Reading Acquisition in Primary School-age Children

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ABSTRACT

Reading acquisition is accepted as a significant process both for children and adults. It is seen as an essential process for children's school achievement and for future life success in different domains such as social and economic of adults. Important cognitive processes such as memory skills and visual attention along with psycholinguistic effects such as lexicality effect, word frequency effect and length effect have significant impact on the reading acquisition development. The current study had three aims; (a) to add more informative findings to the literature in terms of reading acquisition of monolingual Turkish speaking primary school-aged children, (b) to search whether the psycholinguistic effects observed in Turkish speaking adults are present for the Turkish speaking monolingual children, and (c) to investigate the differences between 2nd and 5th grades in terms of different cognitive processes. The sample consisted of 28 2nd grade and 30 5th grade native Turkish speaking children. The study included 5 different computerized tasks and 5 different non-computerized tasks. The findings of the study showed that the reading accuracy performance of children reaches the ceiling level after one year reading training. Also, all of the psycholinguistic effects have influence on reading speed performance of children. Lastly, the findings revealed that except from Phonological Short-term Memory all of the other memory skills and visual attention improve with age, repeated practice and experience.

Keywords: Reading acquisition, reading speed, school-age children, Turkish language, and cognitive processes

ÖZ

Okuma kazanımı hem çocuklar hem de yetişkinler için önemli bir süreç olarak kabul edilmektedir. Çocukların okul başarıları ve yetişkinlerin gelecekteki sosyal ve ekonomik gibi farklı alanlardaki başarıları için de okuma kazanımı gerekli bir süreç olarak görülmektedir. Bellek becerileri ve görsel dikkat gibi önemli bilişsel süreçlerin ve sözcük etkisi (lexicality effect), söcük sıklığı etkisi ve sözcük uzunluk etkisi gibi dilbilimsel etkilerin okuma kazanımının gelişimi üzerinde önemli etkisi bulunmaktadır. Bu araştırmanın üç amacı vardır; (a) literatüre Türkçe konuşan tek dilli ilkokul çocuklarının okuma kazanımı ile ilgili ayrıntılı bilgi verici sonuçlar eklemek, (b) Türkçe konuşan yetişkinlerde gözlemlenen dilbilimsel etkilerin Türkçe konuşan çocuklarda da gözlemlenip gözlemlenmeyeceğini araştırmak, (c) farklı bilişsel süreçler açısından 2. ve 5. sınıflar arasındaki farkları araştırmaktır. Katılımcıların 28'i 2. sınıf ve 30'u 5. sınıf ana dili Türkçe olan çocuklardan oluşmaktadır. Deney bilgisayara bağlı 5 farklı görev ile bilgisayara bağlı olmayan kağıt kalem yöntemiyle 5 farklı görev içermektedir. Çalışmanın sonuçları çocukların okuma doğruluğu performanlarının bir yıllık öğretimden sonra en yüksek seviyeye ulaştığını göstermektedir. Aynı zamanda, tüm dilbilimsel etkilerin çocukların okuma hızı üzerinde etkili olduğu gözlemlenmiştir. Son olarak araştırmanın sonuçları fonolojik kısa sureli bellek dışındaki tüm bellek becerileri ve görsel dikkat görevlerinin yaş ve tekrarlanan öğretim deneyimleri ile gelişme gösterdiğini ortaya çıkarmıştır.

Anahtar Kelimeler: Okuma Kazanımı, Okuma Hızı, Okul Çağındaki Çocuklar, Türk Dili ve Bilişsel Süreçler

To My Family

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LIST OF ABBREVIATIONS

AoA	Age of Acquisition
C	Consonant
F	F-ratio
LHF	Long High Frequency
LLF	Long Low Frequency
LNW	Long Nonwords
M	Mean
Ms	Millisecond
N	Sample Number
p	Probability
PA	Phonological Awareness
PSTM	Phonological Short-term Memory
r	Pearson's Correlation Coefficient
RAN	Rapid Atomized Naming
RAN_Col	Naming Color
RAN_Lett	Naming Letter
RAN_Numb	Naming Number
RAN_Obj	Naming Object
RCPM	Raven's Colored Progressive Matrices
RT	Reaction Time
SD	Standard Deviation
SHF	Short High Frequency
SLF	Short Low Frequency

SNW	Short Nonword
SOV	Subject Object Verb
SPSS	Statistical Package for Social Science
t	Critical Value
V	Vowel
VAS	Visual Attention Span
VPT	Visual Pattern Test
VSTM	Visual Short-term Memory
WM	Working Memory
α	Alpha
$\eta 2$	Eta-squared (a measure of the size of an effect)

Chapter 1

INTRODUCTION

Reading acquisition is a critical process both for children's school achievement and later success of adults in society (Poe, Burchinal, & Roberts, 2004; Snow, Burns, & Griffin, 1998). In general, reading acquisition is considered as an important process for the future achievements in different domains such as social and economic life (Poe et al., 2004; Snow et al., 1998). Manguel (1997) suggested that reading is essential for better understanding of the world; therefore, many of researchers have focused on exploring the mechanisms required for reading acquisition among typically developing children. Previous research suggests that early language skills are related with reading acquisition. For example, Boudreau and Hedberg (1999) suggested that language development has an important role in literacy achievement. Therefore, many studies increasingly taking into account language development while studying reading. Although the main focus of this study is reading acquisition in the Turkish language, at first two classical approaches for language development will be briefly described due to its relationship with reading acquisition. Overview of studies on reading acquisition will be presented later. One of the classical approaches is proposed by the Behaviorist Skinner (1957) where language development was explained by the learning theory principles. He claimed that language acquisition depends on the everyday life experiences of infants and this acquisition is based on the conditioning and reinforcement principles. For instance, parents reinforce their children utterances by paying attention, valuing and smiling

back to them. On the other hand, Nativist Noam Chomsky (1957) explained language acquisition with an inborn capacity. He proposed the Universal Grammar Theory suggesting that children are born with biological grammar categories; like a noun category and a verb category, and these innate grammatical categories enhance the children's language development. According to his theory, children need to just learn the words of their language and the innate categories combine all the grammatical information for them. Both of these approaches are accepted (Wardhaugh, 1971) suggesting that children are born with innate grammatical categories and later they improve these categories with conditioning and reinforcement principles.

Language development is a cognitive process that involves different milestones (Bates, O'Connell, & Shore, 1987; Capture, Shapiro, & Palmer, 1987; Lenneberg, 1969; Reznic & Goldfield, 1992). After birth, babies are able to perceive speech and produce some sounds by crying, cooing and babbling, which are defined as prelinguistic speech. Infants, before 6 month of age can learn the main sounds of their native language and start to use gestures such as pointing (Butterworth & Morissette, 1996) in order to communicate with familiar others. During the 9-to-10 months of age they begin to understand basic words such as 'No' or their own names and are able to imitate words. Within the same period the ability to listen and understand what others say, namely receptive language develops very rapidly (Burchinal et al., 2000). Later, at around 18-to-24 months of age toddlers are able to initiate verbal communication and use words. However, intentional verbal communication capacity may show individual differences. Lastly, between 20-to-30 months of age, children can acquire the fundamentals of the syntax. With this acquisition they come to understand very well the conversations and to develop more

complex sentences with 3 or more words. The ability to communicate with others and put thoughts into words and sentences with a meaningful and grammatically accurate way namely expressive language helps the child to become more competent in social relations (Rescorla, 1991). Before 5 years of age, although they are not able to read, children through symbols can understand the written language. This understanding of written language is gained with different stimulating materials that they encounter in their daily experiences. For example, they encounter different signs and logos with written words and they learn what these words mean. Until the age of 5, they assume that each of the letters of a word is a separate word (Gentry, 1981; McGee & Richgels, 2000). During the preschool years, children become aware of different language components such as phonology, morphology, semantics, pragmatics, and lexicon through different educative activities. With these play activities children become aware of the fact that letters are parts of the words and they are linked to sounds in a systematic way (Gentry, 1981; McGee & Richgels, 2000). It is largely accepted that the first reading acquisition experiences of children begin during the preschool years, with curiosity to written materials such as storybooks, recognizing the signs around, numbers, letters etc.

Similar to language development, reading acquisition requires perceptual and cognitive abilities that researchers have focused to identify. Basically, reading refers to a process that includes understanding speech that is written down (Kamhi & Catts, 1986). The main goal of the reading process is to extract the meaning of the written speech (Ziegler & Goswami, 2005). The main task for children that are learning to read is matching specific visual symbols (graphemes) that are used by their culture for representing speech to units of sounds (phonemes). For many of the languages all

around the world, the visual symbols and the units of the sounds have a systematic relationship; however, the relationship between the visual symbol and the meaning is arbitrary (Share, 1995). For instance, the visual symbol ‘D’ is always sounded /d/ but this does not give any information about the meaning of the words that begin with ‘D’. Therefore, children are required to be mastered in terms of the system that enable them to map symbols and sounds, in order to be able to access the thousands of words already presented in their spoken lexicons. According to Ziegler and Goswami (2005) this process is named as Phonological Recoding. It is thought that the phonological system is already structured long before the reading process and has a crucial role in successful reading acquisition.

For assessing the phonological structure of children many of the previous research focused on the experimental measures of Phonological Awareness (PA) skills. PA can be described as understanding and being aware that the spoken words can be divided into individual phonemes and composed of speech sounds (Dandache, Wounters, & Ghesquiere, 2014). PA is the most crucial factor that strongly predicts the reading acquisition across languages (Ziegler & Goswami, 2005). Addition to PA, Rapid Atomized Naming (RAN) and Visual Short-term Memory (VSTM) are related to the phonological processing ability of children (Dandache et al., 2014). RAN is a method that is used for assessing the naming speed and refers to adequate phonological code retrieval from the long-term memory while reading. It is an effective process for reading and is related with the phonological representations of the words. On the other hand, VSTM, a system that has responsibility to store, access, and process the stable relations between verbal and written materials, is another process that has relation with the phonological ability of children although it

has no relation with phonological storage. Therefore, VSTM has an important link with reading acquisition (Dandache et al., 2014). VSTM performance can be clearly observed on the children who begin to read because they are continuously exposed to new reading materials. Besides VSTM, other memory processes such as Working Memory (WM) and Phonological Short-term Memory (PSTM) have a crucial relation with reading performance of children (Gathercole & Baddeley, 1990). According to Fostick, Bar-El, and Ram-Tsur (2012), if a child has inadequate WM and PSTM capacities, s/he experiences difficulties in learning the sound structures of new words because these have a crucial role on learning the phonological structure of the language.

In addition to the above-cited cognitive processes, visual attention is another cognitive process that is considered to have a significant influence on the reading acquisition (Bosse & Valdois, 2009). Since, reading can be classified as a visual perceptual task that needs to process of multi-letter strings, Laberge and Samuel (1974) emphasized the important role of visual attention for word reading. Therefore, as suggested it is important to take into account the visual attention performances of the children while studying reading acquisition.

In summary, from the above literature it is evident that reading acquisition requires several distinct cognitive processes. However, studies coming from cognitive developmental psychology show that children have individual differences in terms of these various cognitive processes while acquiring reading (Cunningham & Stanovich, 1997). For example, Snowling (2001) suggested that a child with reading impairments shows problems in some of these cognitive processes. Earlier, children who have reading impairments were sub-grouped based on the discrepancy between

their IQ levels and reading achievement scores. However, recently they are sub-grouped based on the individual differences in terms of the cognitive processes that are related with the reading acquisition (Catts, Hogan, & Fey, 2003). In addition, problems in cognitive processes that are significantly related with the reading acquisition first appear at the first and second grades when the children begin to read; therefore, identifying a child as a poor reader before school-age is difficult (Boudreau & Hedberg, 1999). Finally, the orthographic transparency, namely the correspondence between graphemes and phonemes of a language has a significant influence on the reading acquisition and predicts reading success (Snowling, 2001). The orthographic difference across languages also has an important role on children's reading acquisition. For example, in opaque orthographic languages where the written script does not fully represent the phonemic structure of spoken language (Aro, 2004) like the English language, children with reading difficulties commonly have problems in their PA skills whereas in transparent orthographic languages like Greek, German, and Italian the mostly observed problem is slowness in reading (Lundberg, & Hoien, 1990; Porpodas, 1999; Rodrigo, & Jimenez, 1999; Wimmer, 1993; Wimmer, Mayringer, & Landerl, 1998; Yap, & van der Leij, 1993; Zoccolotti et al., 1999).

To date, many studies examined the reading acquisition and the cognitive processes related with it in various alphabetic orthographies such as English, German, French, Spanish, Italian, and Greek (Frith, Wimmer, & Landerl, 1998; Goswami, Gombert, & Barrera, 1998; Goswami, Ziegler, Dalton, & Schneider, 2001; Landerl, Wimmer, & Frith, 1997; Porpodas, 1999; Rodrigo, & Jimenez, 1999; Wimmer, & Hummer, 1990; Zoccolotti et al., 1999). Several studies from different orthographies have

focused on the problems that children are faced with while acquiring reading (Holopainen, Ahonen, & Lyytinen, 2001; Landerl, & Wimmer, 2000; Wimmer, & Mayringer, 2002; Wimmer et al, 1998; Yap, & van der Leij, 1993; Zoccolotti et al., 1999). However, only a small number of studies have examined reading acquisition and its required cognitive processes for normally developing children in transparent orthographies, like the Turkish language. Many of prior studies in Turkish language focused on the comparison between English and Turkish (e.g. Öney, Peter, & Katz, 1997; Öney & Goldman, 1984).

As the focus of this study is to add more empirical evidence in the field of reading acquisition in Turkish language, the reading acquisition process in general will be discussed in the following paragraphs.

1.1 Reading Acquisition

Previous studies showed that children begin to acquire reading skills long before their school years (Snow, Burns, & Griffin, 1998). Before engaging in fluent reading, they work to learn the ways in which they can analyze reading and spoken language. Basically, reading acquisition needs a system that involves matching letter sequences of the written words (graphemes) and the sounds of the words (phonology) (Snowling, 2001). Briefly, reading can be described as a process that requires understanding of the written speech. The main goal of the reading process is to reach the meaning of the written speech (Ziegler & Goswami, 2005). The significant task of the children for acquiring reading is to learn the code that is used by their language for expressing the speech through a series of visual symbols. Mainly, the reading acquisition includes two stages; in the first stage, children need to learn mapping between visual symbols and sounds and then, during the next stage, they

require to master visual symbols and sounds matching in order to reach the thousands of words that have already existed in their spoken lexicon (Cunningham & Stanovich, 1997).

Nearly all English-based models of reading acquisition include the idea of dual processing routes for visual word recognition; one route is for the translation letters to sounds which depends on the phonological process (phonological route) and another route for automatic word recognition (lexical route) (Coltheart, 2006). For better understanding of these cognitive processes reading acquisition models have been developed. These models have different developmental sequences. Among these models, Gough and Hillinger (1980) proposed a model with two stages for reading acquisition; an early-visual association stage and a stage of decoding-based learning. In the first stage, there is a visual process but it does not include any information related with the decoding. Children use any functional source of information for separating one word from another. According to Perfetti and Marron (1998), by doing this, children develop a visually reachable lexicon. They have to find the appropriate conditions for moving to the next stage. For example, their PA skills need to be improved and they require having an intention to encode all, rather than just some of the letters of a word. In the second stage, they pass a new procedure, which is based on the alphabetic principles and decoding begins. Another model was developed by Ehri (1980; 1991; 1992) and the differentiation of this model from the Gough's model is that it has no purely visual stage. This model suggests that there is an interactive relation between phonological process and word recognition. It is based on amalgamation process. It claimed that the most essential part of reading acquisition is making enough practice in reading specific words by

phonologically recoding. By doing this, children create access routes for these words into their lexical memory. According to Ehri (1992), young readers depend on their knowledge of grapheme-phoneme correspondence for building these access routes. They match particular letters in the spellings of words to particular phonemes in the pronunciation of the word. Accordingly, letters are processed as visual symbols of phonemes and the letter sequences are held in memory as an alphabetic, phonological representation of a particular word. This model claimed that reading acquisition requires using letter-sound knowledge and the phonological cues from the basis for visual word identification skills. For instance, a child can use the sounds of the letters 'J' and 'L' to memorize the sound of the word 'Jail'. According to this model the key factor for first stage is to learn the alphabet. Then, the reading acquisition process begins when the child established the relations between phonological and orthographic components of the words. In addition to this, connectionist models have also been developed in order to explain reading acquisition (Plaut, McClelland, Seidenberg, & Patterson, 1996; Zorzi, Houghton, & Butterworth, 1998a; 1998b). These models were accepted as the models that fit best both for normally developed and reading impaired children. The connectionist models involve opposite assumptions to the item specific mechanisms that of the dual-route models that were mentioned before. They suggested that the cognitive system of the word recognition improves the unconscious learning in irregular orthographies like English; therefore, the reading becomes an unconscious process (automatic process). They also emphasized the process of matching the letter strings of written words and the phonemic sequences of spoken words (Snowling, 2001).

As the various models explained reading acquisition with different developmental sequences, the cross-language differences also influence acquiring reading significantly (Ziegler & Goswami, 2005). Most of the cross-language comparisons of reading acquisition were done between English and other languages that have more regular orthographies such as Turkish, Finnish, Italian, and Greek. For example, Öney and Goldman (1984) conducted a study which was one of the first Turkish language investigations and they compared the pseudoword reading ability of Turkish and American children at first and third grades. They found that Turkish children were both more accurate (94% vs 59%) and faster in the first grade. In terms of accuracy, both group reached the ceiling level at third grade but the Turkish group were still more fluent compare to American students. Similar finding have been shown by other studies (Durgunoğlu & Öney, 1999; Öney et al., 1997). Based on these findings it can be said that reading acquisition seems to be slower in English compared with other more regular orthographies like Turkish. Aro (2004) stated that in the most regular alphabetic orthographies reading acquisition reaches ceiling level after one year of reading instruction. For instance, Öney and Durgunoğlu (1997) followed a group of Turkish children during the first grade and assessed their reading acquisition in October, February, and May. They found that children showed a rapid growth in a word reading skills; in October they had 26% reading accuracy, in February their reading accuracy increased to 72% and in May it reached the ceiling level to 93%. According to the researchers, this rapid increase is the result of the simplicity of the Turkish grapheme-phoneme correspondence system.

The other important issue for the reading acquisition is the method that the researchers used for measuring it. According Babayiğit and Stainthorp (2007), the

method of assessing reading acquisition differs whether the language has transparent or opaque orthography. In opaque systems like English, the researchers can use the reading accuracy as a measure of reading acquisition; however, in transparent systems they need to use reading speed (reaction times) as an index of reading acquisition. The main reason of this is the simplicity of transparent system which appears to ease the reading accuracy. The reading accuracy performance of the individuals in transparent systems reaches ceiling level within one year of instruction (Öney & Durgunoğlu, 1997).

1.2 Phonological Development

As mentioned above, reading acquisition requires matching between visual symbols and sounds of the written speech that is related to the development of phonological skills. According to Dandache et al. (2014), phonological ability can be seen as an umbrella term for explaining the ability to reach, process, and design the speech sounds. For explaining phonological development, there are 2 different theoretical views (Ziegler & Goswami, 2005). First one is modular view, which suggested that the phonemic structure of children is innate but they are not aware of that and they learn explicitly about the phonemic structure that they already have in their lexical representations. On the other hand, the second view, which is named as the holistic view, claimed that children improve their lexical representations by adding phonological knowledge to it while developing. Therefore, they have ability to differentiate the phonologically similar items in their spoken vocabulary. For assessing phonological development the experimental methods of PA were used in previous studies and it was claimed that RAN and VSTM are related cognitive processes with it.

The following paragraphs will present the cognitive processes that have link with phonological development under three main processes; PA, RAN, and VSTM.

1.2.1 Phonological Awareness (PA)

PA refers to the children's awareness of sub-lexical segments of speech sounds (Aro, 2004). Namely, it can be described as the conscious realization of children that the spoken words are composed of individual speech sounds (phonemes) and the combination of speech sounds (Dandache et al., 2014). According to Snow et al. (1998), the PA skills of children mainly develop long before the school age and there are 3 general PA skills; 1- identifying and differentiating between letters, 2- processing phonological information, and 3- matching specific letters to specific sounds. All of these skills are the most significant requirements of reading acquisition; therefore, PA skills are the most critical skills for successful reading acquisition (Aro, 2004; Dandache et al., 2014; Snowling, 2001) especially for alphabetic orthographies (Durgunoğlu & Öney, 1999). Since, the reading acquisition depends on the mapping between grapheme to phoneme in alphabetic orthographies, this critical relationship between PA and reading acquisition is not surprising. Previous studies on this relation were done in English as well as other languages and it was claimed that it is still unknown whether this link is causal or not in all alphabetic languages (Durgunoğlı & Öney, 1999; Ziegler & Goswami, 2005).

As a last point, for PA development previous studies suggested there are cross-language differences. According to Aro (2004), the development of PA is more rapid in transparent orthographies than in English, which has opaque orthography. PA reaches ceiling level relatively soon after the beginning of reading instructions in transparent orthographies. In addition, many studies in transparent orthographies

suggest that PA can predict reading acquisition but it is not a reliable predictor for reading problems in such languages (de Jong & van der Leij, 1999; Durgunoğlu & Öney, 1999; Holopairen et al., 2001; Landerl & Wimmer, 2000; Poskiparta, Niemi, & Vauros, 1999; Wimmer, 1993; Wimmer, Landerl, Linortner, & Hummer, 1991). As mentioned above, in more transparent orthographies the more reliable measurement is reading speed (reaction times) rather than reading accuracy, which is used mostly in English studies (Aro, 2004). This is also reliable predictor of reading problems in more transparent orthographies (Lundberg & Hoien, 1990: Porpodas, 1999; Rodrigo & Jimenez, 1999; Wimmer, 1993; Zoccolotti et al., 1999).

1.2.2 Rapid Atomized Naming (RAN)

Naming speed refers to the adequacy of phonological information that is retrieved from long-term memory and has an effective role on reading acquisition (Dandache et al., 2014). Previous studies suggested that there is a strong link between reading and naming (Holopainen et al., 2002; Wimmer, & Mayringer, 2002; Wimmer et al., 2000). Basically, naming speed can be named as name retrieval and is a complex process. According to Wolf (1984; 1991), naming and reading share many of the similar cognitive and linguistic processes; however, they use different ways for reaching these similar processes. These ways can change based on the naming task, reading task, and the age and level of achievement of children. Different tasks of naming and reading are thought to share similar cognitive skills. For example, letter-naming tasks include letter knowledge which is also required for reading (Neuhaus, Foorman, Francis, & Carlson, 2001). Additionally, previous studies showed that the letter naming measurement before the child is not able to read provides a predictive result for reading acquisition (Wolf, Bally, & Morris, 1986).

For assessing naming speed, RAN can be used. It was developed by Denckla and Rudel (1976) and includes a series of continuous naming speed tasks. Mainly, Bowers, Golden, Kennedy, and Young, (1994) claimed that RAN performance of a child shows how rapidly and effortlessly reach the names of common symbols (i.e. digits or letters) and is effective as PA as in the learning and retrieving orthographic patterns. That is, RAN performance reflects the ability of child in terms of how quickly lexical representations of printed words are reached. For instance, children who have slow performance on RAN tasks have problems in processing letters fast enough to enable the development orthographic lexical representations. Therefore, RAN performance has an effective role on reading acquisition.

1.2.3 Visual Short-term Memory (VSTM)

Alvarez and Cavanagh (2004) claimed that all cognitive activities require short-term storage and manipulation of information in memory. Working Memory (WM) and its components have significant roles in that. Baddeley (1978; 1992) suggested that WM has separate components for storing the visual and verbal information. For storing visual materials, WM can be divided into 2; a high-capacity sensory memory and a relatively limited-capacity short-term memory (Phillips, 1974). VSTM refers to a system that has responsibility to store, access, and process the stable relations between verbal and written materials (Dandache et al., 2014) and reading acquisition has a relationship with VSTM development. Since, reading acquisition needs to realize the sequences of letters, words, and their meaning, the VSTM performance of a child who begins to learn reading has an important role. Commonly, the VSTM performance of children at the beginning of reading acquisition is more apparent and it continues to develop in later stages. Also, if a child has problem in terms of

VSTM, s/he uses the context in order to overcome this problem because their semantic knowledge is developed in these stages.

Literature suggests that VSTM has a limited capacity (Luck & Vogel, 1997; Vogel, Woodmen, & Luck, 2001). Its capacity depends on the number of objects that can be stored; for instance, VSTM can store one feature (e.g. color or orientation) of up to four objects and two or four features up to four objects. That is, the important thing for the capacity of VSTM is the number of objects that can be stored not the number of features. As mentioned before, children who are at the beginning of the reading acquisition process, are exposed to a significant amount of new reading material over a short period of time and so VSTM would be an important early reading acquisition contributor. Since, at the beginning stages of reading acquisition children require to be mastered in many skills; for example, they need to learn letter names, letter sounds, grapheme cluster sounds, and oral responses for all words, they can experience VSTM problems. Therefore, this can influence their reading acquisition success. Orton (1928) mentioned that children with reading impairment always confuse letters that are similar in appearance but varied in orientation so that they experience problems in storing visual information of letters. In addition, Lyle and Goyen (1968) compared poor and good readers at 7 and 9 ages on VSTM and they concluded that poor reading specifically at the beginning of reading acquisition was associated with VSTM deficit. In short, the literature suggested that VSTM performance of children influence the successful reading acquisition mostly at the beginning stages.

Besides VSTM, WM and PSTM have an impact on reading acquisition. The followings will give information about WM and PSTM.

1.3 Memory

As mentioned previously, all cognitive activities require storing information in short-term memory and manipulating in memory (Alvarez & Cavanagh, 2004). Since, reading acquisition is a cognitive process, it requires successful memory activities. Many researchers suggested that WM and PSTM have a significant role in reading mainly at the beginning stages (Alloway, Gathercole, Willis, & Adams, 2004; de Jong, 1998; Siegel & Ryan, 1989). WM refers to a system responsible for holding and manipulating information immediately after presentation and is required for the execution of complex cognitive activities such as learning, reasoning, and comprehension (Alloway, 2007). It has limited capacity. Studies suggested that normal developing adults can hold approximately 7 digits, 6 letters, and 5 words in WM and they can improve their WM by depending on the content that they have already known.

There are different models that were suggested by various researchers for WM. The first model of WM was proposed by Baddeley and Hitch (1974). It was a multi-system model of WM. According to this model, there are 3 systems of WM. One is the phonological loop, which stores sounds of language and provide rehearsal loop for retention. Other is the visuo-spatial sketchpad, which is responsible for constructing visual images and mental maps. The last one is the central executive system, which is a central system that captures attention to the significant information, suppresses the unwanted information, and directs multiple cognitive tasks. The second model was developed by Ericsson and Kintsch (1995) who suggested that WM is similar to the digit span, which refers to the ability to recall and repeat up the digits. According to this model, WM can be seen as a process for

linking small pieces of information and then unpacking and relating them through retrieval structure. The last model was suggested by Cowan (2005) who claimed that WM is a part of long-term memory and is not separated from it. For this model, the visual, auditory, and spatial representations in WM are a subgroup of representations in long-term memory. The WM can be seen on two levels; unlimited long-term memory that are activated and a limited focus of attention holding up to 4 activations at a time. The memory researchers mainly used Baddeley and Hitch's (1974) model, which was improved by Baddeley (2000). Alloway et al., (2004) suggested that the phonological loop which is responsible to store verbal information and can be named as PSTM, has a significant role in learning letter-sound relations and in storing main phonological sequences and phonological recoding.

Although WM and short-term memory are similar to each other, they are different (Gathercole, Alloway, Willis, & Adams, 2006). Short-term memory is a term used for storing units of information, whereas WM refers to the capacity to store information while engaging in other cognitive activities. Short-term memory is assessed by serial recall tasks; however, WM is measured by complex memory tasks. Besides these differences they have some similarities. For instance, they both have limited capacity and individual difference can be seen in terms of their capacity.

Both WM and PSTM have an impact on successful reading acquisition. According to Alloway (2007), poor performance in WM and PSTM skills is related with reading impairment. Similarly, Torgesen, Rashotte, Greenstein, Houck, and Portes (1987) claimed that children with reading problems have poor performance on WM and PSTM tasks; since, they are not able to maintain phonetically coded material in WM long enough to gain consolidation. Furthermore, these memory skills are more

important at the beginning stages of reading acquisition compare to later stages because during these stages word decoding is slow and requires more effort compare to later stages and the relation between graphemes and phonemes is not automatic; therefore, memory skills have significant role for the beginning readers (de Jong, 1998). In short, if there is a problem in memory skills, it can cause delays in reading acquisition due to necessities of processing and storing of phonological information. Moreover, Tunmer and Hoover (1992) claimed that memory skills are related with the other crucial cognitive processes such as PA of reading acquisition. These memory skills are required to assess PA; since, PA tasks mainly need to store and manipulate of phonemes. In summary, previous findings suggested that PSTM and WM skills are critical for reading acquisition especially at the stages when the simple letter-sound relations are learned and applied by children (Gathercole & Baddeley, 1990).

The following will explain other cognitive process that has impact on reading acquisition. Also, the cross-culturally seen effects which are lexicality effect, word frequency effect, and word length effect will be given in the following paragraphs.

1.4 Other Related Concepts

1.4.1 Visual Attention

Reading acquisition in alphabetic languages like English, German, and Turkish requires learning the links between sequences of visual symbols (i.e. related orthographic units like grapheme, syllables, and whole words) and the related units of sounds (i.e. related phonological units such as phonemes, syllable, and whole words). Therefore, reading can be seen as a visual perceptual task that involves a process of multi-letter sequences (Bosse & Valdois, 2009). Due to this feature of

reading, it can be said that in normally developed readers visual processing performance has a relation with reading performance (Bosse, Tainturier, & Valdois, 2007). Although some reading and word recognition models discussed the role of visual attention, many of the reading theorists did not take this concept into account specifically and not emphasize the processes that related with the attention while examining the reading acquisition (Bosse, Tainturier, & Valdois, 2007). However, especially in alphabetic languages there is a need to learn the association between sequences of visual symbols and related units of sounds, so that the visual attention has a critical role in reading. At the beginning stages of reading acquisition, Laberge and Samuels (1974) who gave a significant role to visual attention while word reading process, claimed that children have to take into account each letters successively of a word that they need to name. After that, they gain experience and letter identification becomes automatic; therefore, they focus on larger units of the words. According to Laberge and Samuels (1974) visual attention process is required for processing of the definition of the orthographic units during reading.

The concept of VAS was suggested first by Bosse et al. (2007) in order to show the difficulties in letter-strings processing. They tried to prove that children, who have reading impairment, would also have problems in VAS and these problems are related to each other. Literature shows that there is a significant relationship with reading acquisition and VAS. For instance, Pelli, Burns, Farell, and Moore-Page (2006) claimed that children who have problems in reading acquisition at the beginning, show low performance on tasks of multi-letter processing which is a necessity of VAS. In addition, Siegel and Ryan (1989) suggested that during the first grade in which the reading acquisition begins, the VAS is correlated with reading

accuracy and reading speed performance both for words and nonwords. Based on these findings it can be said that VAS performance significantly and independently influence the reading performance at the beginning of reading acquisition. Moreover, previous research suggested that there is a cross-grade difference in VAS. That is, VAS performance improves with reading development (Siegel & Ryan, 1989). Therefore, the relationship between VAS and reading words or nonwords is stronger at low grades compare to high grades.

1.4.2 Lexicality Effect

Lexicality effect is known as words are pronounced more rapidly than nonwords (P., Chiappe, D., Chiappe, & Siegel, 2001). According to Pagliuca, Arduino, Barca, and Burani (2008), there are two different procedures for covering print to speech. First one is lexical route, which includes accessing stored lexical representations of a word. Second one is nonlexical route, which includes gathering a pronunciation by the application of grapheme-phoneme correspondences rules. Lexical route is used for reading words that are stored in the lexicon. On the other hand, nonlexical route is used for reading nonwords that do not have lexical entry in the orthographic lexicon; therefore, the readers cannot use lexical route to read nonwords. However, the literature suggests that among various languages these two routes are used differently based on the orthographic differences. For instance, in transparent orthographies words can also be correctly read via the nonlexical route due to the simplicity of the transparent system (Raman, Baluch, & Besner, 2004). Pagliuca et al. (2008) claimed that opaque languages like English rely on lexical route whereas transparent languages like Turkish depend on nonlexical route, which requires the use of grapheme-phoneme correspondence rules. Raman et al. (2004) suggest that in opaque system the readers shift from lexical route to nonlexical route when they read

words and nonwords. However, in transparent languages, it can be assumed that readers do not need parallel use of lexical and nonlexical routes while reading words and nonwords. They use nonlexical route for reading both words and nonwords. Basically, it can be said that opaque languages use lexical knowledge while reading, whereas transparent languages depend on the relations between grapheme and phoneme (sublexical knowledge).

1.4.3 Frequency Effect and Length Effect

Word frequency effect is known that high frequent words are named faster than low frequent words (P., Chiappe et al., 2001). On the other hand, length effect can be described as naming shorter words rapidly than the longer words. Both of these effects are related with the quality of the words which requires to be read; thus, as the literature suggests the quality of the words influences word recognition process (Plourde & Besner, 1997). While the adult readers giving lexical decision, many of the previous studies showed that quality of word impacts the reaction times (RT) of them.

For explaining the nature of word frequency effect, there are some claims. Some researchers suggested that word frequency effect occurs because repeated exposure of a word improves various kinds of processes and strengths the connection between orthographic, phonological, and semantic representation; therefore, high frequency words takes less time to access while reading (Fiez, Balota, Raiche, & Petersen, 1999). In addition, Pagliuca et al. (2008) claimed that nonlexical route is used for reading low frequency words and this leads to slow naming. Moreover, some researchers proposed models for explaining the word frequency effect. There are two suggested models; the order search model (Foster & Bednall, 1976; Rubenstein,

Garfield, & Millikan, 1970; Taft & Foster, 1975) and logogen model (Morton, 1969). According to the order search model, there is a list for the frequency of lexical representation and in this list the highest ones are at the beginning, whereas the lowest ones are at the end of the list. Thus, the readers can easily reach the high frequent words from the beginning of the list and require much time to access the low frequent words from the end of the list. On the other hand, the logogen model suggests that there is an information level of each lexical entry or logogen and it activates when the sensory input has the appropriate feature. The particular logogen become ready for recognition when it reaches the activation threshold. Overtime, it drops to the original resting state and that state is based on the frequency of words. The high frequent words require more resting level than low frequent words; therefore, they can access the threshold level more quickly. In this way, they are ready for recognizing more quickly than low frequent ones. It is well established that the word frequency effect is commonly seen in opaque orthographic languages like English; however, this is also true for transparent orthographic languages such as Turkish, Italian, and Dutch (Raman et al., 2004). For instance, the literature suggested that Turkish speaking adults read more frequent words more rapidly than low frequent words.

For word length effect, Spinelli, et al. (2005) claimed that the readers are more sensitive to the number of letters at the beginning of the reading acquisition. At later stages, this becomes less important for them because they develop their reading skills and some of these skills become automatic processes as mentioned before. However, literature suggested that word length effect can be seen among children whose reading skills were developed and this can be explained with the structural

complexity of the words (Groot, Borgwaldt, Bos, & Eijnden, 2002). A word with more letters, phonemes, syllables, or morphemes has more complex structure; thus, these words require more time to name. For instance, Spinelli et al. (2005) assessed proficient readers' RTs in naming 3-to-8 letters words and they found that in the 5-to-8 letter range their RTs rose linearly. Although word length effect can be observed among all ages, it shows a drop with age. In addition, Zoccolotti, et al. (2005) found that the effect of word length drops dramatically from 1st to 3rd grade in normal reading children. Also, Spinelli et al. (2005) proposed that the word length effect decreases from 3rd grade to 5th grade. The last point is that the word length effect can be seen among both transparent and opaque orthographic languages.

In conclusion, it can be said that both word frequency and word length effects are common for all ages and true for both transparent and opaque orthographic languages.

As the focus of the current research is to study reading acquisition in Turkish speaking primary school-aged children, the followings will include the significant features of Turkish language and it will be introduced with its main points.

1.5 Turkish Language

Turkish is a language that is spoken fluently by approximately 80-90 million people worldwide (I., Raman, E., Raman, & Mertan, 2013). It is the official language of North Cyprus and the Republic of Turkey. In addition, it is spoken by the immigrant population in Germany, France, the Netherlands, Austria, and the UK (Jorgersen, 2003). It is a member of Turkic subdivision of Altaic language family (I., Raman et al., 2013). Its orthography includes 29 letter-alphabet (8 vowels (V) and 21

consonant (C)). The vowels can be shown in four pairs (A-E, I-İ, O-Ö, U-Ü) which are front /back and rounded/unrounded sounds resulting in vowel harmony. Turkish is a transparent orthographic language. In Turkish the number of letters and the number of phonemes correspond because the relationship between orthography and phonology is matched (Raman, Baluch, & Sneddon, 1996; Raman, 2006; 2011). In addition, the grapheme-phoneme conservations are regular. Comparing Turkish with English which has an opaque orthography, the syllable types of Turkish is less than English. In Turkish there are four simple syllable forms (V, VC, CV, and CVC) and the most frequent one is CV. Therefore, Turkish words can be easily broken into syllables (Oktay & Aktan, 2002). Finally, Turkish is an agglutinative language where grammatical elements are joined to the word as suffixes and the neutral word order is subject object verb (SOV) (Oktay & Aktan, 2002; I., Raman et al., 2013).

As cited above, recently the number of studies examining cognitive processes of reading acquisition in Turkish speaking population is increasing. However, these studies mostly include comparison of Turkish with other languages like English and bilingual Turkish speaking individuals. Therefore, there is a need to study the reading acquisition and the cognitive processes in Turkish speaking monolingual children. There is also a need for additional findings for a better understanding of reading acquisition and how cognitive processes influence its development. Finally, there is a need to study whether the findings from Turkish speaking adults on the psycholinguistic effects such as lexicality, word frequency, and word length effects show similarity on the Turkish speaking monolingual children.

1.6 Current Study

The present study is a part of a larger experimental study which is named as 'Language Universality vs Specificity of Reading Processes: Evidence from Turkish-speaking Children'. The current study mainly aims to add more informative findings to the literature in terms of reading acquisition of monolingual Turkish speaking primary school-aged children. Although literature involves some studies on the topic of reading performance among Turkish speaking children, most of them compared Turkish speaking and English speaking children. As cited above, comparative studies on Turkish, UK, and American school children showed that Turkish speaking children were more accurate and rapid than UK and American counterparts (Öney et al., 1997; Öney & Goldman, 1984). In addition, the findings of Öney and Durgunoğlu's (1997) study showed that reading accuracy reaches the ceiling level from 1st grade. Therefore, the second aim of the present study is to compare 2nd and 5th grades in terms of word reading accuracy.

The other aim of the current study is to search whether the psycholinguistic effects studied in Turkish speaking adults such as lexicality effect, word frequency effect, and word length effect are present for the Turkish speaking monolingual children.

The final aim of the current study is to investigate the differences between 2nd and 5th grades in terms of different cognitive processes such as memory skills and visual attention. In the light of these aims, the current study will investigate the following five hypotheses:

1) Longer words and less frequent words will take longer to name by both grades due to the word length and frequency effects; however, 5th grades will be more rapid than 2nd grades in naming words.
2) Reading accuracy will be at the ceiling level (90% and above) among both grades.
3) Words and short items will take less time to be named by both grades due to the lexicality and length effects; however, 5th grades will be faster than 2nd grades in naming.
4) Phoneme tasks that have manipulations at the end will be performed more accurately by children compare to phoneme tasks that have manipulations at the beginning of a word.
5) Children from 5th grades will have better performance compare to 2nd grades in terms of memory and VAS tasks.

Chapter 2

METHOD

In the following part the detailed information about the sample of the study, the materials that were used for data collection and how the procedure was followed during the data collection will be presented.

2.1 Participants

In the current study in total 72 primary school children were recruited. However, 14 of them were removed due to technical problems encountered during the data collection and low motivation to complete the tasks. The sample of the study consisted of 58 (n = 27 girls and n = 31 boys) children from 7 different primary schools in North Cyprus. Children were recruited based on being 2nd (n = 28) and 5th (n = 30) graders and being monolingual Turkish speakers. Grade 2 group consisted of 7-8 years old children (M = 7.57, SD = .68) and grade 5 group composed of 10-11 years old children (M = 10.27, SD = .45). Before data collection parents gave their consent and were informed that their children will pass through some experimental tasks. For each child taking part in the study, at first parents were requested to complete a screening test which was named demographic information and language proficiency questionnaire (see Appendix A). All children had normal or corrected-to-normal vision and had no language impairment as reported by parents.

2.2 Materials

As previously explained for participant recruitment a questionnaire composed of demographic information and language proficiency (see Appendix A) item was used.

For applying several computerized tasks such as VAS and RAN SuperLab 4.5 software package was used. Along with SuperLab 4.5 software package, a SV-1 voice key, a microphone, and a USB voice recorder were used in order to assess RTs, measuring accuracy and double check the answers obtained from each participant, respectively. Besides these computerized tasks, children passed through some non-computerized task such as Phonological STM Digit Span and PA tasks. (See Appendix B for the completed set of tasks manual in Turkish). The computerized tasks were placed at the beginning of the experiment to capture children's attention.

2.2.1 Demographic Information and Language Proficiency Questionnaire

This questionnaire was a screening test and developed by the author and a researcher from Brunel University. It was filled by parents and included two parts. In first part parents responded to 15 questions related with their age, education and occupation and the rest of the questions were about their child's age, native language, and having second language or not. The second part was designed for assessing the language proficiency of the child. The parents evaluated their child's language proficiency in terms of different skills such as reading, writing, speaking, and listening in Turkish. For each language proficiency skills, the parent required to evaluate their child's everyday performance by using 7-point Likert scale from *extremely bad* (1) to *extremely good* (7). High scores for each language skill indicated that the child was evaluated as having a good performance.

2.2.2 Computerized Program

SuperLab 4.5 software package is very commonly used in psycholinguistic and cognitive experiments. For this current study 5 different tasks namely Visual Short Term Memory (VSTM), Rapid Atomized Naming (RAN), Visual Attention Span (VAS), Word/nonword Naming (Reading), and Raven's Colored Progressive

Matrices (RCPM), were adapted as computerized tasks to SuperLab 4.5 software package program by a researcher at Brunel University. The participants were required to complete each task individually in a quiet and not distracting setting. All data were collected by the same native Turkish speaking psychology student.

In the following part specificity of each computerized tasks will be presented in detailed.

2.2.2.1 Visual Short Term Memory (VSTM)

The VSTM experimental task was designed to assess the visual aspects of non-verbal short-term memory. Previous studies suggested that children who had difficulties in reading had poor performance on visual memory tasks emphasizing that the visual memory has a relation with reading acquisition (Samuel, 1971). As Visual Pattern Test (VPT) designed by Della Sala, Baddely, Gray, and Wilson (1997) similar computerized design was set up for VSTM task. During the task, participants were presented 27 checkerboards on the screen (see Appendix B, p. 87-97) one by one and in each of them the half squares filled in a grid. Each of the checkerboards was projected for 3000ms and across the VSTM experiment the grids increased in number and complexity. After each projection of checkerboards on the screen, the participants required reporting the previously projected checkerboard on a paper with an empty one by using a pencil. They were allowed to use rubber during the task for correction (α = .85).

2.2.2.2 Rapid Atomized Naming (RAN)

The RAN task was designed for measuring the naming speed ability of the children (Denckla & Rudel, 1976). It consisted of four sections such as naming objects (RAN_Ob), naming colors (RAN_Col), naming letters (RAN_Lett), and naming

numbers (RAN_Numb). In each section, children required naming accurately and rapidly visual symbols such as objects, colors, letters, and numbers respectively. Their naming speed ability was assessed by using 50 items arranged in 5 rows of 10 items each (α =.84). None of the five different token items for each subtest appeared consecutively on the same line. The items were presented in a 5X10 grid on the screen and at the end of the each naming; the reaction time of each participant was calculated by SuperLab 4.5 software package at the end of each task completed as their naming speed ability score.

2.2.2.3 Visual Attention Span (VAS)

The VAS was designed to assess visual capacity of participants. The methodology of VAS task followed the procedure outlined in Bosse, Tainturier, and Valdois' (2007) study. Throughout this task, 20 random five-letter strings (e.g. R H S D M) built up from 10 consonants (B, P, T, F, L, M, D, S, R, H) was presented to the participants and each letter was showed on the screen, a total of 10 times, twice in each position (α =.96). Letters were never repeated in a string and five-letter strings never matched the skeleton of a real meaningful word. At the start of each trial, there was a central fixation point which appeared during 200ms and then a blank screen was presented during 50ms. After that, 5 letter sequences were appeared horizontally centered on the fixation point for 200ms. The participants' task was to report verbally as many letters as possible that they could remember from the string immediately after it disappeared. After participants reported their responses verbally, the experimenter pressed the button in order to start the next trial. In this experimental task, before recording the data, there were four training trials with which the participants could receive feedback about the task during the experimenter task no feedback was given to them. The responses of the participants were recorded via the USB voice recorder

and by the experimenter during the task. For scoring first, the number of 5-letter strings that the participants accurately reported (maximum score= 20) and the second the number of letters that they accurately reported across the 20 trials (maximum score= 100) were obtained as 2 different scores.

2.2.2.4 Word/nonword Naming (Reading)

This task was designed to measure the participants' both word and nonword reading performances. It started with a practice trial task in which 5 words and 5 nonwords were presented in order to help the participants to be familiar to the main experiment and the voice key. During the practice trial task, the participants were allowed to get feedback about the task whereas in experimental task no feedback was given to them. The experimental task composed of 80 words which were taken from I., Raman et al. (2013) and were controlled for length (4, 5, 6, or 7 letters long), frequency (low and high), and Age of Acquisition (AoA). The Cronbach's alpha value for short low frequency words (SLF), short high frequency words (SHF), long low frequency words (LLF), and long high frequency words (LHF) was .92, .92, .88, and .91 respectively. In addition, the task included 80 nonwords which were adopted from unpublished material (Erten, Bozşahin, & Zeyrek, 2014) and were controlled for length and phonologically in vowel and consonant harmony. The Cronbach's alpha value for short nonwords (SNW) and long nonwords (LNW) were .94 and .92 respectively. During the task, the participants were presented words and nonwords one at a time in a randomized order. Each of them appeared in the center of the screen during 2000ms. This task was completed by using the SuperLab 4.5 software package in company with SV-1 voice recorder and a microphone. The reaction times of the participants were recorded with the SV-1 voice recorder and the reading

accuracy of the participants was assessed based on the responses that the USB voice recorder's records.

2.2.2.5 Raven's Coloured Progressive Matrices (RCPM)

The RCPM measures the nonverbal intellectual ability of the children. It was designed especially for children whose ages are between 5 and 11 years old (Cotton et al., 2005). The revised version of the RCPM is used in both clinical and research settings. In this study, the non-verbal intellectual ability was taken as a control variable. It was used only for eliminating those participants who had low scores from the RCPM and form a convenient sample. The RCPM consists of 36 colored patterns (they are colored in order to attract and maintain children's attention during the task) which were incomplete and they were divided into three sets of 12 (set A, Ab, and B). Within each set the patterns ordered based on increasing difficulty and set B is the most difficult one. Each of the patterns included a series of perceptual and conceptual matching exercise. The task of the participants was to match one of the six options that were presented to them on the screen and enter the corresponding probable correct match option's number to the computer. For scoring, the SuperLab 4.5 software package recorded the participants' correct responses and scored their non-verbal IQ. Scores can be between 0 and 36 (α = .98).

2.2.3 Non-Computerized Tasks

After the five computerized tasks were completed, the participants passed through five different non-computerized tasks namely Phonological STM Digit Span, Working Memory (WM), and Phonological Awareness (Phoneme Deletion, Phonemic Segmentation, and Spoonerism). These tasks conducted without using computer and participants verbally gave their answers. However, participants'

responses were recorded to USB Voice recorder. At the same time experimenter took note of correct responses.

The following part included information about specificity of five different non-computerized tasks.

2.2.3.1 Phonological Short-term Memory (PSTM) (Digit Span)

This task was required for assessing the PSTM (Digit Span) of the participants. It was similar to the Baddeley, Gardner, and Grantham-McGregor's (1995) task and adapted by a researcher at Brunel University for the present study. In this task, there were 8 trials in which the sequences of digits ranged from 2 to 8 numbers long and in each trial the digits were grouped randomly 1 to 9 (α = .74). Through each trial, a sequence of digits (e.g., 8, 3, 5) was presented aloud and the task of the participants was to repeat immediately after the verbal presentation in the same forward sequence. The first trial started with a 2 digits sequence (e.g., 2, 9) and if the participant could repeat the sequence correctly, the length of the next sequence was increased by one (e.g., 3, 8, 6). The length of the longest sequence participants could recall was evaluated as their PSTM (Digit Span) score.

2.2.3.2 Working Memory (WM)

This task was designed to measure the WM (backward digit span) of the participants. It was similar to Johnstone and El-Banna's task (1989) and adapted by a researcher at Brunel University for the current study. In this task, there were 7 trails in which the sequences of digits ranged from 2 to 7 numbers long and in each trial the digits were grouped randomly 1 to 9 (α = .76). During each trial, the experimenter presented aloud a sequence of digits (e.g., 8, 3, 5) and the task of the participants was to verbally reverse the order of the numbers after the verbal presentation. Similar to

the PSTM (digit span) task, the first trial started with a 2 digits sequence (e.g., 2, 5) and if the participant could reverse the sequence correctly, the length of the next sequence was increased by one (e.g., 5, 7, 4). The length of the longest sequence participants could recall was scored as their WM span.

2.2.3.3 Phonological Awareness (PA)

To assess the PA skills, this study included 3 different tasks namely the phoneme deletion task, the phonemic segmentation task, and spoonerism. They were adapted to the Turkish language by a researcher at Brunel University. During all three tasks of PA, there was no time limitation and the words were verbally presented by the experimenter to the participants. Lastly, before the participants began these phonological tasks, an illustration of each task was presented in order to be familiar with the procedure of the tasks. For scoring of all three tasks, the number of correct responses that the participants gave was taken into account.

2.2.3.3.1 Phoneme Deletion

The Phoneme Deletion task was similar to the Lewkowicz's (1980) task. In this task, a set of 10 words (see Appendix B, p. 116) that had not been use in the reading, phoneme segmentation, and spoonerism tasks and were selected from I., Raman et al. (2013) was presented verbally by the experimenter to the participants. The words ranged from 3 to 4 letters long. The task of the participants was to delete the initial or the final phonemes of the words and produce the resulting pseudoword. The first five words of the set of 10 words required to delete the initial phonemes of the words (i.e., delete the sound 'k' from a word 'kar' which means snow in Turkish) and the last five words needed to delete final phonemes of the words (i.e., delete the sound 'a' from the word 'elma' which means apple in Turkish) (α = .64). Score can be between 0 and 10.

2.2.3.3.2 Phonemic Segmentation

The Phonemic Segmentation is the ability to break words into individual sounds. This task was similar to the Yopp's (1995) task and consisted of 20 words (see Appendix B, p. 118) that were taken from I., Raman et al. (2013) and had not been used in the reading task (α = .79). The words were verbally presented by the experimenter and the words ranged from 3 to 5 letters long. Throughout this task, similar to Yopp's (1995) task the participants were required to sound out the letters of a given words respectively (sound out the letters of the word 'tilki' which means fox: 't-i-l-k-i'). Scores can be between 0 and 20.

2.2.3.3.3 Spoonerism

The Spoonerism task was similar to the Motley's (1973) task and composed of 40 words (20 pairs) (see Appendix B, p. 120) that were selected from I., Raman et al. (2013) and had not been used in the reading, and phonemic segmentation tasks (α = .92). The length of the words ranged between 3 to 5 letters long. During this task, 20 pairs of words were verbally presented to the participants and their task was to switch the first letters of these two words (switch the first letters of 'fare-dere' which means mouse-lake: 'dare-fere'). There are two different scoring for this task. First one was conducted for pairs. If participants gave correct answers both words in a pair, they can get 1 for that. Scores can be between 0 and 20 for this scoring. The other one was conducted for each word separately. In that, the correct answers of participants for all words were calculated. Scores can be between 0 and 40.

2.3 Procedure

In order to start the data collection of this study, Eastern Mediterranean University Psychology Department Ethics and Research Committee's required Ethical Guidelines for Conducting Research Application form was completed. After

receiving approval from Ethics and Research Committee (see Appendix C) both from the Turkish Republic of North Cyprus Ministry of Education (see Appendix D) and Primary School headmasters' approvals was obtained.

After the permission was granted, the participants were reached by the help of the headmasters of the primary schools. Additionally, the snowball technique was used for recruiting the participants from different locations in North Cyprus.

Prior to take the inform consents from parents and children, they were informed about the study and ensured that they were willing to take part in the study. The appropriate instructions of the study were provided to both the parents and children and they were assured of full confidentiality. In addition, both parents and children were informed that they may ask questions related to the study during the task or questionnaire completion. None of the parents or children approaches refused to participate to the research. Once parents signed the inform consent form (see Appendix E) they continued on the demographic information and the language proficiency questionnaire, which took them approximately 10 minutes to complete. The inform consent adapted to children's level of understanding, explaining the procedure with different symbols was signed by each participant (see Appendix F).
First each child was familiarized with the technology and then five different computerized tasks and five different non-computerized tasks were run in a systematic schedule as presented in the experimental manual in the appendix B. In average it took 60 minutes to complete the computerized tasks. Overall the data collection process took 7 months.

After the data collection process completed the data were statistically analyzed by using Statistical Package for Social Science (SPSS-Version 20).

Chapter 3

RESULTS

In line with the aims of the study, the collected data were analyzed in the following section. As mentioned in the introduction and methodology parts it was an experimental study so that it requires further analysis beyond the analysis of hypothesis for understanding the results better. Therefore, in the following section first the descriptive and correlation results will be given. Then, the results of the each hypothesis will be given together with the additional findings if it is required. The findings were obtained by conducting different statistical tests such as t-test comparison, correlation analysis, and mixed ANOVA.

3.1 Descriptive and Correlation Results

Language Proficiency as screening test suggested that children were good as reported by their parents in terms of four different language skills (see Table 1).

Table 1: Means, Standard Deviations, Minimum scores and Maximum scores of children for Language Proficiency Questionnaires

Categories	M	SD	min	max
Reading	6.16	1.01	3	7
Writing	6.21	.97	3	7
Speaking	6.50	.79	3	7
Listening	6.16	.97	2	7

In addition, as a control variable RCPM results showed that there was no deviant scores and no significant difference between 2nd and 5th grades in terms of their nonverbal intelligence scores (56) = -1.60, $p > .05$ (see Table 2).

Table 2: Results of independent t-tests and Descriptive Statistics of Grades based on the RCPM, RAN tasks, Phoneme Deletion, Phonemic Segmentation, and Spoonerism scores

	Grade						
	2nd Grade		5th Grade				
	M	SD	M	SD	t	min	max
RCPM	21.46	4.48	23.27	4.11	-1.60	14	36
RAN_obj	66.27	15.15	54.27	10.18	3.56**	34.07	98.44
RAN_col	61.98	14.37	44.93	9.43	5.38**	33.97	92.90
RAN_lett	36.83	8.19	26.72	5.19	5.66**	19.10	58.34
RAN_numb	40.79	7.34	27.69	4.59	8.21**	20.10	61.79
Phoneme Deletion	8.79	1.29	9.47	.86	-2.38*	6	10
Phonemic Segmentation	15.96	3.16	18.63	1.81	-3.98**	8	20
Spoonerism	5.80	5.16	8.64	5.33	-1.98	0	20

Note: * $p < .05$, ** $p < .01$

Pearson correlation results suggested that all tasks of RAN namely RAN_obj, RAN_col, RAN_lett, and RAN_numb were significantly correlated each other (see Table 3). The highest correlation was between RAN_lett and RAN_numb, $r = .76$, $p < .01$ whereas the lowest correlation was between RAN_obj and RAN_numb, $r = .52$, $p < .01$.

Table 3: Correlations between the four tasks of RAN of whole sample

Measures	1	2	3	4
1. RAN_obj	-			
2. RAN_col	*.61***	-		
3. RAN_lett	*.60***	*.61***	-	
4. RAN_numb	*.52***	*.64***	*.76***	-

Note: ** Correlation is significant at the 0.01 level

The comparison 2nd and 5th grades in terms of RAN tasks showed that 2nd grade children were significantly slower than 5th grade children in naming objects t (56) = 3.56, $p < .01$, colors t (56) = .5.38, $p < .01$, letters t (56) = 5.66, $p < .01$, and numbers t (56) = 8.21 $p < .01$. The significant results were presented with Table 2.

In addition, the ranking for the RAN tasks speed in millisecond of children was RAN_lett < RAN_numb < RAN_col < RAN_obj. A one-way repeated ANOVA was conducted to test the effects of RAN tasks differences on naming speed performance of children, for naming objects, colors, letters, and numbers. The results showed that there was a significant effect of RAN task differences on naming speed performance F (2.39,135.95) = 187.21, $p < .01$, $\eta 2 = .77$. RAN_lett (M = 31.60, SD = 8.46) was named significantly rapidly than other tasks. Also, the difference between RAN_numb (M = 34.01, SD = 8.93) and RAN_col (M = 53.16, SD = 14.73) was statistically significant. Similarly, the difference between RAN_col and RAN_obj (M = 60.06, SD = 14.07) (see Table 4).

Table 4: Bonferroni Comparison for RAN tasks in terms of naming speed performance

Comparisons	Mean Speed Difference (ms)	Std. Error	95% CI Lower Bound	95% CI Upper Bound
RAN_Lett vs RAN_Numb	-2.41*	.79	-4.58	-.24
RAN_Numb vs RAN_Col	-19.15*	1.48	-23.21	-15.09
RAN_Col vs RAN_Obj	-6.89*	1.67	-11.45	-2.34

Note: * $p < 0.05$

For the PA tasks namely Phoneme Deletion, Phonemic Segmentation, and Spoonerism, Pearson correlation results showed that all tasks had significant correlation with each other. The highest correlation was between Phonemic Segmentation and Spoonerism, $r = .55$, $p < .01$ whereas the lowest correlation was between Phoneme Deletion and Spoonerism, $r = .44$, $p < .01$. Also, there was a significant correlation between Phoneme Deletion and Phonemic Segmentation, $r = 53$, $p < .01$.

In addition, results suggested that there was significant difference between performance of children in 2nd and 5th grades in phoneme deletion task t (56) = -2.38, $p = .02$ and phonemic segmentation task t (56) = -3.98, $p < .01$. For both tasks, 5th grade children had better performance compare to 2nd grade children. However, for spoonerism task although there was a difference between grades, it was not statistically significant, t (51) = -1.98, $p > .05$ (see Table 2).

Lastly, Pearson correlation results for the relation between words and nonwords naming speed showed that all groups of words and nonwords namely SLF words, SHF words, LLF words, LHF words, SNW, and LNW were correlated significantly (see Table 5). The highest correlation was between the SHF words and the LHF

words, $r = .93$, $p < .01$. Whereas the lowest correlation was between the SHF words and LNW, $r = .78$, $p < .01$.

Table 5: Correlations between the words and nonwords of whole sample

Measures	1	2	3	4	5	6
1. SHF	-					
2. LHF	*.93***	-				
3. SLF	*.87***	*.86***	-			
4. LLF	*.84***	*.84***	*.89***	-		
5. SNW	*.91***	*.88***	*.90***	*.86***	-	
6. LNW	*.78***	*.82***	*.80***	*.83***	*.84***	-

Note: ** Correlation is significant at the 0.01 level

The ranking for the speed of naming words and nonwords in millisecond was SHF < SLF < SNW < LHF < LLF < LNW. A one-way repeated ANOVA was conducted to test the effects of different item groups on naming speed performance of children. The results showed that there was a significant effect of different item groups on naming speed performance F (3.22, 183.41) = 908.87, $p < .01$, $\eta 2 = .94$. SHF words (M = 647.84, SD = 101.85) were named significantly rapidly compare to all other item groups. Moreover, when the order of these item groups SHF < SLF (M = 799.70, SD = 101.85) < SNW (M = 848.36, SD = 130.53) < LHF (M = 915.09, SD = 142.97)< LLF (M = 1070.93, SD = 140.71)< LNW (M = 1298.29, SD = 172.18) was taken into account, it can be said that the difference between groups was statistically significant (see Table 6).

Table 6: Bonferroni Comparison for item groups in terms of naming speed performance

Comparisons	Mean Speed Difference (ms)	Std. Error	95% CI Lower Bound	95% CI Upper Bound
SHF vs SLF	-151.87*	6.96	-173.19	-130.54
SLF vs SNW	-48.66*	7.63	-72.64	-24.69
SNW vs LHF	-66.73*	8.82	-93.74	-39.72
LHF vs LLF	-155.84*	10.66	-188.49	-123.19
LLF vs LNW	-227.36*	12.65	-266.12	-188.60

Note: * $p < 0.05$

3.2 Hypotheses

3.2.1 Hypothesis 1: 'Longer words and less frequent words will take longer to name by both grades due to the word length and frequency effects; however, 5th grades will be more rapid than 2nd grades in naming words.'

To test the first hypothesis a 2 (Grade: 2nd vs 5th) X 2 (Word length: Short vs Long) X 2 (Word frequency: Less vs High) mixed ANOVA with repeated measures on the second and third factors was conducted. The results suggested that there was a significant main effect of word length on word reading speed F (1,56) = 2055.65, $p <$ .01, $\eta 2$ = .97. Short words (M = 726.75, SD = 6.11) were named significantly rapidly than long words (M = 996.95, SD = 9.57). In addition, the results showed that there was a significant main effect of word frequency on word reading speed, F (1,56) = 424.34, p < .01, $\eta 2$ = .88. More frequent words (M = 785.00, SD = 8.10) required significantly less time to be named compare to less frequent words (M = 938.70, SD = 8.56). The main effect of grade was also significant F (1,56) = 181.36, p < .01, $\eta 2$ = .76. 5th grades (M = 761.51, SD = 10.35) were significantly faster than 2nd grades (M = 962.19, SD = 10.72) in terms of reading speed performance. Additionally, the

results suggested that there was a significant interaction between word length and grade, F (1,56) = 21.77, p < .01, $\eta 2$ = .28 in terms of word reading speed. This interaction indicated that there was a significant difference between 2nd and 5th grades when they read long words. Children from 5th grade (M = 882.71, SD = 13.29) were more rapid than children from 2nd grade (M = 1111.20, SD = 13.76). However, for the short words the differences between 2nd (M = 813.19, SD = 8.78) and 5th (M = 640.31, SD = 8.47) grades was significantly smaller compare to long words (see Figure 1).

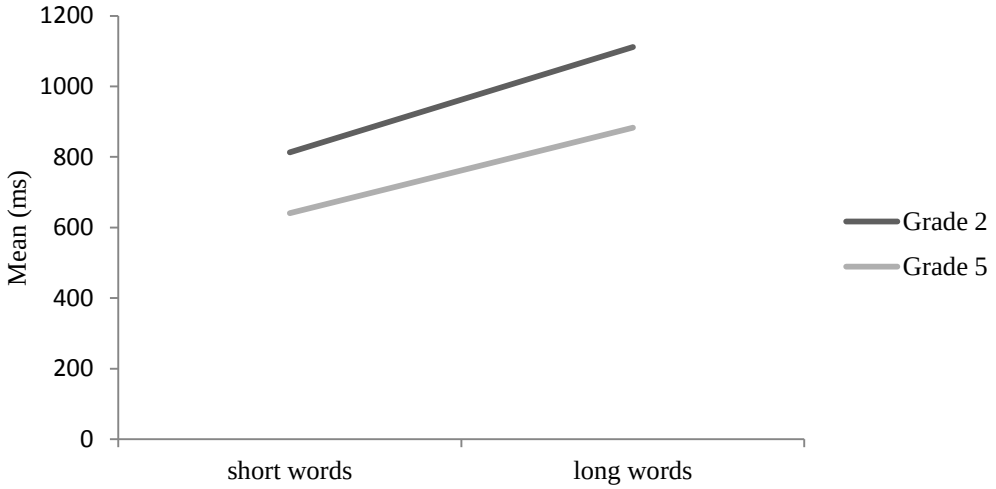

Figure 1: Comparison of 2nd and 5th grades' reading speed mean scores in millisecond (ms) for short and long words.

However, the results showed that the interaction between word frequency and grade was not significant, F (1,56) = .39, p > .05. Similarly, the word length and word frequency interaction did not reach the significance level in terms of word reading speed, F (1,56) = .13, p > .05. Lastly, the results suggested that the word length, word frequency, and grade interaction was not statistically significant, F (1,56) = .88, p > .05.

3.2.2 Hypothesis 2: 'Reading accuracy will be at the ceiling level (90% and above) among both grades.'

Results of the second hypothesis showed that both 2nd and 5th grades' reading accuracy performance were at the ceiling level except for LNW (see Figure 2). In average children had 93.6% reading accuracy. The more accurately named groups were SHF and LLF words whereas the least one was LNW.

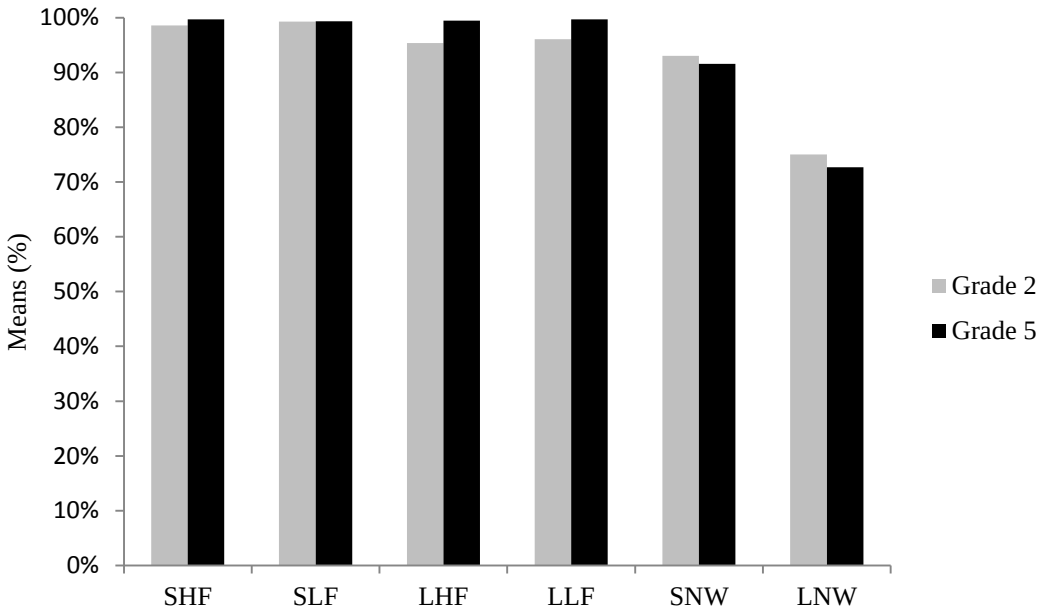

Figure 2: Reading Accuracy mean scores of 2nd and 5th grades in percentages (%)

3.2.3 Hypothesis 3: 'Words and short items will take less time to be named by both grades due to the lexicality and length effects; however, 5th grades will be faster than 2nd grades in naming.'

To test the third hypothesis two separate 2 (Grade: 2nd vs 5th) X 2 (Lexicality: Word vs Nonword) X 2 (Length: Short vs Long) mixed ANOVAs with repeated measures on the second and third factors were conducted. The reason of conducting two ANOVAs was that it is impossible to test the nonwords in terms of their frequency level so that the low and high frequent words were required to be tested separately.

First analysis was done for low frequent words. The results suggested that there was a significant main effect of lexicality on reading speed, F (1,56) = 292.69, $p < .01$, $\eta 2$ = .84.Words (M = 938.70, SD = 8.56) were named significantly faster than nonwords (M = 1077.42, SD = 10.97). Additionally, the results showed that there was a significant main effect of length on reading speed (ms), F (1,56) = 1760.63, $p < .01$, $\eta 2$ = .97. Short items (M = 827.48, SD = 6.92) were named significantly faster than long items (M = 11.88, SD = 12.25). Also, the main effect of grade were significant F (1,56) = 145.93, $p < .01$, $\eta 2$ = .72. Children from 5th grades (M = 899.73, SD = 12.46) were significantly faster than 2nd grades (M = 1116.39, SD = 12.90). Furthermore, the results suggested that there was a significant interaction between lexicality and grade in terms of reading speed, F (1,56) = 6.467, p = .01, $\eta 2$ = .10. This interaction showed that when children read words the grade difference in terms of reading speed was statistically significant. Children from 5th grade (M = 840.68, SD = 11.90) read more rapidly than those who were in 2nd grade (M = 1036.72, SD = 12.32). On the other hand, the difference between 2nd (M = 1196.06, SD = 15.78) and 5th (M = 958.78, SD = 15.25) grades was significantly small for nonwords (see Figure 3).

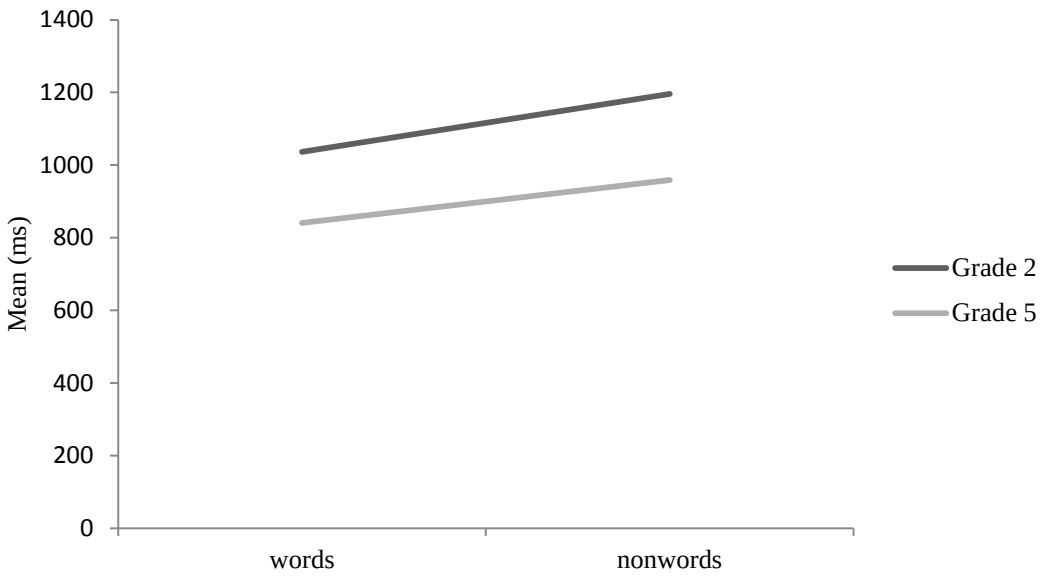

Figure 3: Comparison of 2nd and 5th grades' reading speed mean scores in millisecond (ms) for words and nonwords.

In addition, results suggested that there was a significant interaction between lexicality and length in terms of reading speed, F (1,56) = 205.01, p = .00, $\eta 2$ = .79. This interaction represented that for naming long items there was a significant difference between word and nonword naming speed. Long words (M = 1074.71, SD = 11.56) were named more rapidly than long nonwords (M = 1302.57, SD = 15.68). Conversely, the difference between words (M = 802.69, SD = 7.08) and nonwords (M = 852.27, SD = 8.40) naming was significantly small for short items naming (see Figure 4). However, the interaction between length and grade in terms of reading speed was not significant, F (1,56) = 3.874, p > .05.

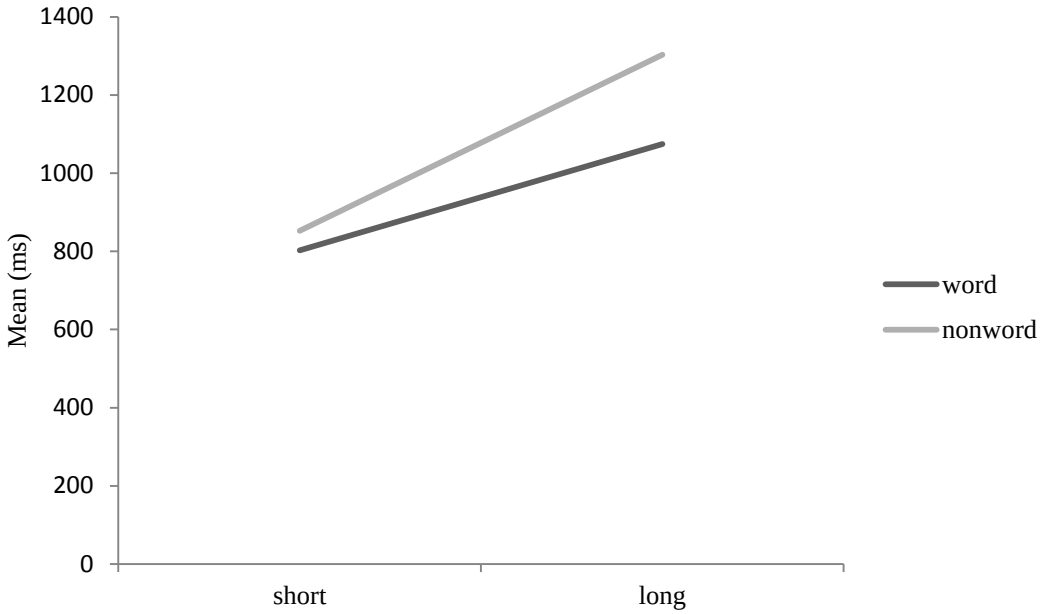

Figure 4: Comparison of short and long items reading speed mean scores in millisecond (ms) for words and nonwords.

The second analysis was done for high frequent words. The results suggested that there was a significant main effect of lexicality on reading speed, F (1,56) = 1173.93, p = .00, $\eta 2$ = .95. Words (M = 785.00, SD = 8.10) were read significantly faster than nonwords (M = 1077.42, SD = 1097). Furthermore, the main effect of length was statistically significant, F (1,56) =1993.71, p = .00, $\eta 2$ = .97. Children spend significantly more time to name long items (M = 1110.88, SD = 11.55) compare to short items (M = 751.54, SD = 6.96). The main effect of grade was also statistically significant F (1,56) = 163.75, p = .00, $\eta 2$ = .75. 5th grade (M = 820.56, SD = 12.02) read rapidly than 2nd grades (M = 1041.86, SD = 12.44). In addition, the results suggested that the interaction between length and grade was statistically significant, F (1,56) = 7.299, p = .01, $\eta 2$ = .12. This interaction showed that there was a significant grade difference in reading speed performance when children were named long items. Children from 5th (M = 989.36, SD = 16.06) grade were named more rapidly than those who were from 2nd (M = 1232.41, SD = 16.62) grade. However, for short item naming although there was a difference between 2nd (M = 851.32, SD

= 10.01) and 5th (*M* = 651.76, *SD* = 9.67) grades reading speed, this grade difference was statistically smaller compare to long items (see Figure 5).

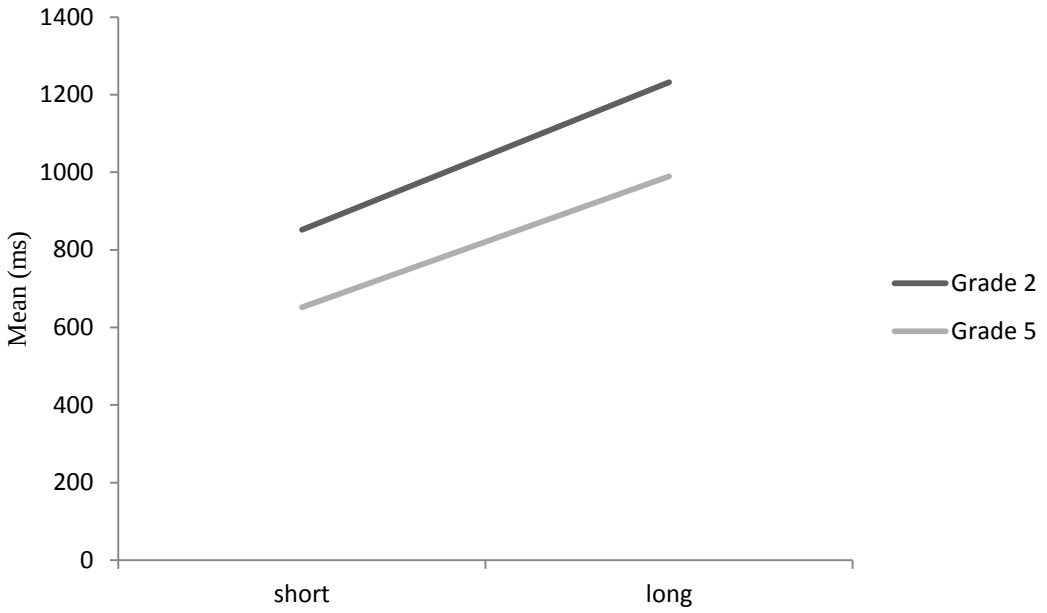

Figure 5: Comparison of 2nd and 5th reading speed mean scores in millisecond (ms) for short and long items.

Moreover, the results suggested that there was a significant interaction between lexicality and length in terms of reading speed, F (1,56) = 234.527, p = .00, $\eta 2$ = .81. This interaction indicated that when children read long items the difference between naming speed of words and nonwords was statistically significant. Long words (*M* = 919.19, *SD* = 10.32) were named more rapidly than long nonwords (*M* = 1302.57, *SD* = 15.69). On the other hand, the difference between naming speed of words (*M* = 650.81, *SD* = 7.01) and nonword (*M* = 852.27, *SD* = 8.40) was significantly small for short items (see Figure 6).

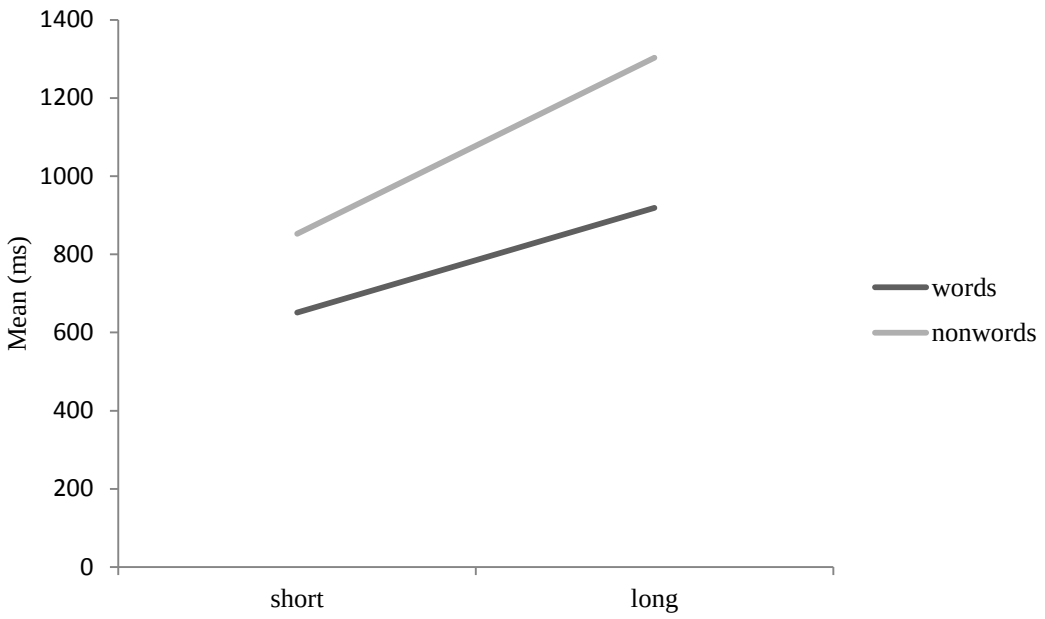

Figure 6: Comparison of short and long items reading speed mean scores in millisecond (ms) for words and nonwords.

3.2.4 Hypothesis 4: 'Phoneme tasks that have manipulations at the end will be performed more accurately by children compare to phoneme tasks that have manipulations at the beginning of a word.'

To test the fourth hypothesis a paired sample t-test was performed between the accurate performance of words have manipulations at the end and the beginning. The statistical analysis reveals the opposite result; that is, the words that have manipulations at the beginning (M = 4.66, SD = .64) were performed better than the words have manipulations at the end (M = 4.52, SD = .75) but this difference was not statistically significant t (57) = 1.16, $p > .05$.

3.2.5 Hypothesis 5: 'Children from 5th grades will have better performance compare to 2nd grades in terms of memory and VAS tasks.'

For testing the fifth hypothesis, two separate independent t-tests were conducted. First one was performed between VAS performance and grades. Results suggested that there was a significant difference between 2nd and 5th grades in VAS

performance, t (56) = -2.69, p = .01. Children who were 5th grade performed significantly better than those who were 2nd grade (see Table 7). Second one was conducted between memory performances for each tasks namely VSTM, PSTM, and WM and grade. The results showed that 2nd and 5th grades children significantly differed on VSTM t (56) = -4.42, p < .01 and WM t (56) = -3.17, p < .01 tasks. For both VSTM and WM tasks 5th grades had significantly better performance compare to 2nd grades. However, the results suggested that in PSTM task the difference between the performance of 2nd and 5th grade children was not statistically significant, t (56) = -1.00, p > .05 (see Table 7).

Table 7: Results of independent t-test and Descriptive Statistics Grades based on the PSTM, VSTM, WM, and VAS scores

Variables	Grade						
	2nd Grade		5th Grade				
	M	SD	M	SD	t	min	max
PSTM	4.68	1.16	4.97	1.03	-1.00	3	7
VSTM	9.82	2.78	13.77	3.88	-4.42**	4	24
WM	2.18	.77	2.93	1.01	-3.17**	1	5
VAS	56.86	12.74	67.20	16.17	-2.69*	24	94

Note: * p < .05, ** p < .01

Chapter 4

DISCUSSION

The present study mainly aimed to add more findings to the literature about reading acquisition of monolingual Turkish speaking primary school-age children. On the basis of this main aim, the current study was conducted to find answers to the following claims. The first one was that from the 2nd grade children will reach the ceiling level (90% and above) in terms of reading accuracy performance. The results were in accordance with this claim such that reading accuracy performance did not differ between 2nd and 5th grades and both grades had more than 90% reading accuracy except for LNW. Children from 5th grade had the highest score which was 99.67% for SHF and LLF whereas the lowest score was 72.71% for LNW. In average, both 2nd and 5th grades' performances were at the ceiling level with 93.6% reading accuracy for all the reading tasks tested. This result supported the findings coming from the longitudinal study of Öney and Durgunoğlu (1997). The authors claimed that the rapid increase in reading accuracy performance of Turkish speaking children is due to the simplicity of grapheme-phoneme correspondence system of Turkish language. This relationship between orthography and phonology is also supported by Raman and colleagues (Raman et al., 1996; Raman, 2006; 2011).

For the PA development which is also related with the phonological development, it was claimed that in transparent orthographies PA development reaches the ceiling level relatively soon after the beginning of reading training due to the Turkish

language characteristics (Aro, 2004). However, the results of current study did not support this claim. For instance, for the phoneme deletion and the phonemic segmentation tasks there was significant difference between 2nd and 5th grades where 5th grades performed significantly better than 2nd grades. Furthermore, 5th grades reached the ceiling level in both tasks with 94.7% and 93.15% respectively. However, 2nd grades (87.90% and 79.50%) did not reached the ceiling level in PA tasks in spite of their good performance. One possible explanation of these results can be the order of the tasks. These PA tasks were towards the end of the experiment which may increase the risk of the fatigue effect which can cause drop in children's performance (Süss & Schmiedek, 2000). Children can be bored and loss their interest towards the end of the experiment so their performance on these task can decrease.

Phonological development findings were strengthened by RAN tasks (RAN_Obj, RAN_Col, RAN_Numb, and RAN_Lett). First of all, findings showed that there was a significant difference between 2nd and 5th grades in terms all of the RAN tasks. For all RAN tasks, 5th grades had significantly better performance compare to 2nd grades. The RAN performance of children shows their ability in how quickly lexical representations of written words are accessed (Dandache et al., 2014), and since 5th grades had more experience and practice compare to 2nd grades accordingly they can process the items for naming more rapidly than 2nd grades. In addition, the current findings showed that the most slowly named task was RAN_Obj whereas the most rapidly named task was RAN_Lett. One possible explanation for this can be that objects are more abstract and require more cognitive efforts; for example, children need to see the objects first and then they need to realized its shape and color, what it is used for, is it living or nonliving object, and etc. Therefore, they need more time to

be named compare to letters. However, for RAN_Lett task due to transparency of Turkish language and the simplicity of relationship between orthography and phonology children can easily and rapidly match the sounds with letters. Lastly, it can be said that children already had the sounds of letters storage in their lexicon from the beginning of reading acquisition process; thus, naming letters took less time compare to other tasks.

When the results of PA tasks and RAN tasks are taken into account, it can be said that phonological development can require time to develop fully among Turkish speaking children. With age phonological ability of children can become an automatic process but it needs adequate practice and experience.

The second claim that the current study tried to find an answer was whether the psycholinguistic effects studied among Turkish speaking adults such as lexicality effect, word frequency effect, and length effect are present for the Turkish speaking monolingual children. In this part, the results of each psycholinguistic effect will be taken into account separately. Starting with the result of word frequency effect, the present study suggested that the word reading speed performance of Turkish speaking children was influenced by the word frequency. That is, more frequent words were named significantly more rapidly than low frequent words. Similar findings on Turkish speaking adults were suggested by Raman et al. (2004). These findings both on adults and children suggesting that repeated exposure to the high frequent words since childhood period make them easier to read. This repeated exposure to the high frequent words experience lead to the development of various kinds of processes and improvement of the connection between orthographic,

phonological, and semantic representation (Fiez et al., 1999). Therefore, children can easily name the more frequent words while reading.

In addition, the current results showed that the lexicality effect (words vs nonwords) was applicable for Turkish speaking children both for high and low frequent words. In other words, nonwords took significantly more time to name compare to words. Literature suggested two routes; lexical and nonlexical routes for naming words and nonwords (Baluch, & Besner, 1991) and the transparency of languages influences which route is used while naming words and nonwords. Transparent orthographies (i.e., Turkish) use the relations between grapheme and phoneme whereas opaque languages (i.e., English) based on lexical knowledge while naming. In opaque languages, children need to shift to the other route (nonlexical route) for reading words and nonwords together. However, for transparent orthographies for adults there is no need for shifting because both words and nonwords can be read with nonlexical route (Raman et al., 2004). Based on this suggestion, there should be no significant difference between naming speed of words and nonwords in Turkish speaking children as well. However, the results of the present study found significant effect of lexicality on reading speed performance. Moreover, the current results revealed that lexicality effect was influenced by grade. That is, 5^{th} grades were significantly faster than 2^{nd} grades in terms of naming both words and nonwords. While all children were informed at the beginning of the reading task that there will be words that they did not see before, 5^{th} grades had better performance in naming nonwords compared to 2^{nd} grades. This can be due to some extent grapheme-phoneme correspondence simplicity of Turkish language and academic experience. Namely, 5^{th} grades had more practice in naming words compare to 2^{nd} grades;

therefore, they become more expert in terms of phonology and orthography relationship. This practice also make easy to name nonwords rapidly although they have no lexical entry before.

The present study also found that length effect (short words vs long words) had significant influence on reading speed performance of children. The results revealed that Turkish speaking children read short words significantly more rapidly than long words. This finding is in accordance with the Dutch study which suggested that a word with more letters, phonemes, syllables or morphemes has more complex structure; therefore, these kinds of words require more time to be named (Groot et al., 2002). Additionally, the current results showed that although both 2nd and 5th grades were significantly faster in naming short words comparing to long words, the performance of 5th grades in reading long words were as rapid as their performance in reading short words. However, for 2nd grades there was a remarkable difference between reading long and short words. Similarly, in Italian language authors (Spinelli et al., 2005; Zoccolotti et al., 2005) observed length effect, however with age this effect dropped dramatically. Spinelli et al. (2005) suggested that with age children develop their reading skills and some of these skills become automatic processes. Therefore, they become less sensitive to the number of letters during later stages compare to beginning stages of reading acquisition.

In the light of these findings about psycholinguistic effects, it can be said that all psycholinguistic effects had significant influence on the reading speed performance of Turkish speaking children. However, the most meaningful one was length effect where even short nonwords were named significantly rapidly than long words. Additionally, the findings showed that regardless the frequency of words (high vs

low) children named short items significantly faster than long items. As previously stated, although short nonwords had no lexical entry before, they were named significantly rapidly than long words. This can be explained with the dual processing routes proposed by Coltheart (2006) who suggested that there are two routes for visual word recognition; one for translating letters to sounds (phonological route) and another for automatic word recognition (lexical route). Reading short words can require automatic word recognition so they can be reached rapidly. However, for long words although they can be named automatically, they can sometimes require phonological process. On the other hand, short and long nonwords can be named with phonological route because they have no lexical entry before. Therefore, they need more time to be named as lexicality effect suggest. Indeed, the current findings showed that the most rapidly named one was short words and the most slowly named one was long nonwords. The present findings showed that although short nonwords had no previous lexical entry, contrary to above model they were read more rapidly than long words. The reason of this finding can be the transparency of Turkish language and the simplicity of the relationship between orthography and phonology. Thus, matching letters to sound is easy in Turkish language and this makes short nonwords easy to be read more rapidly than long words. As a result, it can be said that for Turkish speaking children the length of words and nonwords is the most crucial psycholinguistic effect for reading acquisition although other psycholinguistic effect was also present. As the order of the words and nonwords for reading speed performance of children showed (from the most rapid named to the least, SHF < SLF < SNW < LHF < LLF < LNW), length effect was the most significant psycholinguistic effect for Turkish speaking children in reading speed.

In addition, the current results showed that there was an effect of grade difference in reading speed performance. Namely, 5th grades were more rapid than 2nd grades in reading. This can be explained with the repeated practice and experience. When both grades compared in terms of experience in reading, 2nd grades had less reading experience than 5th grades. Therefore, 5th grades become more rapid in reading than 2nd grades.

The third claim that the current study tried to find answer was that there are differences between 2nd and 5th grades in terms of different cognitive processes such as memory skills and visual attention. Three memory skills were assessed in the current study; VSTM, WM, and PSTM. The findings showed that there was a significant difference between 2nd and 5th grades in VSTM, 5th grades performed significantly better than 2nd grades. Although VSTM which is crucial for storing the orthography (symbols) continues to develop during the later stages of reading acquisition process, children have better VSTM performance due to the repeated practice. Similarly, for WM which was required for combining and manipulating sounds and symbols, the present findings suggested that 5th grades performed significantly better than 2nd grades. The reason of this difference can be also explained by the improvement in WM skills of 5th grades with repeated practice which is in accordance with de Jung's (1998) suggestion that at the beginning stages of reading acquisition word decoding is slow and requires more effort compare to later stages. However, for PSTM no significant difference was found between 2nd and 5th grades.

Besides memory skills the current findings showed that there was significant difference between grades in visual attention performance which was assessed with

VAS task. Similar to WM and VSTM, in VAS task 5th grades performed better than 2nd grades. The current study results are supported by Siegel and Ryan (1989) findings where cross grade difference for VAS performances of children are observed. This result is also in accordance with the Lanberge and Samuel's (1974) findings. Obviously, with practice and experience visual attention skills can be improved and become automatic.

Lastly, the current study tried to find answer whether phoneme tasks that have manipulations at the end were performed more accurately by Turkish speaking children compare to the phoneme tasks that have manipulation at the beginning of the word. Opposite finding obtained showing that phoneme tasks that have manipulations at the beginning were performed better than phoneme tasks that have manipulation at the end of the word. However, this difference did not reach a significance level. This can be due to the methodological issue such that in phoneme deletion task there were in total 10 items 5 for manipulation at the end of the word and 5 for manipulation at the beginning of the word. The number of items for phoneme manipulation may not be enough for this comparison. Additionally, it can be explained with ceiling level of reading accuracy due to the transparency of Turkish language and simplicity in orthography and phonology relationship. Since, children performed at the ceiling level even they were 2nd grade, deleting phonemes from the beginning and at the end of the words and manipulating words cannot be difficult for both grades.

Furthermore, the current results showed that 2nd and 5th grades did not differ in terms of nonverbal intelligence. As a result of this finding, it can be said that the nonverbal intelligence is stable over time. Also, it suggested that different educational system

can be resulted in differences in nonverbal intelligence scores (Raven, 2000). Therefore, it can be said for the present sample that all children were educated in a same educational system and finding no differences between their nonverbal scores is not surprising.

Beside these findings above, the current study has some limitations like every study. First limitation is about the sample size. Fifty-eight primary school-age children participated to the present study. This small sample size limits the generalizability of the findings. With larger sample size the study would give more representative results and increase the generalizability of the findings.

Second possible weakness of the current study is the limited items in parts of the phoneme deletion task (manipulations at the end and at the beginning of the words). There were 5 items for each manipulation and this small number of items can limits the findings. Therefore, having more items for each task would affect the results and may help for finding significant results for this issue.

Third potential limitations of the present study are the excessive number of experimental tasks and the long duration of the experiment. There were 10 tasks in total and it approximately took 60 minutes to complete all tasks but this duration can vary based on the children's individual performance. Furthermore, some of the task took longer time to be completed than others. At school, regular class duration takes 50 minutes and children expected to pay attention to the subject matter during that duration. Nevertheless, they are not expected to pay intense consecutive attention throughout this duration. Sometimes they are allowed to talk with friends and even to stand up during the class time. For that reason, 60 minutes duration attention can be

long for these children and breaking within the same day the experiment into 2 or 3 sessions by giving small pauses would increase their attention. Even though, special care was given in order to design entertaining tasks, some children evaluated these tasks as boring. For those children it may be difficult to focus on the task. For instance, in the current study the computerized tasks were the first 5 tasks whereas non-computerized tasks were through the end of the experiment. As a result, at the beginning of the experiment children enjoyed and were motivated to participate more than at the end, especially when non-computerized tasks started. This situation can also influence their attention through the end of the experiment. The order of the tasks is also important for getting reliable results; for example, in the present study the cognitively demanding tasks like PA tasks were at the end of the experiment. Children would lose motivation and pay limited attention to these tasks. Thus, considering the order of the tasks is also an important issue.

For eliminating the influence of the order of the tasks on results counter balancing can be done. However, for the current study this could not be done due to the technical limitations. For counter balance, varied computer programs need to be developed so there should be more complex technical procedure. For further research this technical limitation need to be eliminated for more reliable results.

The current study has presented a basis for the future investigations in terms of reading acquisition in Turkish language. For further investigations, possible developments could be made to the present methodology as suggested in the limitation part. The present results can also be informative for the educators at schools. For example, the current results suggested that reading accuracy of Turkish speaking children reaches the ceiling level after one year of reading training due to

the characteristics of Turkish language. However, the reading speed performance differed between grades. Fifth grades read more rapidly than 2nd grades. This knowledge is significant for the educators at schools especially for the educators who train children in reading acquisition. If the educators have this knowledge, they can easily realize children with reading difficulties from their slowness in reading. Reading speed performance can give more information about reading difficulties among Turkish speaking children. Therefore, the future studies should focus more on reading speed performance of children rather than the reading accuracy in Turkish language. Reading speed performance on Turkish speaking children would contribute more to the existing literature findings.

Furthermore, with these kinds of experimental studies, the educators can have the knowledge that children with reading difficulties can vary in terms of the problems that they have. The educators learn that they need to observe these children and find out what kinds of mistakes that they make. Later, the educators can develop individual programs for these children based on their problems. They also prepare some strategies and educate these children how they use these strategies while reading. However, before that the educators need to be sure that the problem of children is not due to the intelligence.

It was suggested that children with reading difficulties can have problems in memorizing the sounds of letters (PSTM), storage of the visual symbols of the language (VSTM), matching symbols to sounds (WM), or attending the visual symbols while reading. After the educators decide which problem a child has, they can develop individual programs or strategies to improve that child's memory or visual attention skills.

Having knowledge that how the reading acquisition process among normal developing children is and which cognitive processes affect reading acquisition, is also important for the Ministry of Education. Based on these kinds of experimental findings the Ministry of education can develop some special after school programs for children with reading difficulties and train some educators for specializing in that field. With these programs and educators children encounter well the problems that they have while acquiring reading.

As a general suggestion, these experimental findings should be available for the educators at schools in order to benefit while training children. The Ministry of Education should also promote the educator to apply these significant findings in their professional practices at schools.

On the other hand, nowadays the training in reading begins at the preschool years. Therefore, during these years children need to be encouraged to play games which involve activities that relate with memory and attention. With these playing activities they can improve their cognitive skills which have relation with reading acquisition. During the reading acquisition process, this may decrease the chance that having problems due to the repeated practice and experience and improvement in preschool years.

In conclusion, the current study suggested that Turkish language with its transparent orthography and simplicity in grapheme-phoneme correspondence characteristics bring the reading accuracy of Turkish speaking children at the ceiling level after one year of reading training. However, the reading speed of children is influenced by the psycholinguistic effects such as lexicality effect, word frequency effect, and length

effect (Raman et al., 2004). Among these psycholinguistic effects on the reading speed performance of Turkish speaking children the length effect was the most significant one. Therefore, while studying reading acquisition and reading impairments in Turkish language focusing reading speed rather than reading accuracy would be more appropriate. The importance of cognitive processes such as memory and visual attention on reading acquisition and improvement of these processes with age, repeated practice and experience were other significant findings that this study showed.

In all, as Poe et al. (2004) and Snow et al. (1998) suggested that reading acquisition is a significant process for the future success in different domains such as social and economic life. Therefore, studying the cognitive processes and the factors that affect the reading acquisition is essential. These kind of empirical studies are informative for the educators as well while they are training children for reading acquisition. Being aware of the different possible causes of reading difficulties may help the educators to understand the needs of the children and develop adequate individual educational programs. With this awareness and informative studies the educators can be more supportive for children at schools.

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APPENDICES

Appendix A: Demographic Information and Language Proficiency Questionnaire

Türk Dilini Kullanım Anketi

Lütfen aşağıdaki soruları en doğru şekilde cevaplayınız.

Ebeveyn ile ilgili genel sorular

1) Kaç yaşındasınız? _____
2) Uyruğunuz: KKTC □ TC □ KKKT+TC □ Diğer (Belirtiniz): _____
3) En son aldığınız eğitim diploması:
   Okur-yazar değilim □
   Okur-yazarım ancak ilkokul diplomam yok □
   İlkokul □ Ortaokul □ Lise □ Lisans □ Yüksek Lisans □ Doktora □
   (yıl) _____
4) Mesleğiniz nedir?_____
5) Kocanızın/karınızın/eşinizin yaşı:_____
6) Uyruğu : KKTC □ TC □ KKKT+TC □ Diğer (Belirtiniz):
7) Aşağıdakilerden hangisi kocanızın/karınızın/eşinizin en son aldığı eğitim diplomasıdır:
   Okur-yazar değilim □
   Okur-yazarım ancak ilkokul diplomam yok □
   İlkokul □ Ortaokul □ Lise □ Lisans □ Yüksek Lisans □ Doktora □
   (yıl) _____
8) Eşinizin mesleği nedir?_____

Çocuk hakkında genel sorular

1) Çocuğun yaşı ? _____
2) Çocuğun cinsiyeti: Kız □ Erkek □
3) Doğum Yeri: KKTC □ Türkiye □ Diğer; _____
4) Kıbrıs'ta ne kadar zamandır yaşıyorsunuz (yıl)? _____
5) Anadili nedir?_____

6) Türkçe'den başka bir dil konuşabiliyor mu? Evet □ Hayır □

Türkçe'de Yeterlilik:

	Çok yetersiz	Yetersiz	Biraz yetersiz	Ne yeterli ne yetersiz	Biraz yeterli	Yeterli	Çok yeterli
Okuma							
Yazma							
Konuşma							
Dinleme							

Teşekkürler

APPENDIX B: Manual of Tasks

Psikoloji Bölümü
Doğu Akdeniz Universitesi
Gazimağusa, K. Kıbrıs
Tel: +(90) 392 630 1389 Faks: +(90) 392 630 2475

Bilişsel ve Nörolojik Görüntüleme Merkezi
Psikoloji Bölümü
Sosyal Bilimler Okulu, Uxbridge Campus, Kingston Ln,
Uxbridge, Middlesex UB8 3PH

İyi Günler!

Katılmayı kabul ettiğiniz için teşekkür ediyoruz.

Şimdi bazı harf, kelime ve sayı oyunları oynayacağız.

1. Visual Short Term MemoryTask

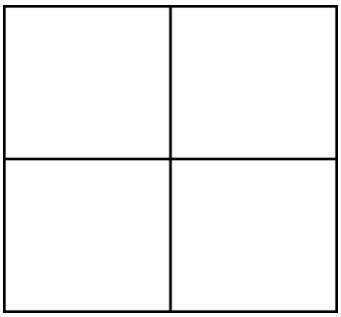
Şimdi ekranda bazı şekiller göreceksiniz.

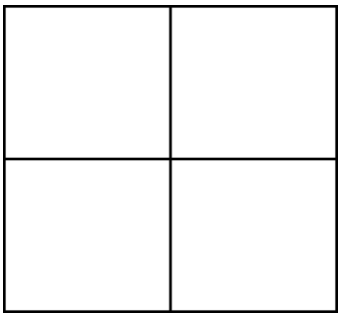
Ekranda beliren her şekle baktıktan sonra önünüzde bulunan kareleri ekranda gördüğünüz şekillere göre doldurmanızı istiyorum.

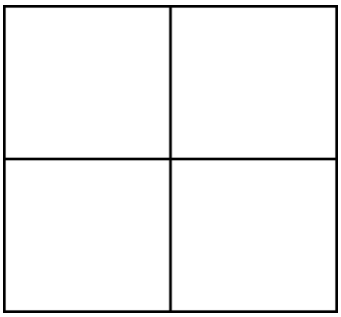
4 kare ile başlayacağız ve sonra şekiller ebatları ve zorluk dereceleri açısından artacaktır.

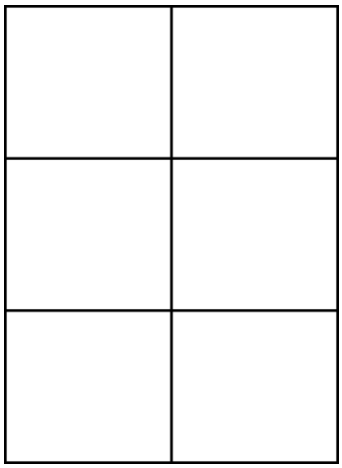
Hazır mısınız? İyi şanslar!

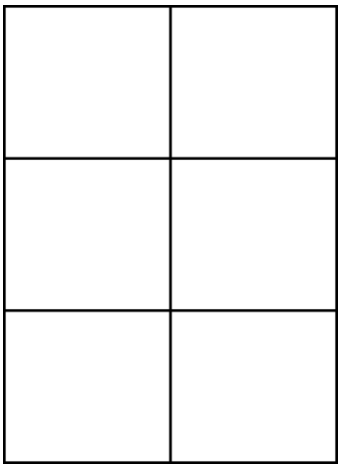
Anket No: _____

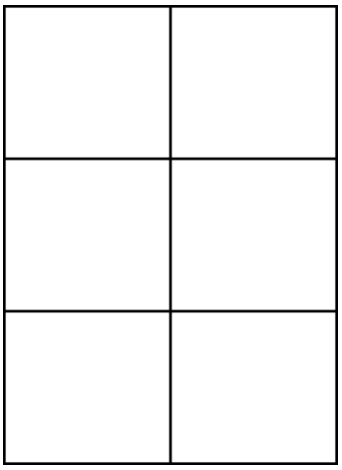


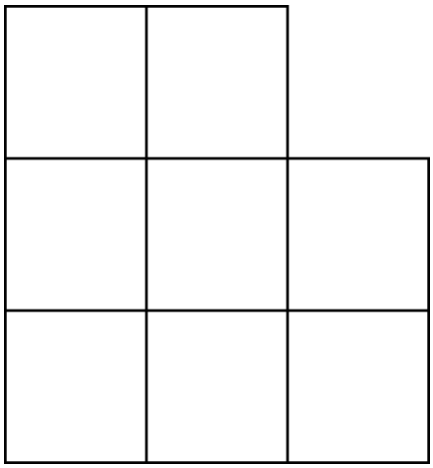


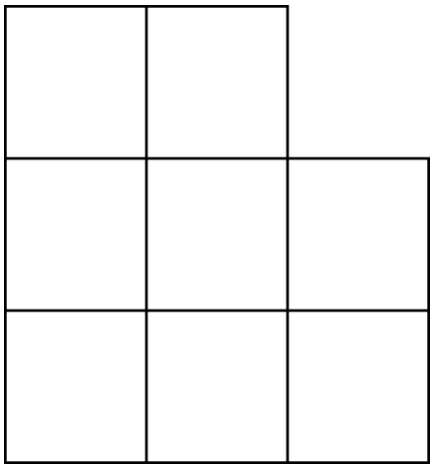


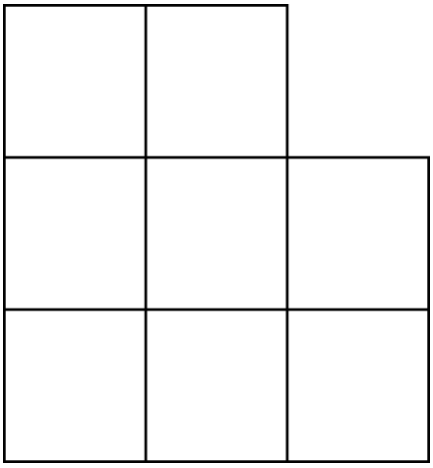


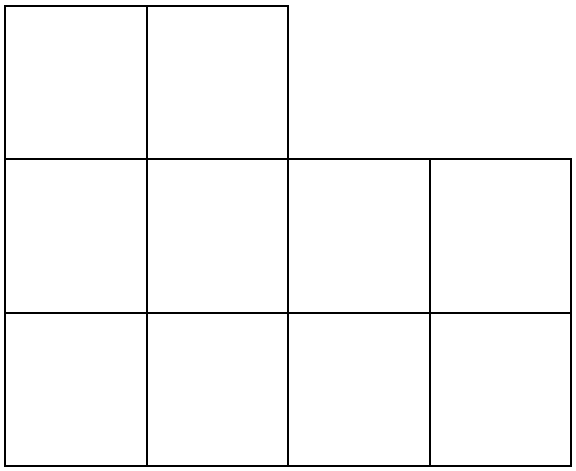


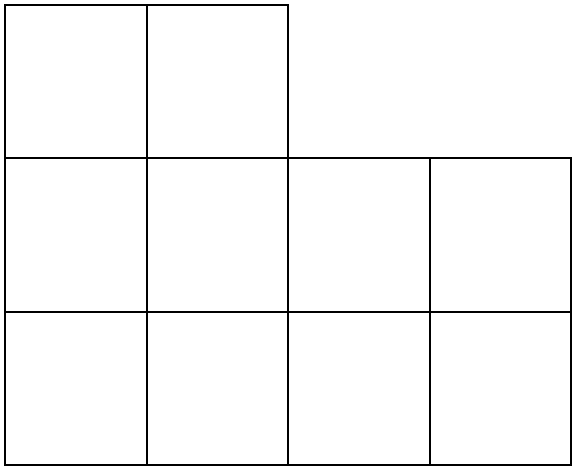


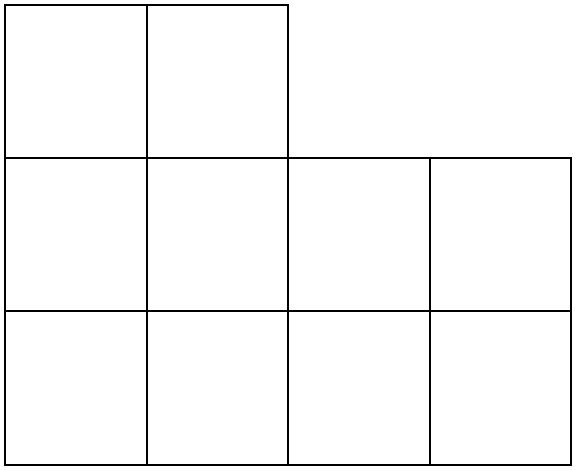


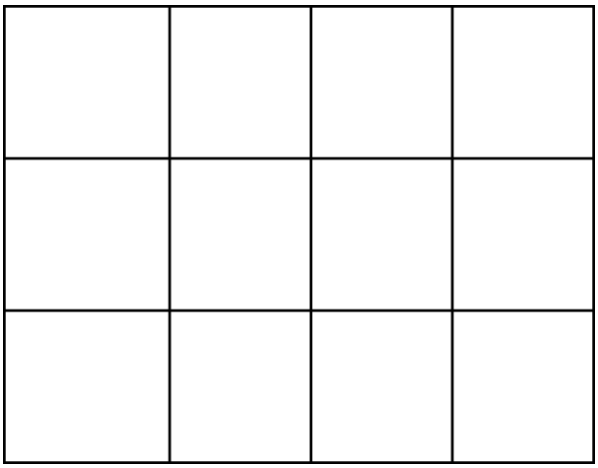


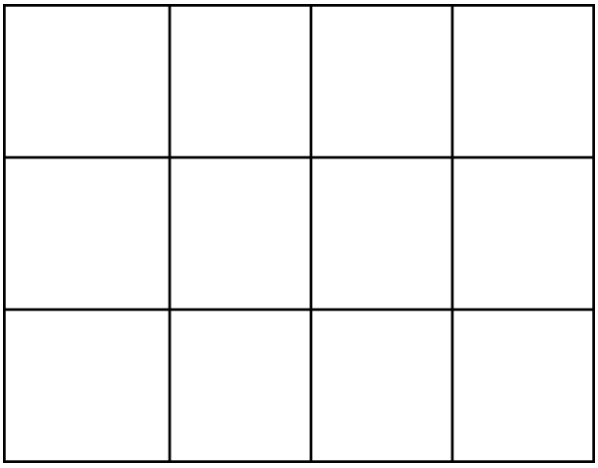


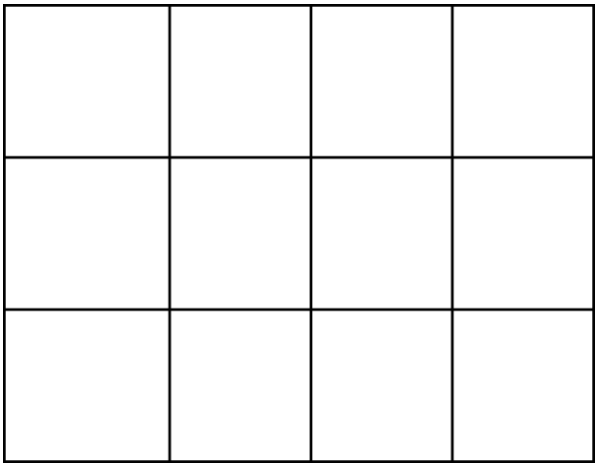


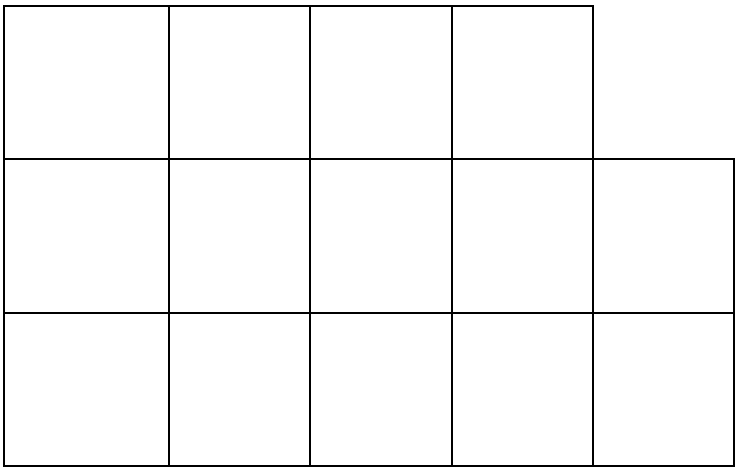


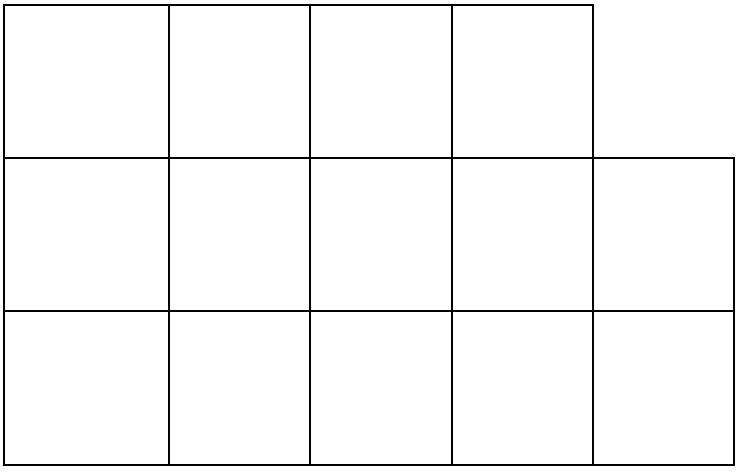


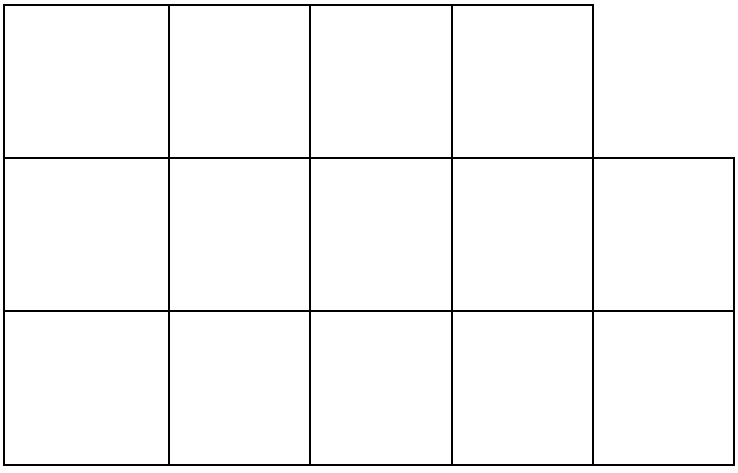


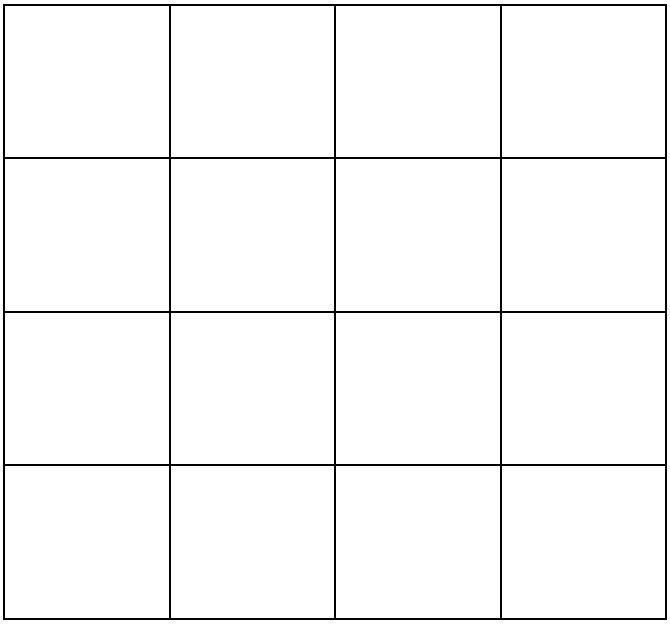


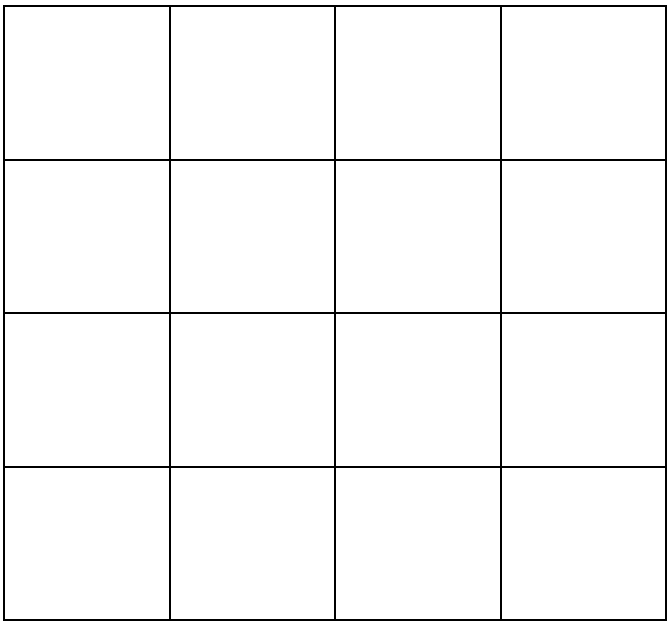


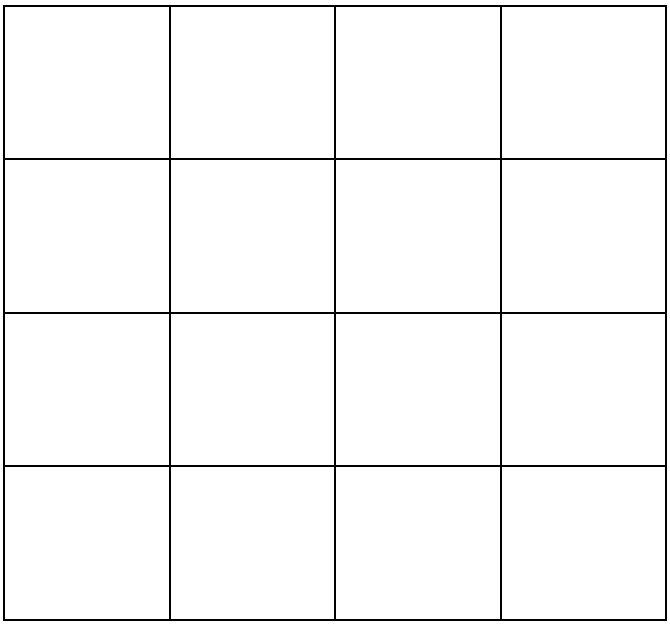


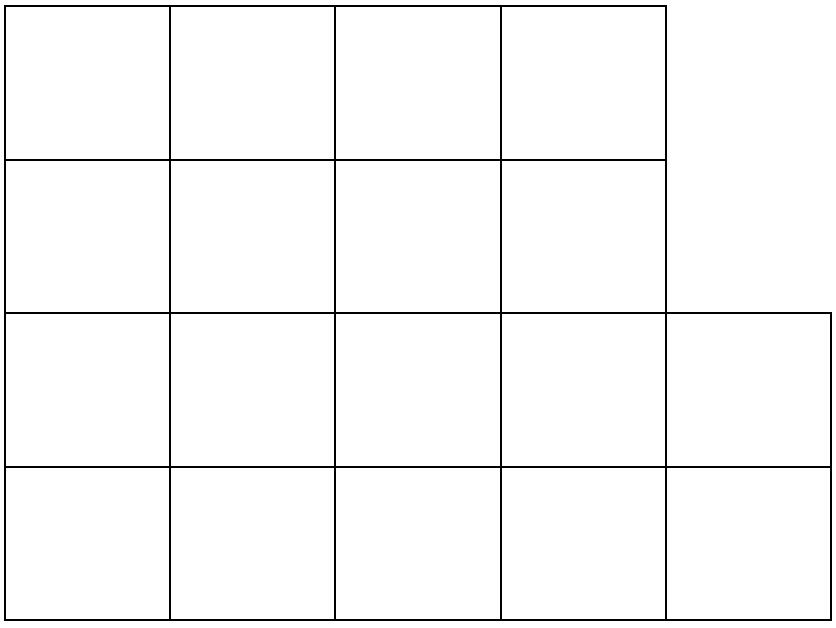


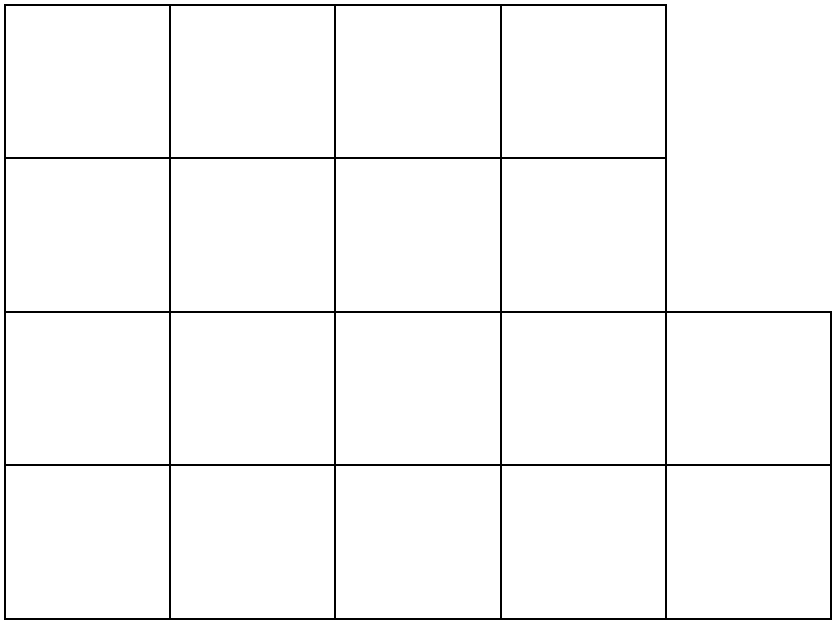


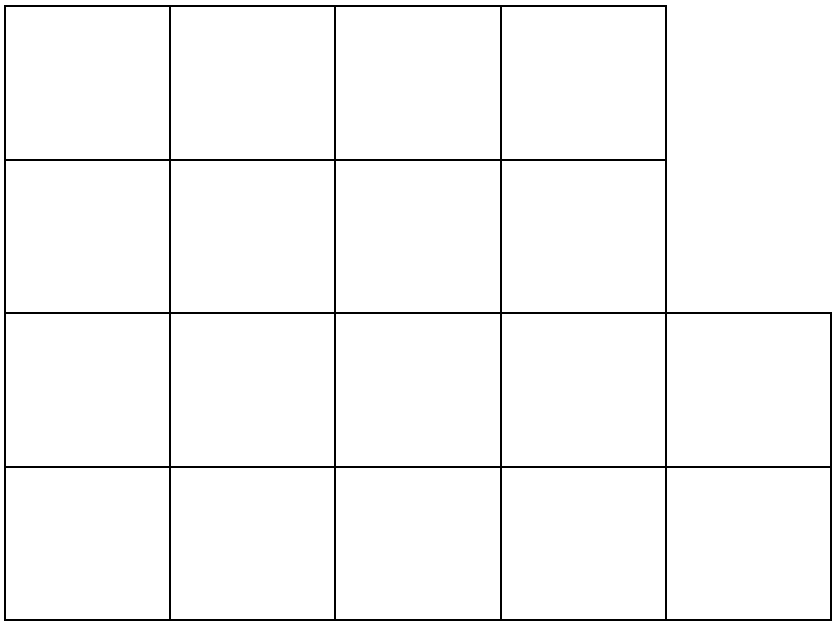


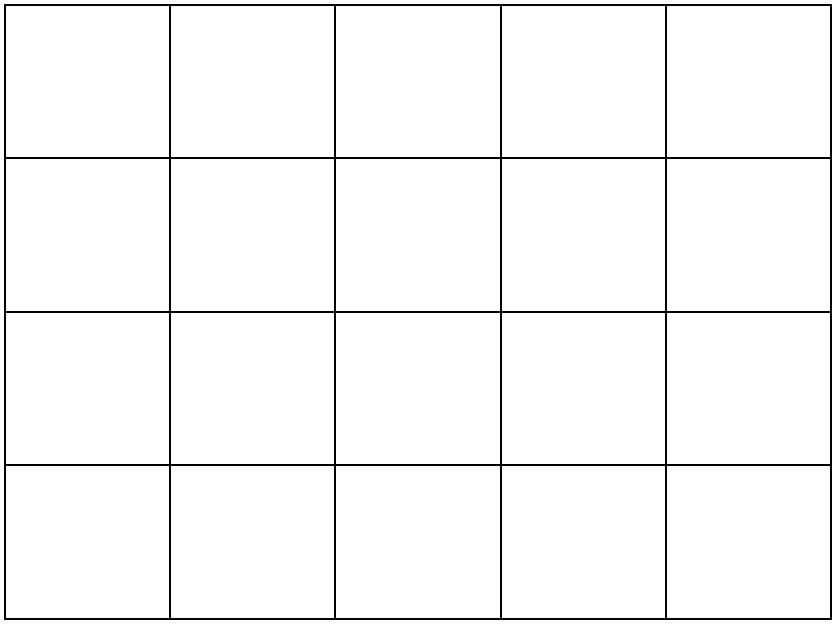


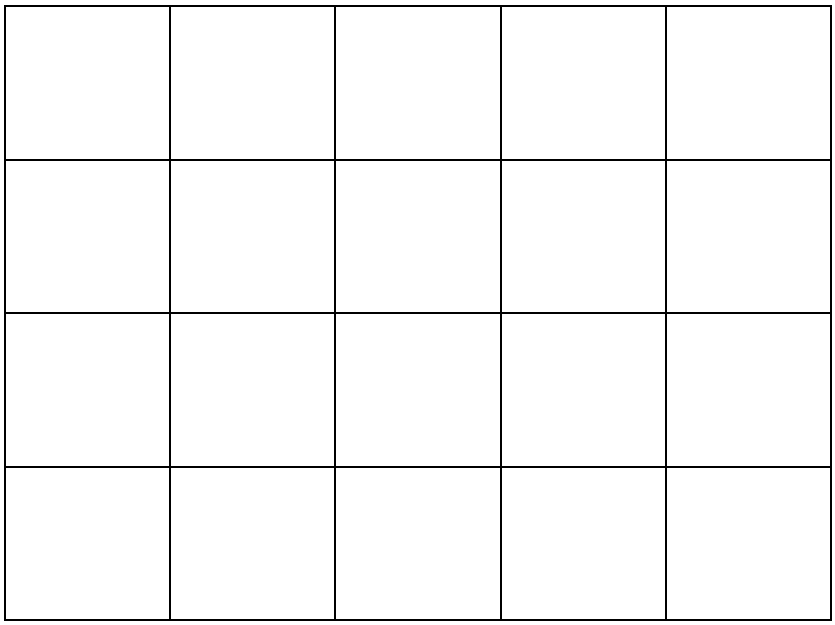


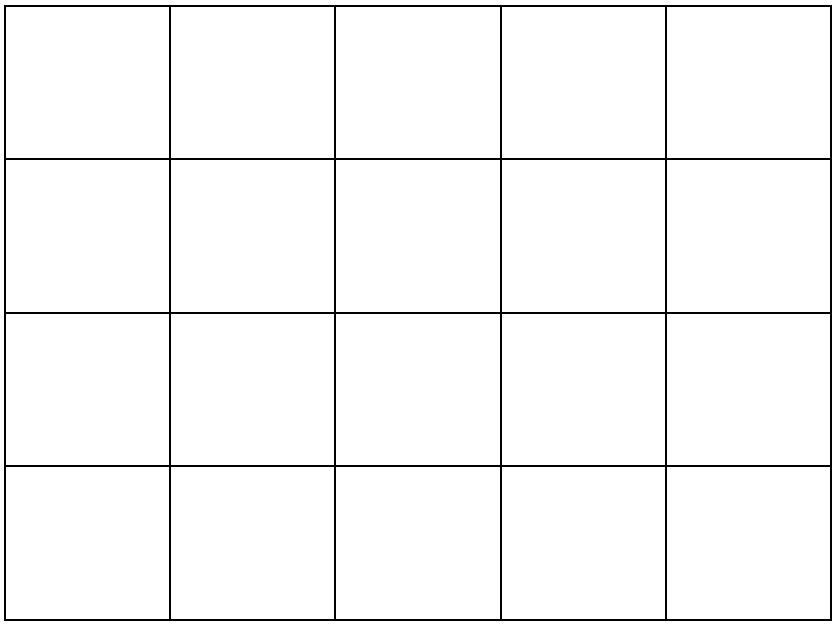












2. Rapid Automised Naming 'RAN' (Objects)

Harika!

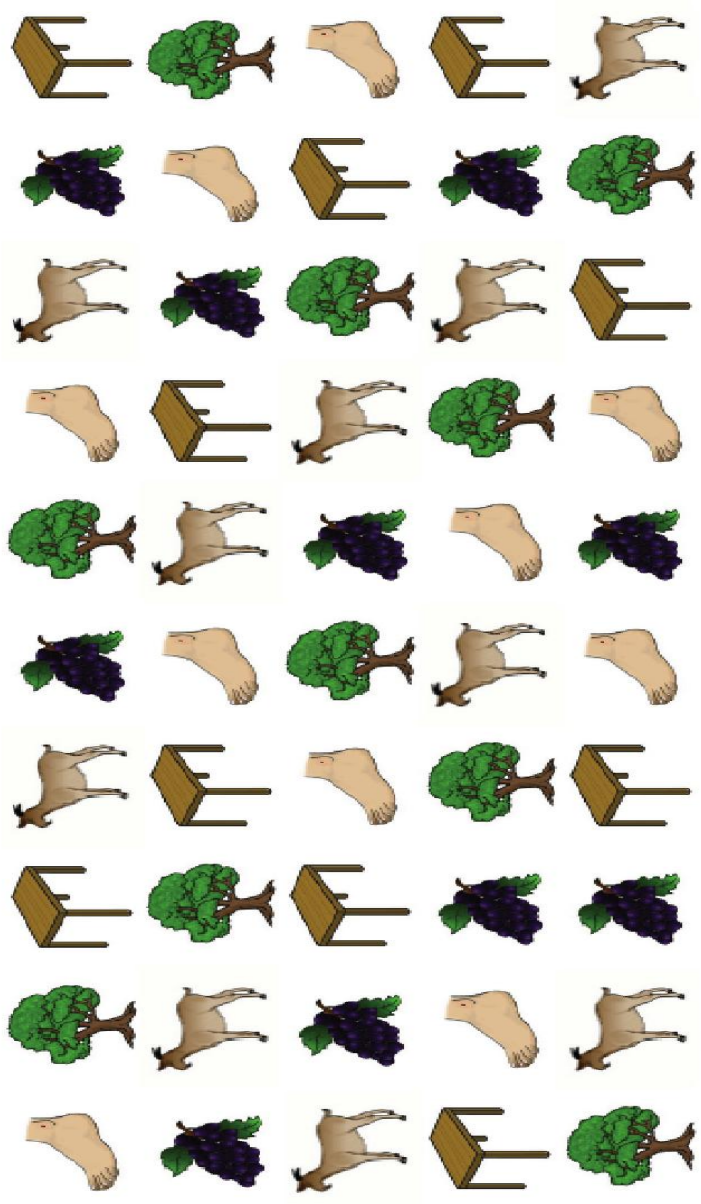
Şimdi oynayacağımız sıradaki oyun bir önceki oyundan biraz farklı bir oyundur.

Ekranın tümünü dolduran nesneler göreceksiniz.

Sol üst köşeden başlayarak gördüğünüz tüm nesneleri soldan sağa ve yukarıdan aşağıya sırayla sesli bir şekilde isimlendirmenizi istiyorum.

Bunu olabildiğiniz kadar hızlı yapmanızı ve son nesneyi de isimlendirdikten sonra BOŞLUK tuşuna basmanızı istiyorum.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.



3. Rapid Automised Naming 'RAN' (COLOURS)

Tebrikler!

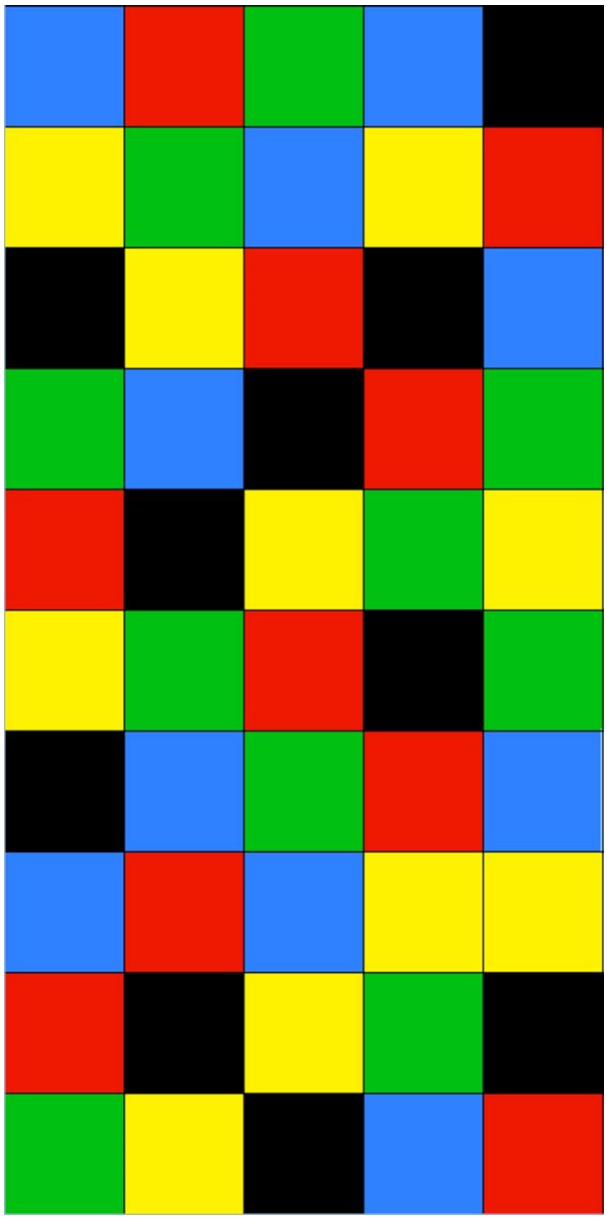
Bu gerçekten çok iyiydi.

Şimdi yine aynı oyunu oynayacağız fakat bu defa ekranda nesneler yerine renkler göreceksiniz.

Sol üst kutudan başlayarak gördüğünüz tüm renkleri soldan sağa ve yukarıdan aşağıya sırayla sesli bir şekilde isimlendirmenizi istiyorum.

Bunu olabildiğiniz kadar hızlı yapmanızı ve son rengi de isimlendirdikten sonra BOŞLUK tuşuna basmanızı istiyorum.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.



4. Rapid Automised Naming 'RAN' (LETTERS)

Harikulade!

Şimdi yine aynı oyunu oynayacağız fakat bu defa ekranda harfler göreceksiniz.

Sol üst kutudan başlayarak gördüğünüz tüm harfleri soldan sağa ve yukarıdan aşağıya sesli bir şekilde okumanızı istiyorum.

Bunu olabildiğiniz kadar hızlı yapmanızı ve son harfi de okumayı bitirdikten sonra BOŞLUK tuşuna basmanızı istiyorum.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.

a	o	s	d	p	o	a	d	p	s
p	d	o	s	a	d	s	p	a	o
d	p	s	a	o	p	d	o	s	a
s	a	p	o	d	a	o	d	p	s
o	d	p	s	a	p	a	s	o	d

5. Rapid Automised Naming 'RAN' (NUMBERS)

Bu olağan üstü bir çaba!

Şimdi yine aynı oyunu son olarak oynayacağız fakat bu defa ekranda sayılar göreceksiniz.

Sol üst kutudan başlayarak gördüğünüz tüm sayıları soldan sağa ve yukarıdan aşağıya sesli bir şekilde okumanızı istiyorum.

Bunu olabildiğiniz kadar hızlı yapmanızı ve son sayıyı da okumayı bitirdikten sonra BOŞLUK tuşuna basmanızı istiyorum.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.

2	4	9	6	7	4	2	6	7	9
7	6	4	9	2	6	9	7	2	4
6	7	9	2	4	7	6	4	9	2
9	2	7	4	6	2	4	6	7	9
4	6	7	9	2	7	2	9	4	6

6. Visual Attention Span (VAS)

Ekranın ortasında bir tespit noktası göreceksiniz. Bu noktaya odaklanmanız gerekmektedir. Kısa bir süre sonra kısa süreliğine 5 harften oluşan bir dizi ekranda belirecektir ve bu dizinin ardından kar taneciklerinden oluşan bir maske gösterilecektir

Sizin yapmanız gereken bu dizideki harflerden ne kadar çok harf hatırlayabilirseniz onları söylemektir. Harflerin sırası önemli değildir. Dizide verilen her harf sadece bir kez görülmektedir.

4 alıştırma testi ile başlayacağız sonrasında oyunumuz 20 deneysel test ile devam edecektir.

Hazır mısınız? İyi şanslar!

Şimdi 20 deneysel test yapacaksınız.

Hazır mısınız? İyi şanslar!

VAS GLOBAL LIST

Anket No: _____

R H S D M	**R**	**H**	**S**	**D**	**M**	
D R L F T	**D**	**R**	**L**	**F**	**T**	
T F P S R	**T**	**F**	**P**	**S**	**R**	
H P M S L	**H**	**P**	**M**	**S**	**L**	

D H P B M	**D**	**H**	**P**	**B**	**M**	
M D T L F	**M**	**D**	**T**	**L**	**F**	
S M B P H	**S**	**M**	**B**	**P**	**H**	
F T M P L	**F**	**T**	**M**	**P**	**L**	
T M L B D	**T**	**M**	**L**	**B**	**D**	
L F D T H	**L**	**F**	**D**	**T**	**H**	
P L D H B	**P**	**L**	**D**	**H**	**B**	
R T B F P	**R**	**T**	**B**	**F**	**P**	
B S H T P	**B**	**S**	**H**	**T**	**P**	
L P R M S	**L**	**P**	**R**	**M**	**S**	
S D T L F	**S**	**D**	**T**	**L**	**F**	
P S F R T	**P**	**S**	**F**	**R**	**T**	
B L R D M	**B**	**L**	**R**	**D**	**M**	
H B F R D	**H**	**B**	**F**	**R**	**D**	
M R H P S	**M**	**R**	**H**	**P**	**S**	
F B S H R	**F**	**B**	**S**	**H**	**R**	
R S P F T	**R**	**S**	**P**	**F**	**T**	
T F L R D	**T**	**F**	**L**	**R**	**D**	
L S M P H	**L**	**S**	**M**	**P**	**H**	
D B L M T	**D**	**B**	**L**	**M**	**T**	

7. Reading (Word / nonword naming

Şimdiki oyun için ekranda bazı kelimeler göreceksiniz. Bu kelimelerin bazıları daha önce karşılaştığınız kelimeler bazıları ise daha önce karşılaşmadığınız (anlamı olmayan) kelimelerdir.

Sizden gördüğünüz kelimeleri sesli olarak mikrofona okumanızı istiyorum.

Oyunu daha iyi anlayabilmeniz için ilk önce bir deneme oyunu oynayalım.

Deneme oyununa başlamak için BOŞLUK tuşuna basınız.

8. Reading (Word / nonword naming

İyi iş çıkardın!

Şimdi aynı oyunu oynayacağız fakat bu kez daha önce karşılaştığınız kelimeleri ve daha önce karşılaşmadığınız (anlamı olmayan) kelimeleri karışık bir şekilde ekranda görünecektir.

Deneme oyununda yaptığınızın aynısını şimdi de yapmanızı istiyorum.

Ekranda gördüğünüz kelimeleri sesli olarak olabildiğince hızlı bir şekilde mikrofona okumanızı istiyorum.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.

9. Raven's Progressive Matrices

İyi iş çıkardın!

Şimdi ekranda bazı desenler göreceksiniz.

Desenlerde eksik bırakılan yerleri tamamlamak için size verilen sayılardan uygun olanını seçiniz.

Hazır olduğunuz zaman oyuna başlamak için BOŞLUK tuşuna basınız.

Harika gidiyorsunuz!

Şimdi bilgisayarı kullanmadan bazı oyunlar oynayacağız.

10. Phonological STM Digit Span

Şimdi de sayı oyunu oynayacağız.

Size bazı sayılar söyleyeceğim ve sizden bu sayıları size söylenilen sırada tekrar bana söylemenizi isteyeceğim.

Bu sayıları sadece bir defa söyleyebilirim bu nedenle dikkatlice dinleyiniz.

(örnek) Eğer size 6-8 diyorsam sizin vereceğiniz cevap ne olur?

(BOŞLUK tuşuna basınız)

11. Working Memory

İyi iş çıkardın!

Tamam. Şimdi aynı oyunu farklı bir yolla deneyelim.

Size bazı sayılar söyleyeceğim ve sizden bu sayıları ters çevirip bana geri söylemenizi istiyorum.

Bu sayıları sadece bir defa söyleyebilirim bu nedenle dikkatlice dinleyiniz.

(örnek) Eğer size 6-8 diyorsam sizin vereceğiniz cevap ne olur?

(BOŞLUK tuşuna basınız)

Anket No:_____

Phonological STM Digit Span

2-9	2-9	
3-8-6	3-8-6	
3-4-1-7	3-4-1-7	
8-4-2-3-9	8-4-2-3-9	
3-8-9-1-7-4	3-8-9-1-7-4	
5-1-7-4-2-3-8	5-1-7-4-2-3-8	
1-6-4-5-9-7-6-3	1-6-4-5-9-7-6-3	
5-3-8-7-1-2-4-6-9	5-3-8-7-1-2-4-6-9	

Working Memory

2-5	5-2	
5-7-4	4-7-5	
7-2-9-6	6-9-2-7	
4-1-3-5-7	7-5-3-1-4	
1-6-5-2-9-8	8-9-2-5-6-1	
8-5-9-2-3-4-2	2-4-3-2-9-5-8	
6-9-1-6-3-2-4-2	2-4-2-3-6-1-9-6	

12. Phoneme Deletion

Tamam! Şimdi daha çok kelime ile farklı bir oyun oynayalım.

Size bazı kelimeler söyleyeceğim ve sonra bu kelimelerin ilk veya son harflerini çıkardığımız zaman nasıl söyleneceğini (okunacağını) soracağım.

Bu kelimeleri sadece bir defa söyleyebilirim bu nedenle dikkatlice dinleyiniz.

(örnek) Eğer size kedi (kkk) diyorsam sizin vereceğiniz cevap ne olur?

EDİ

(BOŞLUK tuşuna basınız)

Anket No:_____

Phoneme Deletion

Kar (kkk)	Ar	
Gece (ggg)	Ece	
Zar (zzz)	Ar	
Para (ppp)	Ara	
Dar (ddd)	Ar	
Ayak (kkk)	Aya	
Çivi (iii)	Çiv	
Elma (aaa)	Elm	
Eşek (kkk)	Eşe	
Üzüm (mmm)	Üzü	

13. Phonemic Segmentation

Tebrikler!

Tamam! Hadi şimdi daha fazla kelimeler kullanarak farklı bir oyun oynayalım.

Size bazı kelimeler söyleyeceğim ve sizden söylediğim her kelimenin içindeki her sesi sırayla seslendirmenizi isteyeceğim.

Bu kelimeleri sadece bir defa söyleyebilirim bu nedenle dikkatlice dinleyiniz.

(örnek) Eğer size 'tilki' diyorsam sizin vereceğiniz cevap ne olur?

t-i-l-k-i

(BOŞLUK tuşuna basınız)

Anket No:_____

Phonemic Segmentation

top	t-o-p	
kitap	k-i-t-a-p	
saat	s-a-a-t	
masa	m-a-s-a	
kol	k-o-l	
kapı	k-a-p-ı	
aslan	a-s-l-a-n	
ayak	a-y-a-k	
kedi	k-e-d-i	
ekmek	e-k-m-e-k	
tren	t-r-e-n	
yatak	y-a-t-a-k	
ayı	a-y-ı	
kiraz	k-i-r-a-z	
ağaç	a-ğ-a-ç	
mısır	m-ı-s-ı-r	
kulak	k-u-l-a-k	
güneş	g-ü-n-e-ş	
köpek	k-ö-p-e-k	
balık	b-a-l-ı-k	

14. Spoonerism

Tebrikler!

Hadi şimdi farklı bir oyun deneyelim.

Size iki kelime söyleyeceğim ve sizden bu kelimelerin ilk harflerinin yerlerini değiştirerek okumanızı isteyeceğim.

Bu kelimeleri sadece bir defa söyleyebilirim bu nedenle dikkatlice dinleyiniz.

(örnek) Eğer size ‘fare-dere’ diyorsam sizin vereceğiniz cevap ne olur?

Dare-fere

(BOŞLUK tuşuna basınız)

Anket No: _____

Spoonerism

fare-dere	dare-fere	
sıcak-böcek	bıcak-söcek	
kapı-yılı	yapı-kılı	
zil-dar	dil-zar	
kuyu-vazo	vuyu-kazo	
masa-vida	vasa-mida	
paket-reçel	raket-peçel	
ceket-pasta	peket-casta	
yılan-horoz	hılan-yoroz	
makas-biber	bakas-miber	
kazak-bavul	bazak-kavul	
iplik-ekmek	eplik-ikmek	
tilki-koyun	kilki-toyun	
tarak-bulut	barak-tulut	
güneş-kilit	küneş-gilit	
domuz-kalem	komuz-dalem	
balon-fırça	falon-bırça	
kiraz-şapka	şiraz-kapka	
limon-burun	bimon-lurun	
köpek-dudak	döpek-kudak	
kaşık-soğan	saşık-koğan	

Appendix C: Approval from Ethics and Research Committee

Eastern

Mediterranean

University

The Department of Psychology

Eastern Mediterranean University

Research & Ethics Committee

Cigir Kalfaoglu

Famagusta, Turkish Republic of Northern Cyprus

Tel: +(90) 392 630 1389

Fax: +(90) 392 630 2475

e-mail: cigir.kalfaoglu@emu.edu.tr

Web: http://brahms.emu.edu.tr/psychology

Ref Code: 14/03-73

Date: 06.03.2014

Dear Evren Raman, Biran Mertan and Sevilay Ilkman,

Thank you for submitting your revised application entitled *Language universality vs. Specificity of reading processes: Evidence from Turkish-speaking monolingual children.* Your application has now been *approved* by the Research & Ethics Committee on 04.03.2014.

If any changes to the study described in the application or supporting documentation is necessary, you must notify the committee and may be required to make a resubmission of the application. This approval is valid for one year.

Good luck with the research.

Yours sincerely,

Assist. Prof. Dr. Cigir Kalfaoglu

On Behalf of the Research & Ethics Committee

Psychology Department

Eastern Mediterranean University

Appendix D: Approval from Turkish Republic of North Cyprus Ministry of Education

KUZEY KIBRIS TÜRK CUMHURİYETİ MİLLİ EĞİTİM BAKANLIĞI İLKÖĞRETİM DAİRESİ MÜDÜRLÜĞÜ

Sayı: IOD.0.00-35/2014/1B **Lefkoşa, 10 Nisan 2014**

Sayın Doç. Dr. Biran MERTAN,
Doğu Akdeniz Üniversitesi,
Gazimağusa.

Müdürlüğümüze bağlı Gazimağusa okullarında gerçekleştirmek istediğiniz **"Kavram Gelişimi ve Okuma Yazma Bozukluğu"** konulu çalışma Talim ve Terbiye Dairesi Müdürlüğü tarafından incelenmiştir.

Yapılan inceleme sonucunda çalışma;

1. Tüm bireyi tanıma teknikleri; gizlilik ve gönüllülük ilkelerine dayalı olarak yapılmalı ve çalışmaya katılan tüm katılımcıların kimlik bilgileri gizli tutulmalıdır.
2. Araştırma sonuçlarına ilişkin geri bildirimler; ailelerin ve öğrencilerin, etkilenmesine karşılık gelmeyecek şekilde iletilmelidir.
3. Okul idaresi, öğrenci ve veliler, çalışmanın amacı ve uygulama süreçleri hakkında bilgilendirilmeli, uygulama için gerekli etik ilkeler, yazılı olarak okul yöneticileri ve ailelere iletilmelidir. Bu bağlamda, ailelerden alınacak izin belgeleri, gerektiğinde Bakanlıkça istenilmek üzere okul idareleri tarafından muhafaza edilmelidir.
4. Çalışmanın tamamlanmasının ardından uygulama süreçleri ve bulgular hakkında Bakanlığımıza yazılı bilgi verilmesi gerekmektedir.

Ancak çalışma uygulamadan önce okul müdürlükleri ile temas kurulması ve **yukarıda belirtilen hususların yerine getirilmesi koşulu** ile uygun görülmüştür. Çalışma tamamlandıktan sonra da sonuçların **Talim ve Terbiye Dairesi Müdürlüğü'ne** iletilmesi

/AA

Ali NİZAM
Müdür

Tel (90) (392) 228 3136 – 228 6893
Fax (90) (392) 228 7158 **Lefkoşa-KKTC**
E-mail meb@mebnet.net

APPENDIX E: Parents Inform Consent Form

Psikoloji Bölümü Doğu Akdeniz Üniversitesi
Gazimağusa, K Kıbrıs
Tel: +(90) 392 630 1389 Faks: +(90) 392 630 2475

Brunel
UNIVERSITY
Bilişsel ve Nörolojik Görüntüleme Merkezi Psikoloji Bölümü
Sosval Bilimler Okulu, Uxbridge Campus, Kingston Ln, Uxbridge,
Middlesex UB8 3PH

Ebeveyn Onay Formu

Araştırma Başlığı: Dilde Evrenselliğe Karşı Özellikli Okuma Süreçleri: Türkçe Konuşan Çocuklardan Kanıt

Araştırmacılar:
Doç. Dr. Biran Mertan (biran.mertan@emu.edu.tr). Doğu Akdeniz Üniversitesi, Gazimağusa, K. Kıbrıs
Evren Raman (evren.raman@bruneLac.uk), Brunel Üniversitesi, UK
Sevilay îlkman (sevilav.ilkman@emu.edu.tr). Doğu Akdeniz Üniversitesi, Gazimağusa, K. Kıbrıs

Bilgilendirme formunu okuduğumu ve araştırmacının açıklamış olduğu çalışmayı anladığımı onaylıyorum. Çocuğumun çalışmada yer almasına izin veriyor ve adının açığa çıkarılmayacağın! anlıyorum.

Çocuğumun okulu ile ve çalışmanın amacı doğrultusunda tamamlanması gerekli olan okuma ve yazma görevleri için çocuğum ile iletişime geçilmesi için araştırmacıya izin veriyorum.

Aynı zamanda çalışmada toplanan verilerin analiz edileceğini ve daha sonra yayınlanacağını anlıyor ve bunun için izin veriyorum.

Katılımın tamamen gönüllü olduğunu, çalışma sırasında toplanacak verilerin kimlik bilgisinin saklı kalacağını ve eğer benim veya çocuğumun çalışmaya herhangi bir nedenden dolayı devam edemeyeceğimizi düşünürsem çalışma sırasında herhangi bir zaman hiç bir neden göstermeden çalışmadan çekilebileceğimi anlıyor ve onaylıyorum.

Tarih: ..... / .... /2014 Ebeveyn İmzası

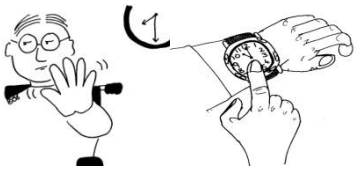
Bu araştırmanın yürütülmeside etik konularla ilgili olarak endişeleriniz varsa, lütfen Doğu Akdeniz Üniversitesi Psikolojik Araştırmalar ve Etik Komitesi'ni yazılı olarak ayrıntılı bir şekilde bilgilendiriniz.

Appendix F: Children Inform Consent Form

Merhaba. Benim adım Sevilay (aşağıdaki benim resmim) ve ben psikolog olmak için öğrenim görmekteyim. Dersim için bir proje yapıyorum ve sizin yardımınıza ihtiyacım var.

Tükçe'yi nasıl kullandığınızı öğrenmek ve sizinle bazı kelime oyunları oynamak istiyorum.

İstediğiniz zamanda oyunu durdurabilirsiniz. Oyun bir saatten fazla sürmeyecektir.



Evet veya hayır deyebilirsiniz. Bu oyuna katılıp katılmamak kararı size kalmıştır.

Eğer katılmak istiyorsanız lütfen formları okuması için birisinin yardımını isteyiniz.

Eğer kelime oyunu oynamak istiyorsanız, eklenmiş olan formu imzalayıp okula geri getirmenizi rica ediyorum.

Eğer çalışma hakkında daha fazla bilgi edinmek isterseniz lütfen benimle ya da okul müdürü ile iletişime geçiniz.

Bu yazıyı okumak için zaman ayırdığınız ve yardımınız için teşekkürler.

Eğer ben Sevilay ile kelime oyunu oynarsam

- Oyunun kaydedileceğini biliyorum.

- Kelime oyununu birlikte oynayacağımızı biliyorum.

- Oyunu istediğim herhangi bir zamanda durdurabileceğimi biliyorum.

Eğer yukarıdaki açıklamaları anladıysanız şimdi çalışmaya katılıp katılmayacağınıza karar vermeniz gerekmektedir.

Bu çalışma ile ilgili Evren ile konuşmaya karar verdim.

Lütfen Evet ya da Hayır seçeneklerinden birini daire içne alınız.

Hayır

Evet

İmza……

<u>Lütfen bu formu en kısa zamanda okulunuza geri gönderiniz</u>