	66.7%	46.7%	46.7%	40%	40%	0%
3	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Abl. Agent	Poss.Fac.Nom	Acc.Ind.Obj	Dir. Obj.	Dat.Ind. Obj.	Sbj. of Comps
	93.3%	86.7%	86.7%	80%	73.3%	40%	40%	33.3%	20%	20%
4	Sbj.Fac. Nom	Abl. Agent	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom.	Acc.Ind. Obj	.Dat.Ind. Obj.	Dir. Obj.	Sbj. of Comps
	100%	100%	95%	95%	80%	60%	55%	50%	45%	30%
5	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Poss.Fac.Nom	Abl. Agent	Comp. Sbj.	Acc.Ind.Obj.	Dir. Obj.	Sbj. of Comps.	Dat.Ind.Obj.
	100%	100%	100%	100%	100%	85%	70%	70%	55%	35%
6	Sbj.Act. Nom.	Fut.Sbj. Pas	Sbj. Fac. Nom	Comp. Sbj.	Poss.Fac.Nom	Acc.Ind. Obj.	Sbj. of Comps.	Dat.Ind. Obj.	Dir. Obj.	Abl. Agent
	100%	100%	95%	95%	95%	95%	95%	90%	90%	90%
7	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom	Abl. Agent	Sbj. of Comps.	Dir. Obj.	Acc.Ind. Obj	Dat.Ind Obj.
	100%	100%	100%	100%	100%	100%	90%	80%	80%	70%
8	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom	Abl. Agent	Acc. Ind. Obj.	Sbj. of Comps.	Dat.Ind. Obj	Dir. Obj.
	100%	100%	100%	100%	100%	100%	90%	90%	85%	85%
9	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom	Abl. Agent	Dir. Obj.	Acc.Ind. Obj.	Sbj. of Comps.	Dat.Ind.Obj.
	100%	100%	100%	100%	100%	100%	95%	95%	95%	85%

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Table 2

Distribution of the Proportion of the Production of Expected RC Structures in Each Age Group

Order / ages	1	2	3	4	5	6	7	8	9	10
2	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom	Dat.Ind. Obj.	Dir. Obj.	Acc.Ind.Obj.	Abl. Agent	Sbj. of Comps.
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Comp. Sbj.	Poss.Fac.Nom	Dat.Ind. Obj.	Dir. Obj.	Acc.Ind.Obj.	Abl. Agent	Sbj. of Comps.
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Sbj. of Comps.	Comp. Sbj.	Sbj.Fac. Nom	Sbj.Act. Nom	Fut.Sbj. Pas	Poss.Fac.Nom	Dat.Ind. Obj.	Dir. Obj.	Acc.Ind.Obj.	Abl. Agent
	10%	5%	0%	0%	0%	0%	0%	0%	0%	0%
5	Comp. Sbj.	Sbj.Fac. Nom	Abl. Agent	Sbj.Act. Nom	Fut.Sbj. Pas	Poss.Fac.Nom	Dat.Ind. Obj.	Dir. Obj.	Acc.Ind.Obj.	Sbj. of Comps.
	25%	10%	10%	0%	0%	0%	0%	0%	0%	0%
6	Sbj. of Comps.	Poss.Fac.Nom	Comp. Sbj.	Abl. Agent	Dat.Ind. Obj.	Sbj.Fac. Nom	Sbj.Act. Nom	Dir. Obj.	Acc.Ind.Obj.	Fut.Sbj. Pas
	60%	45%	30%	30%	25%	10%	10%	10%	10%	5%
7	Poss.Fac.Nom	Sbj.Fac. Nom	Comp. Sbj.	Abl. Agent	Sbj.Act. Nom	Sbj. of Comps.	Dat.Ind. Obj.	Fut.Sbj. Pas	Dir. Obj.	Acc.Ind.Obj.
	65%	60%	60%	50%	40%	40%	25%	20%	10%	0%
8	Comp. Sbj.	Poss.Fac.Nom	Sbj.Act. Nom	Abl. Agent	Sbj.Fac. Nom	Sbj. of Comps.	Dir. Obj.	Dat.Ind. Obj.	Acc.Ind.Obj.	Fut.Sbj. Pas
	70%	70%	65%	60%	55%	35%	30%	15%	15%	0%
9	Abl. Agent	Sbj.Fac. Nom	Sbj. of Comp.	Sbj.Act. Nom	Dat.Ind. Obj.	Poss. Fac. Nom	Comp. Sbj.	Acc.Ind. Obj.	Fut.Sbj. Pas	Dir. Obj.
	55%	40%	25%	20%	15%	10%	5%	5%	0%	0%

As it is shown in Table 1, the acquisition of RC starts as early as 2-year-olds. This is the youngest age in the study. Even though the proportion is low, the acquisition of RC structures was observed for all of the depths at the age of 3. Comparing the age 3, there is a notable increase in the proportion of acquisition of RC structure for each depth at the age of 4. Considering the proportion of acquisition, there is no striking difference between the ages of henceforth. In each age group from 5 to 9-year-olds, almost all children displayed an understanding of the prompt question.

As seen in Table 2, there is no production of any expected RCs at the ages of 2 and 3. Although the proportion of RC production is low, the first expected RC production was recorded at the age of 4. Out of 20 participants, only two 4-year-olds produced expected RCs. There is a sharp increase at the age of 6. All depths are produced by at least one 6-year-old child. At the age of 7 and 8, the proportions of the production of RCs were almost stabilized. There is an unexpected decrease at the age of 9. This decrease was observed at each RC structures.

4. Conclusion

Language development and cognitive development can be predicted from language production (Ramirez, Lieberman, Mayberry, 2012). However, all the phases of this development do not emerge exactly at the same time. The results of this study indicate that the monolingual Turkish speaking children can understand the RCs; however, they cannot produce RC structures as expected. The first production of RC structures is observed at the age of 3 and it is increased with the age and at the age of 6 children show similar patterns to adults. There were no significant differences between 6 to 8-year-olds. Until the age of 6, the number of expected RC structures was only 13 in total. At the age of 6, this number increased sharply and 47 expected RC structures were produced by this age group. This sudden increase suggests interesting insight into their abilities related to their cognitive and language development. At the age of 6, participants produced expected RC structures from every depth which shows that children have enough knowledge regarding the production of RC structures around this age and the proportion of the answers was almost the same at the ages 7 and 8.

The most interesting outcome of this study is that there is a decrease in the production of RC structures at the age of 9. Unlike the increase in the production of RC structure at the younger ages, there is a decrease in the production of the expected RC structure by 9-year-olds. It seems that 9-year-olds are experiencing a transition phase related to their cognitive and language development. Berman and Slobin (1994) claim that regarding language production 9-year-olds are maintaining a bridge between 5-years and adults. Sometimes they fall behind the 6 and 7-year-old children in terms of expected RC structures. Piaget (1954) identifies developmental stages and categorizes 9-years-old children in the concrete operation stages which is between 7 and 11 years. Özcan (2005) proposes that during this

transitional period children develop organized and rational thinking and their responses are not homogeneous. They may have marks from logical thoughts but they may not use these thoughts.

The result of this study is consistent with the previous studies that children at early age can produce subject RC structures easier than object RCs. It was observed that when children answer the prompt questions, they prefer to produce an easier form of the expected RC, or they produce syntactically different but functionally similar responses such as the minimal form of the particular depth.

The most complex RC structure differs in the age groups. Regarding comprehension, all adults comprehended all the depths. For the ages 2 and 4 the depth (10) Subj. of Comps., for the age 3 the dept (6) Dat. Ind. Obj. and the depth (10) Subj. of Comps., for the ages 5, 7 and 9 the dept (6) Dat. Ind. Obj., for the age 6 the dept (6) Dat. Ind. Obj., the depth (7) Dir. Obj and the depth (9) Abl. Agent, and for the age 8 (10) Subj. of Comps., for the ages 5, 7 and 9 the dept (6) Dat. Ind. Obj., for the age 6 the dept (6) Dat. Ind. Obj. and the depth (7) Dir. Obj. are the most complex structures for children to comprehend.

The developmental process does not have sharp changes. "There is a continuum in that the improvement is incremental with increasing age (Özcan, 2018, p: 1498). The study shows that the acquisition and production of RC structures are not an easy process for children; rather it is a developmental process and requires cognitive maturity and knowledge.

This research determines the Turkish monolingual children's accessibility of RCs. Based on the results of the study, Turkish lessons might be rectified and the curriculum of the lessons might include teaching usage of the RC structures which children are ready to achieve. Moreover, the findings could be applied to English lessons to teach these structures. Children's current cognitive level of understanding the depth of RC could be taken into consideration. It is observed that at the age of 9 there is a sharp decrease regarding the RC production. The reason behind this decrease should be investigated in further studies.

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