DEVELOPMENT OF THE TURKISH RAPID AUTOMATIZED NAMING TESTS

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Fatma Hande Bakır

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The thesis of Fatma Hande Bakır

has been approved by

Assist. Prof. Fatma Nalan Babür
(Thesis Advisor)

Assoc. Prof. Deniz Albayrak Kaymak

Assist. Prof. Gülcan Erçetin

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Thesis Abstract

Fatma Hande Bakır, "Development of the Turkish

Rapid Automatized Naming Tests"

The aim of the study was to adapt the four subtests of Rapid Automatized Naming Tests (RAN) for Turkish children aged five to ten years and to establish the validity and reliability of the tests for the same population. The participants were 277 students ranging from kindergarten to the fifth grade. RAN has four subtests: Pictures, Colors, Numbers, and Letters. Children were expected to name visually presented stimuli as accurately and quickly as possible.

Construct validity was determined by the intercorrelation among RAN subtests, age differentiation, and correlation with oral reading fluency measure. For the content validity, expert judgment was considered. Correlation analyses indicated that as children became older, the total time to name visually presented items diminished. All RAN subtests were significantly correlated with each other since they all measure visual naming speed. The symbolic tasks (i.e., RAN Letters and RAN Numbers) were much more associated with each other unlike RAN Objects and Colors. The relationship between reading speed and RAN showed that children performed better in RAN tests, when the number of words read correctly in one minute increased. The Turkish RAN tests provided a high degree of consistency across test-retest and interrater reliability. The results revealed that RAN tests are reliable and valid measures for Turkish speaking children. However, further research is needed to establish norms for RAN tests for Turkish children. The Turkish RAN tests will be useful for future studies for exploring the role of naming speed and for understanding a child's reading development.

Tez Özeti

Fatma Hande Bakır, "Türkçe Hızlı Otomatik İsimlendirme Testleri'nin Geliştirilmesi"

Bu çalışmada, Hızlı Otomatik İsimlendirme (HOİ) Testlerinin Türkçe'ye uyarlanması, beş ile on yaş arasındaki Türk çocukları için geçerlilik ve güvenirliğinin sağlanması amaçlanmıştır. Testler dört bölümden oluşmaktadır: Resimler, Renkler, Rakamlar ve Harfler. Bu araştırmaya anasınıfından beşinci sınıfa kadar 135 kız ve 142 erkek olmak üzere toplam 277 öğrenci katılmıştır. Çocuklardan görsel olarak sunulmuş maddeleri, mümkün olduğunca hızlı ve doğru bir şekilde isimlendirmeleri istenmiştir.

Yapı geçerliliği, alttestler arasındaki ilişkilere, yaş farkına ve bu testlerin okumada akıcılık ölçeği ile ilişkisine bakılarak belirlenmiştir. Kapsam geçerliliği için uzman görüşleri alınmıştır. Korelasyon analizleri çocukların yaşları arttıkça testleri bitirme sürelerinin azaldığını göstermiştir. Görsel isimlendirme hızını ölçen dört alttestin kendi aralarında önemli ölçüde ilişkili olduğu saptanmıştır. Resimler ve renklerin aksine, rakamların ve harflerin sembole dayalı oldukları için birbirleriyle ilişkisi daha yüksek çıkmıştır. Okuma hızı ile HOİ arasındaki ilişkiye bakıldığında, HOİ testlerini bitirme süresi ile bir dakikada okudukları doğru kelime sayısı arasında anlamlı ilişki bulunmuştur.

Sonuçlar, HOİ testlerinin Türkçe konuşan çocuklar için güvenilir ve geçerli ölçekler olduğunu ortaya koymuştur. Ancak, HOİ normlarını Türk çocukları için oluşturmak için başka çalışmalara gerek vardır. İsimlendirme hızının okuma gelişimindeki rolünü araştırmak ve bir çocuğun okuma edimini anlamak amacıyla yapılacak çalışmalarda Türkçe HOİ testlerinin kullanılması yararlı olacaktır.

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CHAPTER 1

INTRODUCTION

The aim of this chapter is to provide a rationale for the study, to state the problem, and to discuss the significance of the study. The present study is a part of the project supported by research funds from Boğaziçi University (code number 05D101). This project is carried out to adapt and develop several assessment tools that are used for the identification of students with reading difficulties. Among these assessment tools, rapid automatized naming (RAN) tests were chosen for the present study. The reasons for this choice are twofold: (a) RAN is shown to be a powerful predictor of reading ability (Wolf & Denckla, 2005); (b) the test administration is simple and quick. Thus, the present study adapted four subtests of RAN for Turkish children (ages five through ten) and investigated the reliability and validity of the adapted RAN tests for Turkish children.

Reading is "a process by which individuals understand and interpret graphic symbols" (Hammill, 2004, p. 466). Both decoding and comprehension processes work together to formulate the basis of reading ability. Decoding is "to recognize and pronounce the word and thereby access the meaning." Comprehension involves "higher cognitive processes that allow the reader to extract the meaning of the text, to think about it, and to draw conclusions from it" (Hoien & Lundberg, 2000, p. 21). The cognitive and linguistic processes underlying reading and the interrelationship among them have been studied over the years (e.g. Hammill, 2004; Scarborough, 1998; Strattman & Hodson, 2005). There are also substantial efforts to determine the

possible factors that are related to later reading disability (e.g. Badian, 1998; Schatschneider, Fletcher, Carlson, & Foorman, 2004; Wagner & Torgesen, 1987).

Children with normal or above normal intelligence who have significant reading difficulties were characterized by using different terms such as dyslexia, developmental dyslexia or reading disability (e.g. Badian, 1996; 1999; Bingöl, 2003; Catts, 1989; van Daal & van der Leij, 1999). Until recently, different definitions were given to explain what characterizes dyslexia (e.g. Badian, 1999; Catts, 1989; Hoien & Lundberg, 2000). According to the Diagnostic and Statistical Manual of Mental Disorders Text Revision (DSM-IV-TR, 2000), reading disability or dyslexia is defined as "reading achievement, as measured by individually administered standardized tests of reading accuracy or comprehension, is substantially below that expected given the person's chronological age, measured intelligence, and age-appropriate education" (p. 53).

Many researchers have explored the role of phonological processing abilities (phonological awareness, verbal memory, and naming speed) on reading ability (e.g. Badian, 1994, 1998; Scarborough, 1998; Wagner & Torgesen, 1987; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993) and the deficit in the phonological processing abilities was viewed as a leading factor in reading disability (e.g. Wagner & Torgesen, 1987; Wagner et al., 1993). However, some researchers consistently documented that naming speed predicts reading disability and suggested that naming speed is the second core deficit in reading disabilities (e.g., McBride-Chang & Manis, 1996; Wolf, Bowers, & Biddle, 2000). Furthermore, verbal memory tasks are also used as measures in the prediction studies (e.g., Scarborough, 1998; Torgesen, Wagner, Simmons, & Laughon, 1990). In a longitudinal study, the findings showed

that verbal memory, as one of the cognitive-linguistic abilities, was significantly correlated with reading ability (Scarborough, 1998).

Naming speed considered as one of the measures of reading refers to the ability to name rapidly the stimuli or symbols (such as colors, objects) that are visually presented (Wolf et al., 2000). Wolf and Denckla (2005) stated that "naming speed develops before reading is ever taught, making it a prereading window on how well the brain can integrate its visual and verbal processes in time" (p. 2).

Hammill (2004) stated that "… almost all the research on naming speed used nonstandardized measures adapted from Denckla and Rudel's (1974) rapid automatized naming (RAN) procedure. Today, few standardized tests of this ability are available" (p. 457). RAN tests (see Wolf et al., 2000; Wolf & Denckla, 2005) are one of the standardized tests underlying naming speed. These tests measure naming speed and consist of four subtests each having five symbols from a given category (Objects, Colors, Numbers, and Letters) repeated ten times in random order for a total of fifty stimuli. For the last three decades, these tests were used by many researchers and were documented by the association of RAN with reading disability (e.g., Badian, 1994, 1997; Kirby, Pfeiffer, & Parrila, 2003; McBride-Chang & Manis, 1996). Thus, the relationship between reading and naming speed has been examined to assess reading problems and to identify the children at high risk for later reading difficulties. Consequently, naming speed measures may be useful for identification of students with reading disabilities and for the determination of effective intervention.

Purpose of the Study

The purpose of the study is to adapt the four subtests of the RAN, namely, RAN Objects, RAN Colors, RAN Letters, and RAN Numbers for Turkish children between the ages of five to ten and to determine the reliability and validity of the tests for the same population.

Significance of the Study

In Turkey, studies about reading or reading problems are mostly concerned with different reading skills such as word reading, decoding, word attack, verbal intelligence or phonological processing skills (e.g. Baydık, 2002; Kesikçi & Amado, 2005; Oktay & Aktan, 1997). Because RAN has been shown to be a powerful predictor of reading ability, it is important to understand its contribution to reading ability in Turkish children. Although RAN has been examined in some cross-linguistic studies (e.g., Katzir, Shaul, Breznitz, & Wolf, 2004; van Daal & van der Leij, 1999; Wimmer, Mayringer, & Landerl, 2000), it has not yet been discussed in Turkey. Therefore, this study which aims to explore the role of naming speed in Turkish reading acquisition may contribute to the further understanding of reading disability and also to its use as one of the screening measures.

Bishop and League (2006) in their follow-up study aimed at determining multivariate screening measures to predict the later reading achievement of seventy nine children from the beginning of kindergarten through the fourth grade. They argued that “a screening measure that incorporates letter identification, phonological awareness, and rapid automatized naming consistently correlates with reading

achievement throughout the primary and intermediate grades, when using fluency as an outcome measure" (p. 250). So, RAN tests can be used as a screening measure which gives information about reading fluency of children.

Good readers become better readers since they continue to read and improve their reading skills whereas poor readers may perform poorly in high-level reading tasks due to insufficient reading practice. Stanovich (1986) called this phenomenon "Matthew effects". Therefore, early screening and assessment, as well as remediation of reading problems play an important role. For this reason, to develop or adapt measurement tools that assess reading skills become significantly important for identifying children with reading problems.

Bingöl (2003) stated that there is a lack of adequate measures to assess reading skills. RAN tests which are easy and quick to administer, will create an opportunity both for the educators and psychologists to screen and identify the potentially reading-disabled children. So, this study will be one of the first steps of discovering the role of RAN in identifying the reading development of Turkish speaking children.

As a result, the adapted version of RAN tests can be used (a) for the identification of Turkish speaking children who are at risk for reading disabilities; (b) for the assessment of naming speed deficits, and lastly (c) for the prediction of later reading achievement.

CHAPTER 2

LITERATURE REVIEW

The literature review begins with the definition of developmental dyslexia and its association with naming speed. Then the history of RAN, the types of RAN tasks, the double and triple deficit hypotheses are discussed. The predictive role of RAN for reading disability across grades, reading levels, and languages are reviewed. The second part of this chapter examines fluency that is closely associated with naming speed. In the last part, Turkish language characteristics and Turkish based studies about reading disability are presented. Based on the review of the literature, the research questions are defined.

The Concept of Reading Disability

Specific problems in reading, mathematics, or writing ability were considered under the diagnostic term called "learning disability". These specific learning problems occur in the absence of other obvious conditions, such as mental retardation or brain damage (Mash & Wolfe, 2002). According to DSM-IV-TR (2000), reading disability (or dyslexia) is defined as "reading achievement (i.e. reading accuracy, speed, or comprehension as measured by individually administered standardized tests) that falls substantially below that expected given the individual's chronological age, measured intelligence, and age-appropriate education" (p. 51).

A more comprehensive definition of reading disability is necessary in order to understand its nature and the factors that cause or lead to reading disability. Until

recently, different definitions were given to explain what characterizes dyslexia. For example, Catts (1989) defines dyslexia as

> … a developmental language disorder that involves a specific deficit(s) in the processing of phonological information. The disorder is generally present at birth and persists into adulthood. A prominent characteristic of the disorder is a specific reading disability. Preceding, accompanying, and following this reading disability, the disorder manifests itself in various difficulties in phonological coding, including problems in encoding, retrieving, and using phonological codes in memory. In addition, difficulties may be observed in speech production and in the metalinguistic awareness of speech sound segments (pp. 58-59).

In another definition of dyslexia, it is described as "a persisting disturbance in the coding of written language, which has its cause in a deficit in the phonological system" (Hoien & Lundberg, 2000, p. 9). These two definitions emphasize deficit in phonological processing. A large body of research (e.g., Badian, 1999; McBride-Chang, & Manis, 1996; van Daal & van der Leij, 1999) has attempted to explain reading disability. However, the results differ according to the age, grade levels or the variables selected for the study. Therefore, to reach a clear definition of dyslexia, new research findings are required.

A substantial amount of research has shown that phonological awareness (the ability to manipulate speech sounds) is a powerful predictor of reading ability (e.g., Wagner & Torgesen, 1987; Wagner, Torgesen & Rashotte, 1994). Although naming speed has been shown as another important predictor of reading (Denckla & Rudel, 1976a,b; Kirby et al., 2003; Wolf et al., 2000), the concept of naming speed has been viewed differently by some researchers (e.g., Meyer, Wood, Hart, & Felton, 1998; Wagner et al., 1993; Wagner, Torgesen, Rashotte, Hecth, Barker & Burgess, 1997; Wolf & Bowers, 1999). For instance, naming speed has been conceptualized as a component of phonological processes such as "the retrieval of phonological codes

from a long-term store" (Wagner et al., 1993, p. 84). However, naming speed includes many subprocesses alongside phonological processes. As shown in the letter-naming model (see Wolf, 1999; Wolf & Bowers, 1999), rapid letter naming requires

> (a) attention to letter stimulus; (b) bihemispheric, visual processes that are responsible for initial feature detection, visual discrimination, and letter and letter-pattern identification; (c) integration of visual feature and pattern information with stored orthographic representations; (d) integration of visual information with stored phonological representations; (e) access and retrieval of phonological labels; (f) activation and integration of semantic and conceptual information; and (g) motoric activation leading to articulation (Wolf& Bowers, 1999, p. 418).

For this reason, naming speed cannot be categorized under phonological skills and recently has been defined as "a complex ensemble of attentional, perceptual, conceptual, memory, phonological, semantic and motoric subprocesses that have precise, rapid timing requirements within and across all components" (Wolf et al., 2000, p. 408).

Naming speed indicates how fast the brain can integrate the visual and verbal processes. It develops before reading is ever taught. Since naming and reading have similar perceptual, cognitive, linguistic, and motoric processes; naming speed measures can be used for the early identification of children with reading disabilities even before reading acquisition (Wolf & Bowers, 1999; Wolf & Denckla, 2005).

History of RAN

The history of rapid automatized naming was based on neurological studies conducted by Geschwind and his colleagues (1965, as cited in Denckla & Cutting,

1999) who investigated a case of an adult who had "pure alexia without agraphia" (i.e., being able to write but not read what is written) due to the acquired brain lesion. The researchers noticed that this adult was not able to name colors although there were no signs of color blindness or problems in color matching. This finding led the researchers to make a connection between reading disability and color naming in children.

Color naming and reading ability were assumed to be related since these two tasks require similar cognitive, linguistic, and perceptual processes involved in the retrieval of a visual stimulus (Wolf, 1999). Thus, color naming could be used as an indicator of visual-verbal disconnection. Research on color naming in children showed that their performances differed in terms of naming speed rather than accuracy (Denckla & Cutting, 1999). Later on, Denckla elaborated on previous findings with Rudel and they designed the original RAN tasks (e.g. Denckla & Rudel, 1974, 1976a, 1976b). The subsequent studies provided evidence that naming speed differentiated readers with dyslexia from other readers (Denckla & Rudel, 1974, 1976a).

As a conclusion, Denckla and Rudel (1974) were the first researchers who designed "RAN tasks to measure continuous, serial naming speed performance on common visual stimuli" (Wolf et al., 2000, p. 388). The speed of the retrieval of letters, digits, colors and objects was termed RAN tasks. In each RAN task, children name verbally fifty stimuli as rapidly as possible (Wolf, 1999; Wolf et al., 2000).

Development of RAN Tasks

RAN tasks are used to assess the retrieval speed and to differentiate readers with dyslexia from other children. Denckla and Rudel (1974) developed RAN tasks which include four categories (objects, colors, numbers, and letters). Colors were the first RAN tasks since it was hypothesized that they were learned early and used frequently in daily language (Denckla & Cutting, 1999). Later on, Denckla and Rudel added three tasks, namely objects, letters and digits. In each category, there were five symbols repeated randomly ten times, for a total of fifty stimuli.

Studies have examined the relationship between RAN tasks (objects, colors, numbers, and letters) and reading skills (e.g., McBride-Chang & Manis, 1996; Meyer et al., 1998). Based on these findings, RAN letters and numbers had stronger contribution to reading ability than RAN colors and objects. Also, RAN letters and numbers distinguished good and poor readers better than rapid naming of colors and objects (Wolf, 1999; Wolf, Bally & Morris, 1986). Although object and color naming speed were less predictive of reading than symbol naming speed, some researchers preferred to use nonsymbolic tasks for kindergarten children, due to the fact that preschoolers can name pictured objects or colors more easily than letters or numbers (e.g., Badian, 1994; 1998). As a result, all the RAN tasks used in numerous studies demonstrated the relationship of RAN to reading ability (e.g., Badian, 1994; 1997; 1998; Denckla & Rudel, 1976b; McBride-Chang & Manis, 1996; Meyer et al., 1998; Wolf et al., 1986; Scarborough, 1998).

RAN tasks were measured by the time taken to name all visual items presented in random order. The speed of responses has been a more powerful predictor than the mistakes of the individuals when evaluating their responses (Wolf & Denckla, 2005). A deficit in RAN may be identified when a child spends much longer time than the average child to name all items (Vukovic & Siegel, 2006).

Discrete and Continuous Formats of RAN Tasks

The format of RAN tasks has been another issue to investigate while exploring the role of RAN tasks in the prediction of later reading ability. There are two formats developed for RAN tasks: discrete and continuous.

The continuous format was used by Denckla and Rudel (1974, 1976b). RAN tasks were designed to measure the person's ability to perceive a basic visual symbol and to name it as quickly as possible. Children were asked to name all fifty items on the board consecutively. The total time in seconds taken by the child to name all of the stimulus items is the raw score on the RAN Tests.

On the other hand, the discrete format of RAN tasks (i.e., items presented individually and the score obtained by taking the average of the latencies for fifty items) has been also used to see whether RAN would still be a correlate of reading in this format (e.g., Fawcett & Nicolson, 1994). These researchers found that readers with dyslexia and average readers differed in their performances on the discrete trial format of RAN tasks (colors, digits and letters).

The debate regarding the formats of RAN (discrete versus continuous) included which format is a powerful discriminator of good and poor readers. Research findings consistently showed that continuous or serial rapid naming

discriminated poor and good readers. The rationale behind this assumption is that continuous format requires some processes that are evident for textual reading such as scanning, sequencing. Since serial naming necessitates rapid efficient responding accompanying some executive functions, it was also argued that continuous format predicted later reading achievement much better than discrete format (Denckla & Cutting, 1999). In some studies underlying the retrieval of phonological codes, both continuous and discrete formats were used together as two separate factors (e.g. Wagner et al., 1993; Wagner, Torgesen & Rashotte, 1994).

Description of the Original RAN Tests

The original RAN Objects test includes five stimulus items (book, chair, dog, hand, and star) chosen on the basis of their high frequency, from highly familiar semantic categories related to childhood (i.e., school items, animals, furniture, body, nature). Their ease in articulation and the single syllable structure are also taken into consideration. The original RAN Colors test consists of the five original colors (red, yellow, blue, green, black) appearing twice in each row without repetitions like "red", "red". The original RAN Numbers test includes five numbers (2, 4, 6, 7, 9) which appeared in Denckla and Rudel (1976b). Items appear twice per row without repetitions such as (2-2), (4-4). The original RAN letters test includes five high frequency lowercase letters (a, d, o, p, s) appearing twice per row without obvious repetitions on each row.

RAN tests are individually administered, timed tests. There is no time limit. During the administration of the RAN tasks, the examiner reads the directions and the examinee is asked to name the items as fast and as correctly as possible. Scoring

depends on the total time in seconds taken by the examinee in each RAN test. The performance of the examinee is indicated by standard scores that are obtained by the raw scores. All of the RAN Tests have a mean of 100 and a standard deviation of 15. The consistent errors and self-corrections done by the examinee might be used as additional sources for the assessment although they do not affect the raw or standard score. For instance, if the examinee makes excessive errors on more than five stimuli on a card, then it may be the indicator of other problems such as in visual perception or attention. Excessive errors or self-corrections may threaten the validity of the tests.

RAN tests may be administered to students between the ages of 5-0 and 18-11. The normative data was obtained from 1461 individuals (ages 5-0 through 18-11) in twenty-six states in the United States (Wolf & Denckla, 2005).

Assessment and Screening

RAN tests as a diagnostic tool are easy and quick to administer and can be used for different purposes. The RAN tests, administered yearly to every kindergarten, first-, and second-grade child, can be considered as part of brief, predictive assessment by the school or clinic. Beside the use for early identification of children at risk for reading failure, these tests assess the deficits in naming speed and also predict later reading achievement. They can also be used in the assessment and research on word-retrieval systems for different populations (Wolf & Denckla, 2005).

Reliability of the Original RAN Tests

Test-retest reliability of the RAN tests was examined by using a group of 216 students in Kansas, Maryland, Texas, Virginia, and West Virginia, ages 7- 0 through 17- 11. The RAN tests were administered twice to the same sample with approximately a two week interval. The correlation coefficients for RAN tasks showed that the four subtests had high reliability (The correlation coefficients for objects, colors, numbers, and letters were .84, .90, .92, and .90, respectively).

For the interrater reliability, two staff members independently scored a set of 29 completed protocols chosen randomly from the examinees in the normative sample. The sample included participants between the ages of 6 and 16 years with average rapid naming skills. The coefficients ranging from .98 to .99 strongly supported the RAN tests' reliability among scorers (Wolf & Denckla, 2005).

Validity of the Original RAN Tests

Three types of validity had been presented to provide evidence for the accuracy of the original RAN tests: Content validity, criterion validity, and construct validity.

Content validity

The explanations as to how the RAN subtest items (objects, colors, numbers, and letters) are selected as well as how they are constructed provide evidence regarding the content of the RAN tests. The rationale for the selection of the original RAN stimulus items was based on Denckla and Rudel studies in 1974 and 1976.

RAN Objects. This test includes five stimulus items (book, chair, dog, hand, and star) chosen on the basis of their high frequency, from highly familiar semantic categories related to childhood (i.e., school items, animals, furniture, body, and nature).

RAN Colors. This test consists of the original five colors (red, yellow, blue, green, and black).

RAN Numbers. This test includes five numbers (2, 4, 6, 7, and 9) which appeared in Denckla and Rudel (1976b).

RAN Letters. This test consists of five high frequency lowercase letters (a, d, o, p, and s).

Criterion-Related Validity

This type of validity can be assessed by two forms that are either concurrent or predictive. In a recent study (Goldberg O`Rourke, Katzir-Cohen, & O`Brien, 2001 cited in Wolf & Denckla, 2005) the RAN Letters and Numbers tests and the Rapid Digit Naming and Rapid Letter Naming subtests of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) were administered to 43 elementary school students with ages from six to ten years. The coefficient for RAN Numbers and CTOPP Rapid Digit Naming was .72; the coefficient for RAN Letters and CTOPP Rapid Letter Naming was .71. As RAN tests (letters and numbers) were correlated with those of another test, measuring the same behavior or trait (CTOPP Rapid Digit and Letter Naming), the criterion validity was supported with these findings.

Construct Validity

As indicated by Wolf and Denckla (2005) naming speed and reading are defined as "overlapping systems of perceptual, linguistic, cognitive, and motoric systems that require rapidity and attention to perform" (p. 32). The components of naming speed have similar processes with those used in reading. For instance, reading skills that emphasize fluency such as word identification have been expected to be much more related to naming speed performance than those that emphasize accuracy like word attack.

To demonstrate the construct validity, the RAN tests are discussed in terms of age differentiation, their distinguishing feature of good and poor readers, the intercorrelations of RAN tests scores, and lastly the relationship of RAN tests to other reading tests. Findings indicate the relationship between the scores of RAN tests and the participant's chronological age, suggesting that as children grow older, they take less time to name the stimulus items (Wolf & Denckla, 2005).

The relationship between chronological age and RAN performance scores has been shown to be strongly correlated so that as the participants grow older, the amount of time taken to name the stimulus items declines (e.g., Denckla & Rudel, 1974; 1976a; 1976b).

Distinguishing good readers from poor readers is another way of showing the validity of test results. A large body of research discussed the role of RAN in the differentiation of individuals with varying degrees of reading ability such as children with dyslexia or garden variety children. The research underlying the differences between good or average readers and poor readers can be regarded in several ways: Cross-sectional, longitudinal or cross-linguistic studies.

Based on the findings of the cross-sectional studies, performance in naming speed differentiates most children with dyslexia from other readers at every age (e.g., Badian, 1996; Catts et al., 2002; Denckla & Rudel, 1974; Kirby et al., 2003; McBride-Chang & Manis, 1996; Schatschneider et al., 2002).

Several studies demonstrated that RAN performance predicts concurrent and later reading skills in children with reading disabilities (e.g., McBride-Chang & Manis, 1996; Meyer et al., 1998). For instance, Meyer and colleagues (1998) studied the predictive value of rapid naming over time for various aspects of later reading. Data were obtained from two different samples of students who were evaluated from third-grade through the eighth-grade. The first sample included 154 students chosen randomly and normally distributed (i.e., those having various degrees of reading abilities as poor, average, and good readers). The second sample consisted of 64 poor readers separate from the first sample. The purpose of the study was to compare these two samples to determine whether rapid naming as a predictor should be considered for the whole range of reading ability or just within the lower range. Pearson moment correlation coefficients were obtained and the results showed that rapid naming was predictive of word identification at fifth- and eighth-grade only in poor readers. The double deficit hypothesis developed by Bowers and Wolf (1993) was supported by this study.

Other ways of demonstrating the construct validity of RAN tests were to examine the intercorrelation of test scores and the relationship of RAN tests to reading tests. The standard scores of the normative sample were found to be intercorrelated. A large body of the research has documented the relationship of RAN tests to other predictors of reading (memory, orthographic awareness,

processing speed, etc.) as well as to reading itself (e.g. McBride-Chang & Manis, 1996).

Double Deficit and Triple Deficit Hypothesis

A large body of research has focused on phonological deficits as an explanation of reading difficulties or disabilities (e.g. Wagner & Torgesen, 1987; Wagner et al., 1993). Therefore, the intervention and training programs for children with reading disability were based on the phonological processing and decoding tasks. However, there were some children with poor reading skills who still resisted the phonological interventions or treatments. For this reason, some researchers assumed that there may be some other explanations beside phonological deficits such as naming speed deficits (Wolf, 1999).

Naming speed, also known as rapid automatized naming, refers to rapid efficient responding to a visual stimulus (Denckla & Cutting, 1999). There is growing evidence that deficits in naming speed tasks are associated with reading disabilities (e.g., Ho, Chan, Tsang, & Lee, 2002; Kirby et al., 2003; McBride-Chang & Manis, 1996; Meyer et al., 1998; Wolf, O'Rourke, Gidney, Lovett, Cirino, & Morris, 2002). Recent research has also integrated naming speed deficits as a second core deficit of reading disability, viewed as a separate component of phonological processing skills (e.g. Wolf, 1999; Wolf & Bowers, 1999). Furthermore, Wolf and Bowers (1999) stressed that these two deficits (phonological and naming speed deficits) are not the only possible explanations of reading failure. So, new dimensions or processes might be added to explore the possible factors leading to reading disability.

Over one decade of research has investigated the co-occurrence of the two deficits in the same individual (Badian, 1997; Lovett, Steinbach, & Frijters, 2000; Schatschneider, Carlson, Francis, Foorman, & Fletcher, 2002; Wolf & Bowers, 1999). These studies originated from the double deficit hypothesis (DDH) proposed by Bowers and Wolf in 1993. This hypothesis is a new theoretical conceptualization and integration of phonology in reading with naming speed. According to DDH, three subtypes of poor readers are defined: Those who have only naming speed deficits, those who have only phonological deficits and lastly those who have both phonological and naming deficits (i.e., double-deficit group). The individuals with phonological deficits have difficulties in decoding words and phonological awareness tasks. They tend to have significantly low scores in blending sounds into words, phoneme deletion tasks. On the other hand, those who have deficits in naming speed are significantly slower at the continuous naming of an array of visually presented stimuli. They might have problems in reading fluency and comprehension. The most severely impaired children were those who have problems in both tasks (Wolf, 1999; Denckla & Cutting, 1999; Manis, Doi, & Bhadha, 2000; O'Brien, Wolf, Morris, & Lovett, 2004).

The conceptualization of reading disability has been extended by adding a third factor to DDH. Badian (1997) included the orthographic awareness (i.e., recall of the spelling patterns) as a third factor to the double deficit hypothesis and investigated the role of phonological, naming speed, and orthographic awareness on reading performance, aiming at understanding why some children have a serious impairment in reading. The subjects consisted of ninety children (ages six to ten years) with different degrees of reading skills, such as dyslexics, garden variety poor readers, reading-level matched younger children, and children with low verbal

intelligence. Garden variety readers (also known as "nondiscrepant readers") refer to the poor readers whose reading level is proportional to their achievement or intelligence scores (Wolf & Denckla, 2005). The results showed that children who have both phonological and naming speed deficits were more impaired than those who have a single or no deficit. This group of children also had orthographic deficits. (50 % of the dyslexic subjects had all the three deficits – i.e., phonological, naming speed, and orthographic deficits.) This study supported the DDH developed by Bowers and Wolf (1993). However, more research is needed to determine the deficits underlying reading failure or disability. Research findings indicated that the degree of reading disability was related to the number of the deficits. So, those who had more than two or three deficits were characterized as the more severely impaired readers (e.g., Badian, 1997; Ho, Chan, Tsang, & Lee, 2002).

RAN and Reading

The relationship of naming speed to different kinds of reading tasks (word reading, comprehension, and memory) has been documented by many researchers (e.g., Badian, 1994; Manis et al., 2000; McBride-Chang, & Manis, 1996; Meyer et al., 1998). The following section presents the association of naming speed to reading ability or disability on the basis of data from different grades, populations, and languages. In summary, there is abundant evidence that rapid naming is a strong predictor of reading disabilities across ages, languages, and readers' subtypes (e.g., Denckla & Cutting, 1999; Wolf & Bowers, 1999; Wolf & Denckla, 2005).

RAN as a Predictor of Reading Disability across Grades

A considerable number of studies have explored the variables that predict later reading performance (e.g., Schatschneider et al., 2004; Wagner & Torgesen, 1987; Wagner et al., 1993; Wolf et al., 1986). Naming speed research studied and followed a large group of children at every age from the beginning of kindergarten through late years of schooling (e.g. Badian, 1996; Denckla and Rudel, 1976b; Manis et al., 2000; Meyer et al., 1998).

Various research findings indicated that the predictor role of naming speed may change depending on age or grade levels. In an eight-year longitudinal study, Meyer et al. (1998) found that the development of rapid naming was greatest between the first and third grades. Wagner and colleagues (1997) suggested that the unique contribution of naming speed diminished by third grade, but phonological awareness continued to predict later reading ability. They indicated that RAN was much more predictive in first and second grade orthographic skills.

However, Kirby and colleagues (2003) reported that naming speed, which had a weaker relationship with reading development during the first years of schooling, increased with grade level. So, they indicated that the influence of naming speed may not be age limited. On the contrary, its relationship with reading becomes much more important as children age.

RAN as a Predictor of Reading Disability across Good and Poor Readers

Good readers can be identified as those who "…(a) associate speech sounds with letters (phonemes-graphemes); (b) pronounce printed words; (c) gain meaning from

print; and (d) read orally or silently with sufficient accuracy and speed" (Hammill, 2004, p.464). Those who have difficulties in these abilities mentioned above can be characterized as poor readers (Hammill, 2004).

Research on naming speed has examined whether naming speed performances distinguish good or average readers from poor readers (e.g., Catts, Gillispie, Leonard, Kail, & Miller, 2002; Davis, Knopik, Olson, Wadsworth, & DeFries, 2001; McBride-Chang & Manis, 1996). In a series of studies, Denckla and Rudel (1974, 1976b) used the RAN tests (i.e., colors, objects, letters, and numbers) to see whether they differentiate the dyslexic group from average readers and from the nondyslexic group with learning disabilities. The researchers found that letters and numbers were easier to name quickly for all groups; on the other hand objects were the hardest tasks to name rapidly for all groups including the normal, dyslexic, and nondyslexic learning disabled groups. This research revealed that individuals with dyslexia differed significantly from average readers when asked to name rapidly the symbols: letters, numbers, colors, and objects. Furthermore, some research studies compared different group of readers (such as dyslexics, average or garden variety poor readers) in terms of naming speed performances (e.g., Badian, 1996; Denckla & Rudel, 1976a, 1976b). The results showed that RAN tasks differentiated individuals with dyslexia from other reader types.

Based on research findings, RAN has been shown to be an important indicator of later reading ability among different reader groups (e.g., Denckla & Rudel, 1974; 1976b). Other studies supported the previous findings (e.g., Badian, 1994; McBride-Chang & Manis, 1996). Based on these findings, the researchers showed that most dyslexic children are slower in naming speed tasks than average groups.

Studies have shown the predictive role of different cognitive or linguistic processes in reading achievement including naming speed. For instance, McBride-Chang and Manis (1996) examined the associations of naming speed, phonological awareness and verbal intelligence to word reading in good and poor readers in the third and fourth grades. The results indicated that phonological awareness was a predictor of word reading ability in both poor and good readers. However, naming speed was strongly associated with word reading only for poor readers. Naming speed was not an indicator of word reading ability for good readers of this sample. Another conclusion drawn from this study is that verbal intelligence was associated with word reading in the group of good readers. As a conclusion, as reading levels improved, naming speed was not a contributing factor that influences word reading.

In a recent longitudinal study, reading differences in poor and good readers were discussed (Catts et al., 2002). They investigated the role of the speed of processing, rapid naming, and phonological awareness in reading achievement. Measures of response time in motor, visual, lexical, grammatical, and phonological tasks were administered to 279 children in third grade. Then, measures of rapid object naming, phonological awareness, and reading achievement were given in second and fourth grades. The findings showed that poor readers performed significantly slower than good readers on response time tasks across linguistic and nonlinguistic domains. Another finding was that poor readers performed significantly slower than good readers on the rapid object naming task. This result indicated that some poor readers have a general deficit in the speed of processing and that their problems in rapid object naming are in part a reflection of this deficit. Hierarchical regression analyses revealed that the speed of processing explained unique variance in reading achievement when considered along with IQ and phonological awareness.

RAN as a Predictor of Reading Disability across Languages

Studies on dyslexia or reading disabilities are mostly based on the English language (e.g., Badian, 1997; Lovett et al., 2000). Various cognitive and linguistic variables such as phonological awareness, verbal memory or orthographical skills were examined to enhance our understanding of reading disabilities. However, the role of RAN appears to be discovered recently (Denckla & Cutting, 1999; Wolf & Bowers, 1999).

Cross-linguistic research has attempted to provide support for the significance of RAN tasks in the identification of developmental dyslexia regardless of the type of the orthography (i.e., regular or irregular words) specific to the language studied. The acquisition of reading and spelling might be influenced by the nature of the spoken language. For instance in English there are thirty- to forty-five basic sounds or phonemes that are combined to form every spoken word. These basic sounds are generally common in many words. Therefore, phonological awareness (the ability to manipulate speech sounds) is an important process in learning the alphabetic writing system. For example, English has an irregular orthography (Wagner et al., 1994). There are some words (e.g. “laugh”, “where”) that are difficult in terms of phonology. For reading and spelling these kinds of words, one has to memorize the words (Shin, 1998). For this reason, the irregularity of the English language has an effect on reading acquisition.

RAN differences among dyslexic readers have been shown across different languages with regular orthographies such as German (e.g., Wimmer, Mayringer, & Landerl, 2000), Dutch (e.g., van Daal & van der Leij, 1999), Spanish and Finnish (see Wolf, 1999; Wolf & Bowers, 1999). Studies from different languages can

extend the assumption about RAN, its nature and its role in the reading achievement. For example, German has a more regular orthography than English. Wimmer and colleagues (2000) investigated the role of naming speed and phonological awareness in German-speaking children with reading difficulties. They found that naming speed is much more predictive for later reading achievement in German speaking children.

Katzir, Shaul, Breznitz, and Wolf (2004) studied two languages having different orthographies (Hebrew and English) to understand the characteristics of dyslexic children. A set of cognitive, linguistic and reading measures were administered to thirty Hebrew speaking and thirty English speaking children. Naming speed was measured by using three subtests of RAN tests (numbers, letters, and objects, respectively). Depending on speed and accuracy measures, naming performances were compared. In terms of accuracy, differences were not found between these two groups. However, there were differences between Hebrew-speaking and English-speaking children in all reaction times. The results indicated that Hebrew-speaking children with dyslexia were faster in naming numbers, letters, and objects than English-speaking children.

The Chinese language has a different orthography than alphabetic languages (Ho et al., 2002). The connection between a visual symbol and verbal label is important since Chinese has a morphemic-based orthography. This connection shows a similarity with naming speed which requires naming items that are visually presented. Research findings indicated that RAN is a strong predictor of later reading performance (Wolf, O'Brien, Adams, Joffe, Lovett, & Morris, 2003).

As outlined by Wolf et al. (2000), deficits in RAN were found in children with reading disabilities across all languages tested. The cross-linguistic research can

give clues about the universality of reading disabilities (or dyslexia) regardless of the language characteristics.

Reading Fluency

In recent years, reading fluency has been another interest of the researchers who have studied reading problems (Hudson, Lane, & Pullen, 2005). Researchers have attempted to define the concept of reading fluency although it is difficult to reach a consensus (Wolf & Katzir-Cohen, 2001). However, the conceptualization of fluency has been elaborated and broadened by explaining it with other variables such as rate, accuracy, and comprehension at different levels (Katzir et al., 2004). Reading fluency has been defined as "the speed and accuracy with which the text is read orally" (Speece & Ritchey, 2005, p.387) or "the acquisition of smooth rates of processing speed in reading outcomes (e.g. word attack, word identification, and comprehension)" (Wolf, Miller, & Donnelly, 2000, p. 377).Wolf and Katzir-Cohen (2001) attempted to unite the previous and recent studies on fluency and elaborated its definition:

> In the beginnings, reading fluency is the product of the initial development of accuracy and the subsequent development of automaticity in underlying sublexical processes, lexical processes, and their integration in single-word reading and connected text. These include perceptual, phonological, orthographic, and morphological processes at letter-, letter-pattern, and word-level; as well as semantic and syntactic processes at the word-level and connected text level. After it is fully developed, reading fluency refers to a level of accuracy and rate, where decoding is relatively effortless, where oral reading is smooth and accurate with correct prosody; and where attention can be allocated to comprehension (p.219).

It is important to read words quickly and automatically in order not to waste time with the decoding process since comprehension necessitates higher order processes. Thus, it can be concluded that fluent readers can easily decode the text and comprehend what is read. Reading fluently is one of the characteristics of skilled readers, whereas the lack of fluency is evidence of reading problems. Therefore, the development of reading fluency during different stages of reading acquisition has been explored by some researchers (e.g. Hasbrouck & Tindal, 2005; Hudson, Lane, & Pullen, 2005; Speece & Ritchey, 2005).

RAN tasks are regarded as one of the correlates of oral reading fluency. In a longitudinal study, Schatschneider and his colleagues (2004) examined the prediction of reading skills with multiple measures (e.g. naming speed, phonological awareness, letter knowledge) assessed in kindergarten years. The findings regarding the prediction of reading fluency from the beginning of kindergarten to the end of first and second grade indicated that RAN Letters were more strongly correlated with reading fluency than phonological awareness, letter sound knowledge, and letter name knowledge. At the end of the first grade, RAN Objects were also related to reading fluency with a lower degree compared to RAN Letters. Thus, naming speed measures were mostly associated with reading fluency in first and second grade.

Fluency-based measures have been used for different purposes: As screening measures, diagnostic measures, progress-monitoring measures, and outcome measures. First, they can be used as screening tools for children who will be at risk for later reading abilities. In this way, necessary interventions can be provided. As quick and simple measures, they can be used as parts of a diagnostic tool during the assessment of those who suffer from reading problems. These measures can also be

used at different times for monitoring the progress and evaluating the consequences of the interventions (Hasbrouck & Tindal, 2005).

Reading fluency can be assessed through oral reading. When reading orally, the total number of words read correctly per minute is counted. Oral reading norms should be created in order to compare the scores obtained by each performer. Although the performance norms for Turkish children in different grades and ages have not been created yet, there are some studies which have attempted to calculate the words read correctly per minute (e.g. Erden, Kurdoğlu & Uslu, 2002; Şenel, 1998). Erden and colleagues (2002) developed and established Turkish norms for reading speed and writing errors in elementary years (n=2481). Reading speed was characterized by the number of words read from scripts appropriate to grade levels, in a limited time. The results indicated that reading speed errors vary according to grade levels. The mean differences of words read correctly in one minute were found to be significant based on grade levels. For instance, first graders' performances differed from the third-, fourth- and fifth-graders' performances in a significant way. In another study (Korkmazlar,1993), teachers were asked to determine the number of words read correctly in one minute for each grade level (first- through fifth-grade). A total of 15 teachers, three teachers from each grade level, indicated that the number of words read correctly in one minute beginning from first- through fifth-grade was 60, 70, 90, 110, and 120, respectively.

The previous studies mentioned above found different means for words read correctly in one minute in each grade level. For instance, Korkmazlar (1993) suggested that first graders' mean for reading speed was 60 words which was determined according to classroom teachers' opinions. On the other hand, Erden et al. (2002) studied with a large sample (n=2481) and found that the mean of reading

speed for first graders was 45.30 with a standard deviation of 27.47. Due to controversial findings about reading speed obtained either by words read correctly per one minute or by asking classroom teachers' opinions, new oral reading fluency measures were developed for the present study.

The Turkish Language

As outlined by Katzir et al. (2004), cross-linguistic research indicates that although reading disabilities are seen in many languages; phonological deficits, accepted as the core problem of reading failure, are manifested less often in languages with regular orthography. On the other hand, naming speed deficits are demonstrated in many languages that have different orthographies (e.g. German: Wimmer et al., 2000; Dutch: van Daal & van der Leij, 1999; Chinese: Ho et al., 2002). Studies about RAN have mostly focused on the English language but Turkish has different characteristics. For instance, unlike English, Turkish is considered as a transparent language because the correspondence between letters and sounds is almost one-to-one (Bingöl, 2003; Durgunoğlu & Öney, 1999). The knowledge of the correspondence between letters and sounds helps Turkish beginner readers to decode words more rapidly and efficiently (Öney & Durgunoğlu, 1997). Therefore, intervention in phonological awareness may not be helpful in dealing with reading problems experienced in languages that have regular orthographies, if enough emphasis is not put on reading fluency and comprehension problems (Katzir et al., 2004). In that respect, Turkish based research is important to understand the role of naming speed in reading problems.

As a conclusion, it is critical to understand the characteristics of the Turkish language in terms of reading/writing instruction and intervention programs.

Studies about Reading Disabilities in Turkey

Reading disability has been explored by numerous studies from different countries but among different languages, mostly in English (e.g. Badian, 1996; Catts, 1989; Lyon, Shaywitz & Shaywitz, 2003; Scarborough, 1998; van Daal & van der Leij, 1999). In Turkey, the studies about reading disability are much more limited (e. g. Bingöl, 2003; Erden et al, 2002; Kesikçi & Amado, 2005) although difficulty in reading is not uncommon among school children.

According to DSM-IV-TR (2000), the prevalence of reading disorders in the United States is estimated at 4 %. However, the ratio of developmental dyslexia in Turkey was not known until recently. Bingöl (2003) has attempted to find the prevalence of developmental dyslexia in Turkish children among second- and fourth-graders in Ankara. The ratio of developmental dyslexia in the second-grade was 2.1 %, whereas in the fourth-grade this was 0.6 %. Compared to other countries this prevalence ratio was much lower, but definitely more investigations are needed.

The discrepancy between intelligence test scores and reading test scores was accepted as an indicator of "developmental dyslexia". However, in Turkey, there has been no standardized reading test in order to identify dyslexic children even though standardized intelligence tests exist. Therefore, Bingöl (2003) has pointed out the need of a reading achievement test for the Turkish language.

In order to identify children with learning disabilities, Erden and colleagues (2002) developed and established Turkish norms for reading speed and writing errors

in elementary years. Reading speed was characterized by the number of words read from scripts appropriate to grade levels, in a limited time. Writing errors were determined when a three-sentence script, including repeated consonants "p-b-d-t-m-n-v-f", was dictated. The results indicated that reading speed and writing errors vary according to grade levels. The mean differences of word reading speed in one minute were found to be significant based on grade levels. For instance, first-graders' performances differed from the third-, fourth- and fifth-graders' performances in a significant way.

Baydık (2002) examined two groups of students from the first-grade level (those who are reading-disabled and those who are not) in order to compare the word reading skills of these two groups of children. The sample consisted of 42 children (21 reading-disabled and 21 average readers from first-graders in Ankara). Letter naming, nonsense wording, and wording familiar words were used to test the reading ability of the subjects. The results indicated that the performances of average readers were significantly better than those of the reading-disabled group on three measures. The reading-disabled group experienced phonological problems while reading the three lists of words.

In Turkey, studies investigating phonological acquisition in children are limited (Topbaş, 1999). Cross-sectional studies were conducted by some researchers to explore the role of phonological processes at different developmental stages (e.g., Kündük, 1990 as cited in Topbaş, 1999; Topbaş, 1988). Some of the findings indicated that some phonemes (such as the /k/ sound) had been acquired earlier than other phonemes since they were used frequently. The /k/ sound was found to be the most frequent sound in word-initial position by counting the number of entities in the Turkish Junior Dictionary (10,000 words). Topbaş (1988) stated that "…the

frequency of /k/ sound in the input to the child in Turkish, allows them to experience that sound earlier" (p. 77).

In a descriptive study with a sample of 20 children between the ages of two to six, the phonological processes in the acquisition of Turkish were examined. The use of phonological processes such as consonant deletion and syllable deletion differs according to age. For instance, final consonant deletion and initial consonant deletion were the phonological processes that disappeared after the age of three (Acarlar & Ege, 1996).

As the English and Turkish languages have different alphabetical writing systems, the relationship of phonological awareness to later reading ability in both languages was investigated to see the role of phonological awareness in reading achievement. The phonological awareness tasks were compared both in English and Turkish speaking children to understand the effect of phonological awareness on later reading achievement. Turkish speaking children performed better in almost all phonological tasks compared to English speaking children due to Turkish language characteristics which facilitate the acquisition of the phonological tasks (Oktay & Aktan, 1997).

The measurement tools used in reading research are very limited. Some researchers have attempted to develop new measures (e.g., Baydık, 2002) or to adapt assessment tools previously used in different countries (e.g., Şenel, 1998). The adapted tests used in reading research are mostly related to phonological processing skills. A large discrepancy between achievement and aptitude (IQ) has been accepted as one of the criterion for the identification of reading disability (e.g., Kesikçi & Amado, 2005).

The relationship among phonological memory, short-term memory and the Wechsler intelligence scale for children (WISC-R) test scores were examined by comparing the Turkish speaking, reading-disabled children with the average readers. The results indicated that reading-disabled children had difficulties in phonological processes although Turkish is phonologically less complicated than English. The error scores concerning phonological memory clearly distinguished the control group from children with reading disorders. Also, reading-disabled children had lower scores on the WISC-R verbal subscales (i.e., vocabulary, similarities, arithmetic, and verbal total score) although they had higher scores on performance skills (Kesikçi & Amado, 2005).

To date, the associations of reading to naming speed have not been studied in Turkey. In order to explore the relationship between reading achievement and different linguistic-cognitive processes such as naming speed, new research studies are required.

Research Questions

Based on the literature review and the research findings, the research questions of the study will be

1) How is the construct defined and reflected in the tests?
2) What are the intercorrelations among the subtests of RAN?
3) Are RAN scores of the children negatively correlated with age?
4) Are RAN scores of the children correlated with the number of words read correctly per minute?

5) Are RAN scores of the children correlated with reading speed evaluations?
6) What is the interrater reliability coefficient for each subtest of Turkish RAN (objects, colors, numbers, and letters)?
7) What is the test-retest reliability coefficient for each subtest of Turkish RAN (objects, colors, numbers, and letters)?

CHAPTER 3

METHODOLOGY

The purpose of the study was to adapt the RAN tests to Turkish and to investigate whether the four subtests of the adapted RAN tests could produce reliable, valid, and generalizable scores in the population of children varying from five- to ten-year olds. To answer the research questions described in Chapter 2, a correlational design was used to see the relationships among RAN subtest scores, between RAN scores, and oral reading fluency measures. This section describes: a) selection of participants, b) instruments, c) procedures, and d) data analysis.

Selection of the Participants

A total of 293 students were chosen from seven elementary schools (three private and four public schools) and one kindergarten in Istanbul. These schools represented different demographic characteristics and populations of varying socio-economic status (SES). The children ranged in age from five to ten years.

First, the school counselors of these sample schools were asked to compile a list of students ranging from kindergarten to fifth grade and representing different SES groups. Children were selected based on the following criteria: Only children between five and ten years old were recruited for the sample. Those age groups were selected because the powerful predictor role of rapid naming in early years of

schooling, even before formal reading instruction, has been documented by many studies (e.g., Denckla & Rudel, 1976a, 1976b; Kirby et al., 2003; Wolf et al., 1986).

When choosing the participants, equal representation of gender was also taken into consideration. Children with limited Turkish proficiency were excluded from the study. The participants consisted of a variety of reading skills and academic achievement. Those who met these criteria were randomly sampled. Before starting administration, the students were asked whether they were willing to be participants or not. If they did not want to participate, they were not included in the study.

Students' socio-economic levels were determined based on parental occupation and education level which ranged from low to high. This approach was taken due to lack of information regarding parental income. Three private schools which were assumed to have mostly high/middle SES students were chosen on the basis of the judgments of the school counselors working in these schools. Four public schools were also chosen as mostly having students from middle or low SES again by asking for the school counselors' opinions. These public schools had kindergarten classes except for one school. Therefore, one kindergarten was added to the study.

Demographic Characteristics of the Sample

At the beginning of the study, a total of 293 students were selected from six age groups. Due to the participant's state of being (for example, fatigue, anxiety, attitude toward the test) 16 students were excluded based on the examiners' comments and observations. If students made excessive numbers of repetitions or self-corrections (more than five items on each card/subtest) their performances were also excluded to

limit the skewness of the data. As a result, all of the following analyses were conducted using the remaining sample of 277 students.

Participants in the study were 277 children between the ages of five and ten from different socio-economic levels. The sample distribution according to gender and SES was almost equal. All participants spoke Turkish as their native language. However, based on the demographic information form, in some participants' home environment (n=19) other languages were also spoken. Students were from three private, four public schools and one kindergarten in Istanbul. The test administration took place in April and May, 2007. The total time for the test administration was approximately 15 minutes. The demographic characteristics are presented in Table 1.

Table 1. Demographic Characteristics of Participants (N=277)

Characteristics	n	%
GENDER		
Female	135	48.7
Male	142	51.3
AGE		
5	36	13.0
6	32	11.6
7	51	18.4
8	53	19.1
9	52	18.8
10	53	19.1
GRADE		
Kindergarten	41	14.8
First	44	15.9
Second	48	17.3
Third	46	16.6
Fourth	50	18.1
Fifth	48	17.3
HAS PRESCHOOL EDUCATION		
Yes	194	70.0
No	59	21.3
No information	24	8.7
SCHOOL TYPES		
Private	137	49.5
Public	140	50.5

A total of 277 students, 135 female students (48.7 %) and 142 male students (51.3 %) were the participants of the study. The sample almost equally represented different age groups, grade levels, and school types. Data indicated that most of the children had preschool education (70 %); none of them had hearing or vision problems. According to the information form, 5.5 % of elementary students had writing and reading problems.

Another question that was asked in the information form was whether the student had been diagnosed with any disorder such as attention deficit or learning disabilities. Based on teachers' responses, eight students had exceptionality status (six students had attention deficit; one had learning disability, and one had exceptionality status that was not defined in the form).

The students' teachers provided information about parental occupation (Table 2). The categorization of this information was accomplished under four main headings: The first group included blue collar workers ranging from semi-skilled to unskilled, with varying occupations that necessitate little or no education (e.g., factory worker, cook, or tailor). The second group consisted of white collar workers who are professionals with theoretical training, working in big organizations or service sectors (e.g., doctors, engineers, architects, or professors). Those who have management responsibilities and owners of big organizations represented the third group. The fourth group consisted of owners of small organizations, or the self employed (e.g., real estate agent).

Those who were retired, housewives or not working were categorized as economically inactive. The contradictory or unclear responses were counted as missing data.

As depicted in Table 2, while most of the mothers were not working (51.6 %), only 3.6 % of the fathers were economically inactive. Most of the fathers were professionals (37.9 %).

Table 2. Distribution of Parental Occupation

Work type	Mothers		Fathers	
	f	%	f	%
Blue collar, semi or unskilled workers	7	2.5	62	22.4
White collar workers	96	34.7	105	37.9
Having management responsibilities, owners of big organizations	9	3.2	18	6.5
Owners of small scale business, self-employed	9	3.2	64	23.1
Economically inactive	143	51.6	10	3.6
Missing Data	13	4.7	18	6.5

Data about parents' educational level was also obtained from the demographic information form and categorized as below (Table 3).

Table 3. Educational Attainment of Parents

	Mothers		Fathers	
	f	%	f	%
Illiterate/literate or primary education	61	22.3	44	16.4
Junior high/high school	94	34.4	85	31.6
Undergraduate and graduate degree	118	43.2	140	52.0

Table 3 indicates that the percentage of fathers with higher educational degrees (52 %) is higher than the percentage of mothers with higher educational degrees (43.2 %).

The information about students' reading skills and academic performance was gathered from their teachers. Teachers were also asked to evaluate their students' achievement in Turkish and Mathematics courses. The frequency distribution is given in Table 4.

Table 4. Achievement in Turkish and Mathematics Courses (Teacher Evaluation)

Course	Turkish		Mathematics	
	n	%	n	%
Inadequate	21	8.9	30	12.7
Adequate	157	66.5	158	66.9
Superior	53	22.5	43	18.2

Table 4 shows that most participants' achievement was adequate in both courses according to their teachers' responses. This question was asked to examine the relationship of academic courses, especially "Turkish reading achievement", with RAN performances. As expected, there was no significant correlation with mathematic course achievement and RAN. However, there was no significant relationship between RAN performances and Turkish course achievement, except for RAN Pictures ($r = -.16$, $p<.05$). The underlying reason behind this finding might be explained by classroom teachers' evaluations that may not reflect the true potential of students' reading ability.

Instruments

In this study, three instruments were used: Demographic Information Form and Turkish RAN Tests (Pictures, Colors, Numbers, and Letters) and oral reading fluency measures consisting of five different reading passages.

Demographic Information Form. This form was completed by the classroom teachers of the students who participated in the study. This form consisted of questions about the participants such as date of birth, test date, name of the school, student's grade level, parents' occupation and education level (Appendix A). In addition, teachers evaluated their students' academic performances based on first semester grades from Turkish and Mathematics courses (only for elementary students).

Turkish RAN Tests. These tests are composed of four subtests: Pictures, colors, numbers, and letters. Each card has five items repeated ten times in random order. RAN Pictures were line drawings of highly familiar objects in five rows (i.e. dog, flower, hand, pen, and table). RAN Colors consisted of black, blue, green, red, and yellow colors in five rows. RAN Numbers included a set of randomly sequenced numbers in five rows (2, 4, 6, 7, and 9). RAN Letters consisted of five high frequency letters in five rows (b, k, m, s, and t).

The orders of the tests were the same for each participant: RAN Pictures, RAN Colors, RAN Numbers, and RAN Letters. After an untimed presentation of each item, to make sure that the examinee knew the name of the items, the examiner read the instructions and the examinee was asked to name the items as fast and correctly as possible. During the practice procedure, if the examinee was not able to name the items, he or she did not participate in the study. Since they were timed

tests, a stopwatch was used. The total time to complete each RAN subtest was recorded by the examiner using a stopwatch. Scoring depended on the total time in seconds taken by the examinee in each RAN subtest. If the preschoolers were not able to name letters and numbers, these subtests were not evaluated. Self-corrections and errors were also recorded. If the examinee became confused and stopped, the experimenter asked the child to start over. The materials were four stimulus cards, a stopwatch and the examiner record form.

Oral Reading Fluency Measures. Besides four RAN subtests, children between first- and fifth-grade were asked to read orally grade-level passages. There were six reading passages prepared on the basis of grade level. These tests were obtained by counting the number of words read correctly in connected text in one minute. When reading orally, the examiner noted the examinee's mistakes and self-corrections as well as the number of words read correctly per one minute. The six different reading passages were also included as well as their instructions.

Reading tasks measuring fluency or speed were found to be much more related to naming speed performance (Wolf & Denckla, 2005). Thus, oral reading fluency measures were used to compare RAN scores with the number of words read correctly in one minute. Based on the previous studies aiming at measuring oral reading fluency (Erden et al., 2002; Şenel, 1998) and teacher recommendations, six passages with different levels of difficulty were developed. The numbers of words in each sentence, the font as well as its size were taken into consideration in the selection of passages (Table 5).

Table 5. Characteristics of Reading Passages

Reading Passage	Font Size	Font Type	Number of words per sentence	Total number of words
Sample	18	Century Gothic	2.7	22
First Grade	18	Century Gothic	3.3	57
Second Grade	16	Century Gothic	4.9	94
Third Grade	14	Arial	6.6	107
Fourth Grade	12	Arial	9.6	125
Fifth Grade	12	Arial	11.7	153

The passages for first and second graders were written especially for this research by a professor who also writes books for children. The third-grade passage was simplified from a children's storybook by the researcher. The passages for fourth and fifth graders were selected from the textbooks (see in Appendix B) for this age group. These books are approved by the Ministry of National Education as textbooks and were used during the 2006-2007 academic year. There was also a sample passage to make sure that children understand the administration process. A total of 20 classroom teachers evaluated each passage in terms of grade level appropriateness. According to their feedback, the reading passages were reexamined and rearranged if necessary.

Procedures

A pilot study was conducted to determine the pictured objects that are used in the Turkish version. After the adaptation of the tests to the Turkish version, the Ministry of Education was contacted to get permission to select the primary education schools from different districts of Istanbul for the study to be conducted. The Ministry of

Education granted the permission for the administration of these tests. After the administrative requirements were completed, sample schools were informed about the purpose of the study. This research was also approved by the Ethical Committee of Boğaziçi University.

All participants were tested individually in a quiet, separate room, partitioned for testing. The applications were conducted between April and May during the second term of the 2006-2007 academic year. The adapted RAN tests were readministered to a group of a sample at least with a two-week interval.

Data Analysis

The construct validity of the Turkish RAN tests was demonstrated in several ways: (a) the relationships among the RAN subtests, (b) the relationship between RAN and chronological age, and (c) the relationship between RAN and oral reading fluency measures.

The relationship between the subtests of RAN was one of them since all the subtests measure visual-verbal processing speed. Pearson product-moment correlations were computed to see the interrelationships among the four subtests (i.e. Objects, Colors, Numbers and Letters). High correlations will give some evidence that the subtests measure the same construct.

Age differentiation is an indicator of construct validity because RAN performance is developmental in nature. RAN performance was expected to be related to chronological age. Research results indicated that children took less time to name the items as they became older (Denckla & Rudel, 1974). Pearson product-

moment correlation coefficients were used to examine whether there is a relationship between chronological age and RAN scores.

The construct validity of RAN tests in Turkish may also be demonstrated by showing the association between different oral reading measures emphasizing fluency and the RAN subtests. Because the RAN tests measure skills related to reading ability, the results should be correlated significantly with oral reading fluency measures. Pearson product-moment correlation coefficients were used to examine whether there is a relationship between oral reading fluency measures and RAN scores. The results are expected to be significant which are going to indicate the validity of adapted RAN tests. In addition, since any rapid naming tests measuring the visual-verbal processing speed is not available in Turkish; it is not possible to compare RAN tests with other tests. Thus, concurrent validity cannot be obtained.

Only one form of RAN tests exists, therefore alternate forms of reliability cannot be investigated. Because RAN tests are among the speeded tests, split-half reliability cannot be computed. Two types of reliability coefficients were computed for the RAN tests: test-retest and interrater reliability. Pearson product-moment correlation coefficients were also calculated for the test-retest reliability and interrater reliability.

Thus, the overall significance level for the study was set at 0.01. The results were computed using The Statistical Package for Social Studies (SPSS-13).

CHAPTER 4

RESULTS AND DISCUSSION

This chapter presents the results of the study and is organized around the questions of the study. To answer the questions presented in Chapter 2, correlation analyses were conducted. Statistical significance was determined using a probability level of .01 for all analyses. The findings were discussed on the basis of seven research questions.

Presentation of Research Findings

Question 1: How is the Construct Defined and Reflected in the Tests?

The rationale for the selection of the RAN stimulus items in Turkish will provide evidence for content validity. The formats and stimulus items used in the original RAN tests were taken into consideration when selecting the items for the adapted version. The following part describes how the items in each subtest were selected including test format and training.

First, in a pilot study, the original version of RAN tests (four subtests) were administered to a group of Turkish speaking children from different grades to examine their performance when naming the test items (n=11). Their feedback during testing was considered before starting the adaptation procedure.

In the original version, the pictured objects were selected from highly familiar semantic categories (school items, animals, furniture, body parts, and nature) on the basis of syllable structure and easy articulation. The five items chosen for the original RAN Objects subtest are “book”, “chair”, “dog”, “hand”, and “star”. These

words had single syllables and were easy to articulate for English speaking children. However, when these words were translated into Turkish, some of them had more than one syllable such as "chair" meaning "*sandalye*" in Turkish. So, the number of syllables varied from one to three when translated into Turkish. Also, these objects were selected from among highly familiar ones which were determined for English speaking children. Therefore, a pilot study was conducted to determine the most familiar objects for Turkish speaking children. Because expert judgment is another determination for content validity, teachers' evaluations were taken throughout the test item construction process.

The Turkish version of RAN objects were selected by asking 202 children ranging from preschoolers to fifth graders and 27 teachers (five preschool and twenty two primary school teachers). The teachers and children were asked to name at most six objects from six different semantic categories that are highly familiar for children (i.e., school items, animals, furniture, body parts, and nature). Their responses were collected and high frequency objects (at least three objects for each category) were identified. Table 6 displays the first three frequent objects from each semantic category.

Table 6. Frequency of Highly Familiar Objects

	Category				
Rank	Animals	Body Parts	Furniture	Nature	School Items
1.	Dog	Arms	Seat	Tree	Pen
2.	Cat	Legs	Table	Flower	Eraser
3.	Lion	Eyes	Bed	Sea	Notebook

As presented in Table 6, the most frequent object named by the students and teachers as body parts is the “arms”. Instead of “arms”, the picture of the “hand” which was also among the most frequent objects was chosen due to the fact that some of the students got confused especially preschoolers when they were asked to name arms.

Based on this information, the pictures of these objects were drawn by a painter and the researcher. Then, another group of children (n=44) were asked to name these pictures. These children were chosen from one private and one public school. Feedback about picture naming were taken from six different grade groups (kindergarten through fifth grade). Accordingly, the pictures of these items were again checked by a group of primary school teachers (n=15) to avoid misinterpretations or confusions regarding what the pictures represented. Based on the teachers’ responses, the five pictured objects were determined as *çiçek* (flower), *el* (hand), *kalem* (pen), *köpek* (dog), *masa* (table). Only the picture of the “dog” item remained as the one in the original version. Furthermore, when these items were chosen, their syllable-structure (either one or two syllable) and their ease in articulation were taken into consideration. Due to the linguistic characteristic of Turkish, except the word “hand” (*el*), these chosen words mostly consisted of two syllables. Interestingly, two object names (i.e. pen “*kalem*” and dog “*köpek*”) started with the /k/ sound which also reflected the frequent use of the /k/ sound in Turkish.

RAN Colors subtest is used as they are in the original version. RAN Colors test includes the original five colors (red, yellow, blue, green, black) appearing twice in each row without repetitions like red, red. Colors were the first RAN tasks since it is hypothesized that they are learned early and used frequently in daily language (Denckla & Cutting, 1999). A total of 20 children (mostly preschoolers) were asked

to name these before determining the colors used for Turkish version. All of them named these colors accurately and without hesitation.

Likewise, RAN Numbers subtest is used as they are in the original version. RAN Numbers test includes five numbers (2, 4, 6, 7, and 9) which appeared in Denckla and Rudel (1976b). Items appear twice per row without repetitions such as (2-2), (4-4). Because the number "seven" is written differently in the Turkish writing system, children from various grades (n=45) were asked to name number "seven" as it was presented in the original format. The children easily recognized and named this number. In addition, classroom teachers were asked their opinions regarding the form of number "seven" (n=12). The teachers indicated that the way number "seven" is written may be used as in the original format. Therefore, number "seven" is used as in the original version (i.e., as 7).

Turkish RAN Letters test includes five lowercase letters (k, s, m, b, and t) appearing twice per row without obvious repetitions on each row. The five lowercase letters were selected on the basis of the Orthography Guide of the Turkish Language Association (2005). 12,739 words were counted by the researcher and it was found that Turkish words mostly started with the letters "k, s, m, b, t" respectively. Research findings about Turkish phonology (Kündük, 1990, as cited in Topbaş, 1988; 1999) indicated that some phonemes were acquired at earlier ages. For instance, the acquisition of the phoneme /k/ is earlier than the others. The reason behind this assumption is the frequent use of these phonemes in the Turkish language. Therefore, RAN Letters test included the letters (k, s, b, m, and t) which were assumed to be easily known and articulated by school age children because of their frequent use.

After the test items of the RAN subtests were determined, the instructions of the original RAN tests and test record form were translated into Turkish. The translated version of the instructions was checked by two faculty members from the Faculty of Education. Furthermore, cultural and linguistic aspects of Turkish language were taken into consideration when the materials (such as the stimulus cards of four RAN subtests and examiner record form) were translated into Turkish.

Test Format and Training

In order to adapt RAN tests to Turkish, the copyright owner's permission (i.e., Pro-Ed Publisher) was taken. Stimulus cards were formed according to the original version of RAN tests. Each card was 21.7 x 27.9 cm. Pictured items were line drawings of familiar objects for children. Colors were represented by 1.2 x 1.2 cm squares. Letters and numbers were one centimeter and Arial font. The distance between items in each card was arranged equally (2 cm among items; 3 cm between lines).

After the adaptation procedure, the examiners (consisting of one graduate student, 16 undergraduate students and the researcher) received training for two weeks for a total of eight hours (four hours per week) in order to learn the instructions and to practice the administration of the tests. In order to avoid scoring problems, training hours mostly included practice in scoring. Each examiner was evaluated and given feedback during the practice sessions.

Another determination of content validity is expert judgment. Teachers' evaluations were taken at the time the items were constructed. For instance, teachers were asked to name familiar objects from different categories for children of these

ages. Teachers' opinions about the number "seven" were also taken when constructing RAN Numbers for the Turkish version.

Question 2: What are the Intercorrelations among the Subtests of RAN?

To be clear about the analyses, the expected directionality of the measures must be understood. For example, for RAN measures, recorded in seconds, higher scores indicate slower naming speeds, whereas for the oral reading fluency measure, recorded as the total number of words read correctly, higher scores indicate better performances. Table 7 shows that children took less time to recall letters than numbers on average. Also children took longer time to name colors than pictures according to this table. Means and standard deviations for each RAN subtest are displayed in the following table together with minimum and maximum scores (Table 7).

Table 7. Means, Medians, Standard Deviations, and Minimum/Maximum Scores for the RAN Subtests and Oral Reading Fluency Measures

Measure	N	Min	Max	Median	Mean	(SD)
RAN Pictures (time in sec.)	277	25	89	45	46.49	11.33
RAN Colors (time in sec.)	277	28	107	50	53.74	15.47
RAN Numbers (time in sec.)	273	16	112	30	34.15	14.24
RAN Letters (time in sec.)	245	16	83	26	29.12	10.10

For statistical analyses, each of the measures was examined and the analyses indicated that the scores on the tests were not normally distributed. Because of these problems, inverse transformations were applied to the raw data of each RAN subtest in order to normalize the distributions prior to the parametric statistical analyses for

testing normality. The following analyses reported below were done using transformed variables.

Pearson-moment correlation analyses were used to address the research question concerning the intercorrelations between RAN subtests. Intercorrelations among the variables are presented in Table 8. All correlation coefficients are statistically significant at p<.01.

Table 8. Correlation Matrix for Intercorrelation of RAN Tests

RAN Tests	Pictures	Colors	Numbers	Letters
Pictures	___	.80	.74	.67
Colors		___	.73	.70
Numbers			___	.83
Letters				___

p<.01

There was a significant positive relationship among all four RAN subtests. This result indicated that all were significantly correlated with each other. The variables had moderate-to-high reliability coefficients, which were assessed by four RAN subtests.

Since four RAN subtests measure visual naming speed, all were expected to be highly related with each other (Wolf & Denckla, 2005). RAN Numbers and Letters were much more correlated with each other since these subtests consisted of orthographic symbols. The results revealed that the relationship between Letters and Numbers (r=.83, p<.01) was significantly high. However, RAN Letters were less correlated with objects (r=.67, p<.01) and colors (r=.70, p<.01). These findings were consistent with previous research (e.g., Denckla & Rudel, 1976b; Wolf et al.,1986). The two nonsymbolic tasks (objects and colors) were significantly correlated with each other in high magnitude (r=.80, p<.01). The present study demonstrated that all

RAN substests are significantly related to each other. The intercorrelation among four subtests provided evidence for the construct validity. Correlations were in expected directions, with magnitudes comparable to the previous findings (Wolf & Denckla, 2005). As stated by Denckla and Rudel (1974), children name letters and numbers more easily and quickly although they were acquired later than objects and colors. In line with the Denckla and Rudel (1974) study, the results of the present study showed that the subjects named letters and numbers more quickly than objects and colors.

Question 3: Are RAN Scores of the Children Negatively Correlated with Age?

RAN Pictures

For RAN Pictures, the mean of the total sample was 46.49. As displayed in Table 9, as children grow older, the total time taken to name the pictures diminishes. This finding is in line with other RAN studies reporting similar results. However, the mean scores for six- and seven-year olds indicated that scores were very similar and there was little dispersion among the scores. This might be explained by the similarities between the sample distributions of these two age groups (see Figure 1).

Table 9. Means, Standard Deviations and Minimum/Maximum Scores for RAN Pictures According to Age Groups

Age Groups	N	Min.	Max.	Median	Mean	(SD)
5	36	42	89	62	63.03	9.87
6	32	35	85	49	49.13	9.48
7	51	32	82	48	50.10	10.45
8	53	32	60	46	45.75	6.89
9	52	26	55	38	39.29	6.16
10	53	25	53	36	37.98	11.33

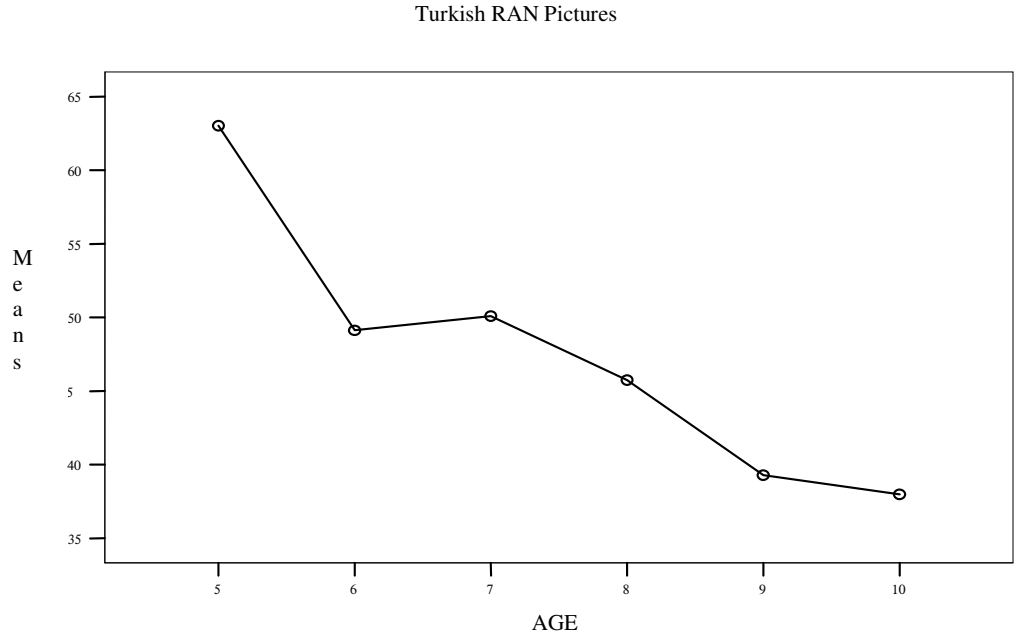

Figure 1. Plot of the means for RAN Pictures according to age

RAN Colors

For RAN Colors, the mean of the total sample was 53.74. As displayed in Table 10, as children grow older, the total time taken to name the colors declines (see Figure 2).

Table 10. Means, Standard Deviations and Minimum/Maximum Scores for RAN Colors According to Age Groups

Age Groups	n	Min.	Max.	Median	Mean	(SD)
5	36	45	101	70.00	70.50	15.03
6	32	39	101	64.50	64.47	14.80
7	51	34	107	55.00	57.47	14.94
8	53	35	85	49.00	52.34	10.90
9	52	32	71	42.00	44.77	8.89
10	53	28	68	41.00	42.47	15.47

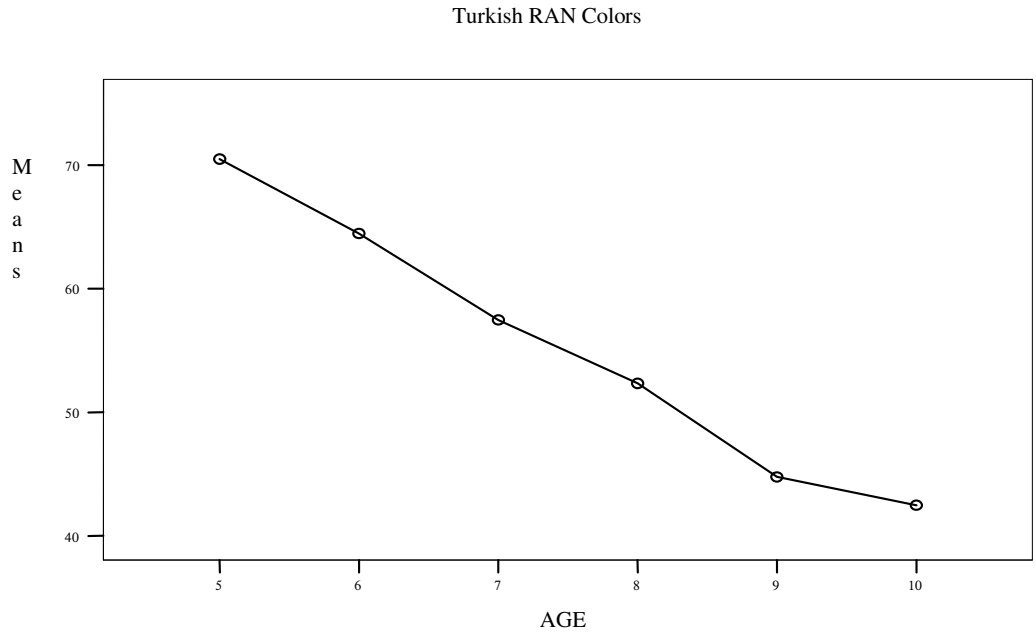

Figure 2. Plot of the means for RAN Colors According to Age

RAN Numbers

For the RAN Numbers, the mean of the total sample was 34.15. As displayed in Table 11, as children grow, the total time taken to name the numbers diminishes.

Table 11. Means, Standard Deviations and Minimum/Maximum Scores for RAN Numbers According to Age Groups

Age Groups	n	Min.	Max.	Median	Mean	(SD)
5	32	42	112	59.00	62.09	17.46
6	32	28	76	41.00	42.59	9.48
7	51	21	50	32.00	32.67	7.01
8	53	20	54	29.00	29.77	6.11
9	52	19	35	25.00	25.94	4.18
10	53	16	53	25.00	26.04	6.60

The high values of the variance among five-year olds compared to the six-year olds reveal that the performances of five-year olds demonstrated more variability than six-year olds. This could be explained by the structure of the group of the 5-year olds which included some children who already knew numbers. Furthermore, the mean scores for 9- and 10- year olds indicated that scores were very similar and there was little dispersion among the scores, which was not expected. This might be explained by the homogeneous structure of these age groups (see Figure 3).

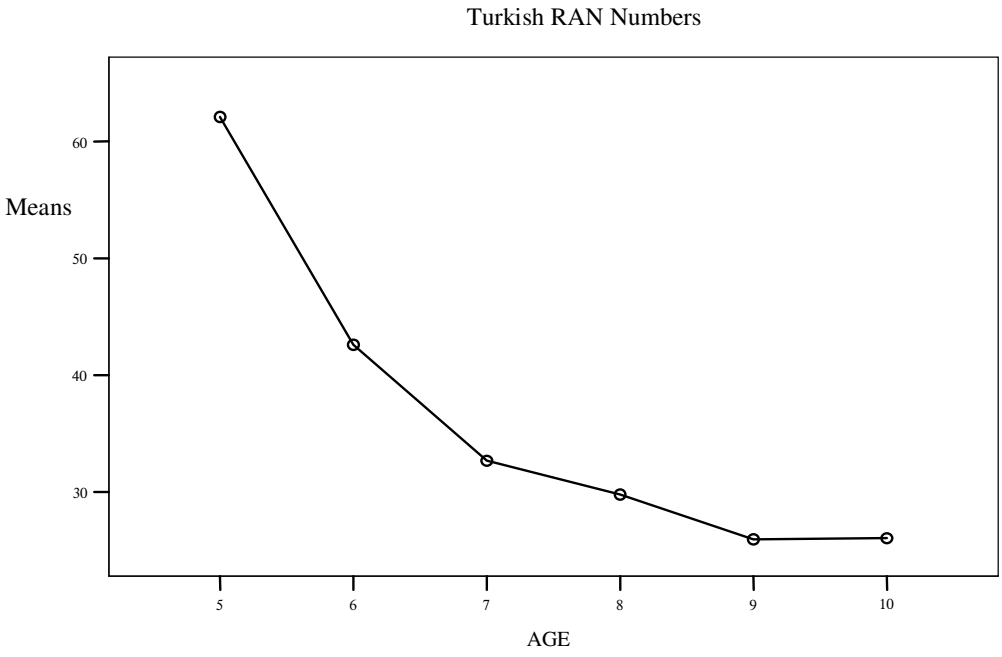

Figure 3. Plot of the means for RAN Numbers according to Age

RAN Letters

Table 12. Means, Standard Deviations and Minimum/Maximum Scores for RAN Letters According to Age Groups

Age Groups	n	Min.	Max.	Median	Mean	(SD)
5	9	34	83	65.00	59.00	16.00
6	27	21	75	34.00	38.26	12.43
7	51	20	51	29.00	30.51	6.68
8	53	18	45	27.00	27.51	5.31
9	52	17	40	24.50	24.58	4.23
10	53	18	40	23.00	24.13	6.60

For RAN Letters, the mean of the total sample was 29.12. As depicted in Table 12, children take less time to name letters as they become older. However, as it was detected in RAN Numbers, the mean scores for nine- and ten-year olds, (24.58 and 24.13, respectively) indicated that scores were very similar and there was little dispersion among the scores, which was not expected. This might be explained by the homogeneous structure of these age groups (see Figure 4).

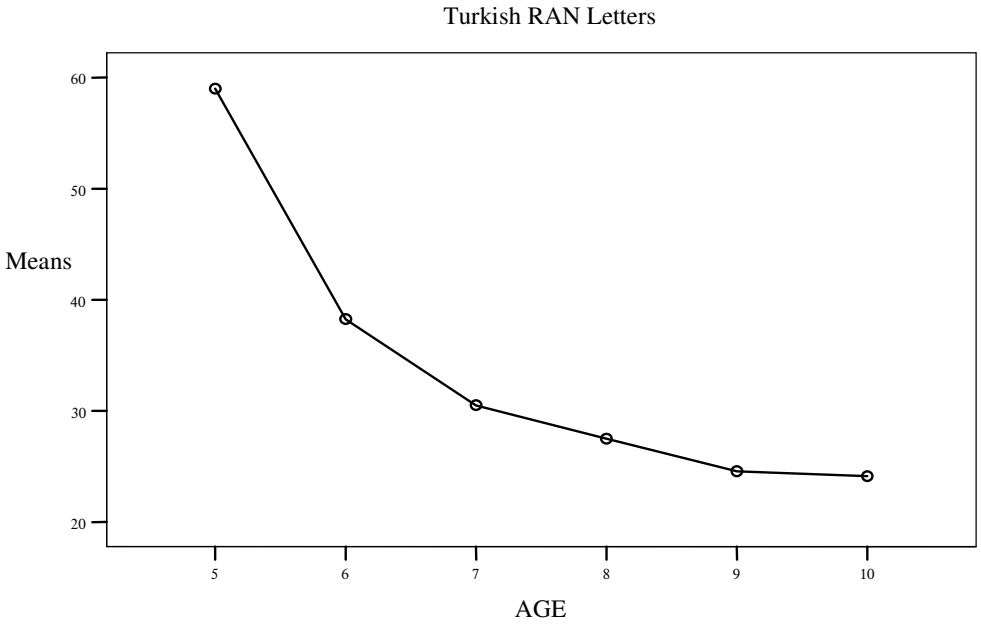

Figure 4. Plot of the means for RAN Letters according to age

Age correlated negatively and significantly with RAN Pictures (r =-.66, p<.01), RAN Colors (r =-.63, p<.01), RAN Numbers (r =-.73 p<.01), and RAN Letters (r = -.62, p<.01). The significant correlation coefficients range from moderate to high in magnitude (r= -.62 to -.73).

Age differentiation provides evidence for construct validity because visual naming speed is developmental in nature (Wolf & Denckla, 2005). Therefore, all

four RAN subtests were expected to be related with the chronological age. Previous studies indicated that children took less time to name the items as they became older (Denckla & Rudel, 1974, 1976b).

In the original tests, all of the coefficients were statistically significant at the $p<.0001$ level of confidence for the correlation of RAN tests with age. Means, standard deviations and correlation with age were obtained from 14 age groups ranging from five through eighteen ($r = -.62$ for Objects; $r = -.64$ for Colors; $r = -.52$ for Numbers; $r = -.48$ for Letters). This study also showed a significant negative relationship between age and Turkish children's performances on RAN tests. Thus, as children become older, they tend to name faster all the items presented in each subtest.

Question 4: Are RAN Scores of the Children Correlated with the Number of Words Read Correctly per Minute?

Oral Reading Fluency Measures

Oral reading fluency measures were obtained by counting the words read correctly in one minute. Participants read orally the reading passages which were developed according to their grade level (first- through fifth-grade). Due the fact that some of the participants (n=31) finished reading the passage earlier (in less than one minute), the ratio was calculated. Therefore, before the correlation between the words read correctly in one minute and RAN scores was analyzed, the ratio was obtained. The ratio was calculated by multiplying the number of words with sixty divided by the total time taken to read the passage.

Since those who were six years old in kindergarten (n=5) were not able to read the passages, they were not assessed for oral reading speed. The mean of words per minute for six year olds (M=35.07, SD= 14.79) was lower than the mean of words per minute for seven year olds (M=63.79, SD=27.81). In Table 13, there is an increase in the mean of words per minute as children age. Interestingly, the mean of words per minute for eight year olds (M=86.60, SD=24.14) is almost equal to the mean for nine year olds (M=85.65, SD=20.01).

Table 13. Means, Standard Deviations and Minimum/Maximum Scores for Words Read Correctly in One Minute According to Age Groups

Age Groups	n	Mean	(SD)	Min.	Max.	Range
6	27	35.07	14.79	6	146	140
7	51	63.79	27.81	27	133	106
8	53	86.60	24.14	22	159	133
9	52	85.65	20.01	38	131	93
10	53	94.38	24.63	34	161	127
Total	236	77.31	29.73	6	161	155

Erden and her colleagues (2002) assessed the oral reading speed across grades in a sample consisting of 2481 students. They examined the oral reading speed based on the number of words read correctly in one minute, in relation with the grade level. The researchers reported that the total mean was 89.33 with a standard deviation of 46.19. Differences were found to be significant across grade levels. First graders (M=45.30, SD=27.47) differed significantly from third, fourth and fifth graders. Although mean differences were found to be significant across grade levels, findings in the current study were somewhat different from previous research (Erden et al.,2002; Korkmazlar, 1993). For instance, the means of the numbers of words read

correctly in one minute were lower than the ones given in previous research (e.g., Erden et al., 2002). First graders' means (M=35.07; SD=14.79) differed significantly from second, third, fourth, and fifth graders' means ($p<.05$). Means for second graders differed significantly from first, third, and fifth graders ($p<.05$). On the other hand, mean differences across third and fourth grade were not found to be significant.

The fourth question was whether RAN scores were correlated with reading fluency measures or not. One of the ways of testing the construct validity of adapted RAN tests was to correlate with other measures of reading ability. As outlined by Wolf and Denckla (2005), "naming speed, particularly for letters, represents an early approximation of reading speed for words and is an important predictor of reading fluency" (p.2). Counting the words read correctly in one minute is another way of measuring reading fluency. Therefore, these two measures were compared. The correlation between rapid naming scores (measured by RAN tests) and oral reading fluency scores (measured by words read correctly in one minute) showed that there was a significant negative correlation between RAN subtests and oral reading fluency. Oral reading fluency correlated negatively and significantly with RAN Pictures ($r = -.55$, $p<.01$); RAN Colors ($r= -.58$, $p<.01$); RAN Numbers ($r= -.66$, $p<.01$); and RAN Letters ($r= -.70$, $p<.01$). These coefficients ranged in magnitude from moderate to high. This result showed that Letters and Numbers were much more correlated with oral reading fluency measure than Pictures and Colors.

Question 5: Are RAN Scores of the Children Correlated with Reading Speed Evaluations?

Participants' reading speed was also evaluated by both teachers and examiners based on five criteria: reading "word by word", "by sounding out letters", "mixed phrasing" (for example; reading sometimes by sounding out the letters, sometimes word by word), "fluently", and lastly "unable to read". The examiners rated students ranging from first to fifth grade according to their performances in oral reading fluency measure. 56 % of the participants were reading fluently. On the other hand, participants' teachers were asked to evaluate their students' reading speed. According to teachers, most of the participants (75 %) were reading fluently.

Table 14. Evaluation of Reading Speed by Teachers and Examiners

Reading Speed	Evaluation of Teachers (n=222)	%	Evaluation of Examiners (n=234)	%
By sounding out letters	4	1.7	18	7.6
Word by word	4	1.7	8	3.4
Mixed phrasing	36	15.3	77	32.6
Fluent	178	75.4	131	55.5
Unable to read	—	—	—	—
Total	222	94.1	234	99.2

Nonparametric correlation analysis was carried out in order to see the relationship between reading speed evaluations and RAN subtests' performances (Table 15).

Table 15. Correlation between Reading Speed Evaluations and RAN

	RAN Pictures	RAN Colors	RAN Numbers	RAN Letters
	r	r	r	r
Teachers' Evaluations on Reading Speed	-.33	-.25	-.30	-.30
Examiners ' Evaluations on Reading Speed	-.35	-.39	-.47	-.46

p<.01

The result indicated that teacher opinions on their students' reading speed were associated negatively with RAN performances in a range of -.25 to -.33. This finding revealed that students, who were rated by their teachers as fluent readers, appeared to perform better in RAN tests. Although there was a low relationship in terms of magnitude, the consistency between expert judgment (i.e., teachers) and RAN performances may indicate the validity of Turkish RAN. Moreover, the examiners evaluated students' reading speed after administrating oral reading fluency measure. The examiners' reading speed evaluations were correlated significantly with RAN subtests in a range of -.35 to -.47. Thus, there was a correlation to a moderate degree among these measures (i.e. RAN, both Teachers and Examiners' Reading Speed Evaluations).

Question 6: What is the Interrater Reliability for Each Subtest of Turkish RAN?

The degree of consistency was also measured by the correlation among the scorers. For the original version, the coefficients ranging from .98 to .99 strongly supported the consistency among scorers (Wolf & Denckla , 2005). A group from participants was randomly selected and each student's performance was scored independently by

two trained examiners. In other words, as one of the trained examiners read the directions, administered all the RAN tests, and recorded the time, the other one also recorded the total time in seconds taken by the examinee. This assessment was done for each RAN subtest separately. The sample participants were between the ages of five and ten years (n= 34).

Interrater reliability was determined by calculating Pearson product-moment reliability coefficients. Thirty four participants were scored by two examiners. In other words, two scores obtained for each student, one score from each examiner for each student, were then correlated.

Table 16 presents the correlation coefficients for interrater reliability for each RAN subtest. The coefficients were very high. These findings were consistent with the reliability coefficients obtained from the original version of RAN (Wolf & Denckla, 2005).

Table 16. Interrater Reliability Correlations of RAN Tests

RAN Tests	r
Pictures	.99
Colors	1.0
Numbers	.99
Letters	.99

p<.01

Question 7: What is Test-Retest Reliability for Each Subtest of Turkish RAN?

In the original RAN tests, the coefficients for test-retest reliability ranged from .81 to .89 at the elementary grade level (Wolf & Denckla, 2005). The Turkish versions of RAN tests were readministered to a group of the students (n= 79) with a two week

interval. The students ranged from kindergarten to fifth grade. The participants were selected randomly on the basis of gender and grade. When forming the new group of students, one girl and one boy were recruited from each grade level at each sample school.

Table 17 shows the distribution of the participants for test-retest reliability based on the age groups. 39 female students and 40 male students were recruited from the sample (n=277).

Table 17. Distribution of Participants for Test-Retest Reliability According to Age Groups

	Female	Male	Total
Age	f	f	f
5	5	5	10
6	8	3	11
7	8	5	13
8	4	11	15
9	7	8	15
10	7	8	15
Total	39	40	79

Test-retest correlations between first and second testing ranged from a low of .85 for RAN Pictures to a high of .95 for RAN Numbers. These findings were consistent with reliability coefficients obtained from the original version of RAN (Wolf & Denckla, 2005). Correlations between the two test administrations are shown in Table 18.

Table 18. Test-Retest Reliability Correlations for RAN Tests Together with Means and Standard Deviations

	First Testing		Second Testing		Correlation
	M	(SD)	M	(SD)	r
RAN Pictures	46.49	11	44.58	10	.85
RAN Colors	53.74	15	51.67	13	.91
RAN Numbers	34.12	14	32.95	13	.95
RAN Letters	29.01	10	27.04	8	.91

CHAPTER 5

CONCLUSION

The current study attempted toadapt the Rapid Automatized Naming (RAN) Tests that is used for identification of students with reading difficulties and to establish the validity and reliability of the adapted RAN tests for Turkish children. This chapter includes a brief summary of the current study, summarizes the findings of the study, discusses the limitations of the study, and suggests implications for future research.

Introduction

Naming speed, considered as one of the measures of reading, refers to the ability to name rapidly the stimuli or symbols (such as colors, objects) that are visually presented (Wolf et al., 2000). Wolf and Denckla (2005) stated that "naming speed develops before reading is ever taught, making it a prereading window on how well the brain can integrate its visual and verbal processes in time" (p. 2).

Denckla and Rudel (1974) were the first researchers who designed "RAN tasks to measure continuous, serial naming speed performance on common visual stimuli" (Wolf et al., 2000, p. 388). The speed of the retrieval of letters, digits, colors and objects was termed RAN tasks. In each RAN task, children named verbally fifty stimuli as rapidly as possible (Wolf, 1999; Wolf et al., 2000).

Studies have examined the relationship between RAN tasks (objects, colors, numbers, and letters) and reading skills (e.g. McBride-Chang & Manis, 1996; Meyer et al., 1998). Based on these findings, RAN letters and numbers made a stronger

contribution to reading ability than RAN colors and objects. Also, RAN letters and numbers distinguished the good and poor readers better than the rapid naming of colors and objects (Wolf, 1999; Wolf et al. 1986).

There is growing evidence that deficits in naming speed tasks are associated with reading disabilities (e.g., Ho et al, 2002; Kirby et al., 2003; McBride-Chang & Manis, 1996; Meyer et al., 1998; Wolf et al., 2002). Recent research has also integrated naming speed deficits as a second core deficit of reading disability, viewed as a separate component of phonological processing skills (e.g., Wolf, 1999; Wolf & Bowers, 1999). Many studies have shown that rapid naming is a strong predictor of reading disabilities across ages, languages, and readers subtypes (e.g., Denckla & Cutting, 1999; Wolf & Bowers, 1999; Wolf & Denckla, 2005).

The relationship of naming speed to different kinds of reading tasks (word reading, comprehension, memory) had been documented by many researchers (e.g., Badian, 1994; Manis et al., 2000; McBride-Chang & Manis, 1996; Meyer at al., 1998). Also, RAN tasks were regarded as one of the correlates of oral reading fluency. In a longitudinal study, Schatschneider and his colleagues (2004) examined the prediction of reading skills with multiple measures (e.g. naming speed, phonological awareness, letter knowledge) assessed in kindergarten years. The findings regarding the prediction of reading fluency from the beginning of kindergarten to the end of the first and second grade indicated that RAN Letters were more strongly correlated with reading fluency than phonological awareness, letter sound knowledge, and letter name knowledge.

To date, the associations of reading to naming speed have not been studied yet in Turkey. In order to explore the relationships between reading achievement and

different linguistic-cognitive processes such as naming speed, new research studies are required.

In summary, although RAN has been shown as a powerful predictor of reading ability (Denckla & Cutting, 1999; Wolf & Bowers, 1999) and has been examined in some cross-linguistic studies (e.g. Katzir et al., 2004; van Daal & van der Leij, 1999; Wimmer et al., 2000), it has not been discussed in Turkey where adequate measures to assess reading skills are limited as stated by Bingöl (2003). Therefore, the adapted RAN tests may contribute to the screening and diagnosis of reading disabilities in Turkish speaking children.

Findings of the Study

This study aimed at establishing the validity and reliability of RAN tests for Turkish speaking children. A total of 277 students (135 girls and 142 boys) ranging from kindergarten to fifth grade were the participants. The sample distribution according to gender and grade level was almost equal. All participants spoke Turkish as their native language. Correlation analyses were conducted to answer the following research questions.

1) How is the construct defined and reflected in the tests?
2) What are the intercorrelations among the subtests of RAN?
3) Are RAN scores of the children negatively correlated with age?
4) Are RAN scores of the children correlated with the number of words read correctly per minute?

5) Are RAN scores of the children correlated with reading speed evaluations?
6) What is the interrater reliability coefficient for each subtest of Turkish RAN (objects, colors, numbers, and letters)?
7) What is the test-retest reliability coefficient for each subtest of Turkish RAN (objects, colors, numbers, and letters)?

The selection of the RAN stimulus items in Turkish provided support for the content validity. The formats and stimulus items used in the original RAN tests were taken into consideration when selecting the items for the adapted version. A pilot study was conducted to determine high frequency items for pictured objects by asking 202 children and 27 teachers. The appropriateness and accuracy of these pictured objects were determined based on children's and teachers' opinions. Turkish RAN Letters were selected on the basis of the Orthography Guide of the Turkish Language Association (2005). 12,739 words were counted by the researcher. The words mostly started with the letters "k, s, m, b, t" respectively. The RAN Letters test includes the letters which were assumed to be easily known and articulated by school age children because of their frequent use.

Expert judgment was another determination of content validity. Teachers' evaluations were taken at the time the items were constructed. For example, kindergarten and elementary school teachers were asked to name familiar objects from different categories, for children of these ages. Teachers' opinions about number "seven" were also taken into consideration when constructing the RAN Numbers for the Turkish version. Thus, the selection of items for each RAN subtest was rationalized as much as possible.

The construct validity of Turkish RAN tests was demonstrated in several ways: First of all, age differentiation provides evidence for construct validity because visual naming speed is developmental in nature (Wolf & Denckla, 2005). The present study showed a significant negative relationship between age (ranging from five through ten) and Turkish RAN tests' performances. Among the four RAN subtests, Numbers had the highest correlation coefficient (r=-.73) with age. On the other hand, Letters had the lowest correlation coefficient (r-.62). In the original tests, all of the coefficients were statistically significant at the p<.0001 level with a range of -.48 to -.64 when correlated with age. Data was gathered from 14 age groups ranging from five through eighteen. Objects and colors had the highest coefficients compared to letters and numbers. However, in the recent study there were six age groups ranging from five to ten. All of the coefficients were statistically significant at p<.01 level. This finding indicated that as children become older, they tend to name faster the visually presented items in each subtest. When symbolic (letters and numbers) or nonsymbolic tasks (objects and colors) are compared, coefficients are close to each other.

Another indicator for the construct validity was the relationship between the subtests of RAN, since four RAN subtests measure visual naming speed, all were expected to be highly related with each other (Wolf & Denckla, 2005). The present study demonstrates that all RAN substests are significantly related to each other. In kindergarten, the total time taken to name all four RAN tasks shows similarity in terms of speed. Since Letters and Numbers become more automatic in the first two years of elementary school, children name letters and numbers much quicker than colors and objects (Wolf et al., 1986; Wolf & Bowers, 1999).

The construct validity of Turkish RAN tests may be demonstrated by using different reading measures, and by showing that these measures correlated significantly with each other. In order to provide evidence for construct validity, oral reading fluency measures were used by asking primary school students to read some passages developed for their grade level. The results showed that RAN performance was significantly correlated with oral reading fluency. As indicated by some researchers (Wolf et al., 1986; Wolf & Bowers, 1999) letter and number naming were much more related to reading than object or color naming. Consistent with previous research, the current study showed that as children named faster the items presented in each subtest, they appeared to read more words accurately and quickly.

For the reliability of Turkish RAN tests, test-retest and interrater reliability were conducted. Interrater reliability coefficients strongly supported the consistency among scorers. The Turkish version of RAN tests were readministered to seventy nine students out of 277, the coefficients for test-retest reliability are consistent with the reliability coefficients obtained from the original version of RAN (Wolf & Denckla, 2005).

As a conclusion, the findings of this study are important for several reasons. This preliminary study supported that these tests are reliable and valid measures. The adapted RAN tests can be used in Turkey as one of the screening measures of reading skills, especially reading fluency, or can be added to assessment batteries.

Limitations of the Study

This study has a number of limitations:

1. Data were transformed since the sample data was not normally distributed. This may be due to the selection of sample schools that were mostly chosen from districts (e.g., Kadıköy, Sarıyer). Although there were children coming from low SES, these school districts have mostly high or middle SES groups. Therefore, a wider range of RAN performance was lacking. The level of parental education also showed a similar pattern indicating that most of the subjects' parents received higher education.
2. Although the distribution of subjects by grade level was almost equal, the sample size for each age group was not equal. For instance, there were nine kindergarten students who were able to name RAN Letters. This may lead to difficulty in interpreting the results. Another limitation related to age was that each age group consisted of children from different grade levels. That is, an eight-year-old child might be either a second grader or third grader. This might affect the sample distribution.
3. For kindergarten children, there were no other reading measures to compare to RAN performances. Only RAN tests were administered. Therefore, the evidence for construct validity was not provided for preschoolers.
4. Oral reading fluency was measured by counting the number of words read correctly in one minute. However, some of the participants finished reading the passage earlier (in less than one minute). In order to include these cases in the statistical analyses, the ratio of words read correctly was taken. Therefore, the reading passages could have been much longer.

5. When means for oral reading speed were compared according to age groups, the mean for eight year-olds (M=87) was higher than the mean for 9 year-olds (M=86), although there was a slight difference. Selection of the reading passages may lead to this finding. Although teachers' evaluations were considered for the selection of these passages, these two reading passages may not differentiate the two grade levels.
6. In the adaptation procedure of each RAN subtest, teachers' judgment and the feedbacks of children were taken for the rationale of the content validity. However,during the adaptation process, the number of students or teachers varied for each RAN subtest. For instance, RAN colors were determined on basis of twenty students' performance, whereas forty-five children were asked to name RAN numbers and their feedback was considered.
7. Teacher evaluations about reading skills were also taken into consideration to obtain more detailed information about the students' reading skills. However, due to the inconsistency in teachers' responses, this kind of information was omitted. If researchers need to get information about students' reading performance, they may need to use different techniques.

Implications

Implications for Practitioners

The first major implication of this study is that RAN tests as a naming speed measure can be added to kindergarten and first grade screening batteries. As stated by Bingöl (2003), the lack of adequate teaching materials or assessment tools is a problem in

early literacy instruction. In order to provide effective early reading interventions or to identify children at risk for reading disability, a variety of reading measures is required. RAN tests can be useful in the early identification of children with reading disabilities. According to the double deficit theory, those who have naming speed deficits are significantly slower at continuous naming of an array of visually presented stimuli. They might have problems in reading fluency and comprehension. So, these tests can be included in predictive and diagnostic batteries. These tests can also contribute to the diagnosis of reading disabilities, especially dyslexia, for clinical practice.

Another implication is that all RAN subtests take a few minutes (5 to 10 minutes) in total. They are easy and quick to administer. According to the double deficit hypothesis (Wolf & Bowers, 1999), children with reading disabilities can have phonological deficits, naming deficits, or both. Naming speed is a strong predictor of fluency and comprehension problems. For this reason, teachers and school counselors can benefit from RAN tests to identify children at risk for fluency problems.

Implications for Reseachers

Naming speed deficits were examined in many languages that have different orthographies (e.g., German: Wimmer et al., 2000; Dutch: van Daal & van der Leij, 1999; Chinese: Ho et al., 2002). Turkish is a transparent language with regular orthography since the correspondence between letters and sounds is almost one-to-one (Bingöl, 2003; Durgunoğlu & Öney, 1999). Thus, the adapted version of RAN tests can provide guidance for further cross-linguistic studies through the comparison

of the RAN performances of Turkish children with other children speaking different languages.

RAN tests, as one of fluency measures, are used to determine naming speed. Comparing these tests with multiple reading measures can provide much more evidence if they are reliable and valid measures for Turkish speaking children. The present study looked at RAN performances in randomly selected samples from different types of schools, assumed as normally distributed. Research consistently documented that RAN performances differentiate children with dyslexia from typical readers (e.g., Wolf et al., 2002). Another issue to be explored in future studies is whether RAN distinguishes children with dyslexia from other reader types such as average, good readers. How children with dyslexia would perform in Turkish RAN tests is one of the research questions to be studied.

The relationship of phonological skill to naming speed remains to be explored since these two concepts have been well documented as predictors of later reading. Although the present study attempted to establish the reliability and validity of RAN, future research should explore the role of naming speed in reading instruction and reading disabilities for Turkish speaking children.

Suggestions for Future Research

After the validation of RAN tests, the next step should be the standardization of RAN tests and establishing norms for Turkish children. Standardization of RAN tests will facilitate further research that focus on the role of RAN on reading. Naming speed has not been investigated in Turkey, yet . Thus, the present study suggests that

further research is needed for examining the role of naming speed among children with different reading skills.

For further research, RAN performances can be compared in terms of having preschool education which is considered as a factor in later academic achievement. Also, longitudinal comparative studies will be helpful to understand the role of RAN in different stages of reading development. This preliminary study suggests that future research may provide more information on the predictive role of naming speed.

APPENDICES

APPENDIX A

DEMOGRAPHIC INFORMATION FORM

TARİH: _____

ÖĞRENCİ BİLGİ FORMU
ANASINIFI

Bu form, öğrencinin sınıf öğretmeni tarafından doldurulacaktır.
Lütfen aşağıdaki bölümü eksiksiz olarak doldurunuz.

- Öğrenci Adı-Soyadı : .....
- Öğrencinin Doğum Tarihi(gün-ay-yıl): ---/ --- / -------
- Okulu: .....
- Sınıfı: .....
- Öğrencinin Cinsiyeti: Kız ( )
  Erkek ( )
- Öğrencinin Okulöncesi Eğitimi (Yuva, kreş...): Var ( ) Yok ( )
- Evde ikinci bir dil konuşuluyor mu?
  Evet ( ) Hayır ( ) Bilgim yok ( )
- **Annenin Eğitim Düzeyi :**
  Okuryazar değil ( ) Okuryazar ( ) İlkokul ( ) Ortaokul ( )
  Lise ( ) Üniversite ( ) Lisansüstü ( )
- **Babanın Eğitim Düzeyi :**
  Okuryazar değil ( ) Okuryazar ( ) İlkokul ( ) Ortaokul ( )
  Lise ( ) Üniversite ( ) Lisansüstü ( )
- **Annenin Mesleği:_____**
- **Babanın Mesleği:_____**
- Öğrencinin işitme problemi var mı? Evet ( ) Hayır ( )
- Öğrencinin dil ve konuşma problemi var mı? Evet ( ) Hayır ( )
- Dikkat eksikliği ve/veya hiperaktivite bozukluğu... gibi tanılardan herhangi birini almış mı?
  Evet ( ) Hayır ( ) Bilgim Yok ( )
  Evet ise hangisi?.....

KATKILARINIZ İÇİN TEŞEKKÜR EDERİZ. ☺

TARİH: _____

ÖĞRENCİ BİLGİ FORMU
(İLKÖĞRETİM 1.-5. SINIF)

Bu form, öğrencinin sınıf öğretmeni tarafından doldurulacaktır.
Lütfen aşağıdaki bölümü eksiksiz olarak doldurunuz.

- Öğrenci Adı-Soyadı : .....
- Öğrencinin Doğum Tarihi: ----/ ---- / -------
- Okulu: .....
- Sınıfı: .....
- Öğrencinin Cinsiyeti: Kız ( ) Erkek ( )
- Öğrencinin Okulöncesi Eğitimi: Var ( ) Yok ( )
- Evde ikinci bir dil konuşuluyor mu?
  Evet ( ) Hayır ( ) Bilgim yok ( )
- <u>Annenin Eğitim Düzeyi :</u>
  Okuryazar değil ( ) Okuryazar ( ) İlkokul ( ) Ortaokul ( )
  Lise ( ) Üniversite ( ) Lisansüstü ( )

- <u>Babanın Eğitim Düzeyi :</u>
  Okuryazar değil ( ) Okuryazar ( ) İlkokul ( ) Ortaokul ( )
  Lise ( ) Üniversite ( ) Lisansüstü ( )

- Annenin Mesleği: _____
- Babanın Mesleği: _____
- Öğrencinin işitme problemi var mı? Evet ( ) Hayır ( )
- Öğrencinin dil ve konuşma problemi var mı? Evet ( ) Hayır ( )
- Öğrencinin okuma yazmada sorunu var mı? Evet ( ) Hayır ( )
- Öğrenme güçlüğü, dikkat eksikliği ve/veya hiperaktivite bozukluğu gibi tanılardan herhangi birini almış mı?
  Evet ( ) Hayır ( ) Bilgim Yok ( )
  Evet, ise hangisi ?_____

Lütfen öğrencinizin **okuma hızını** (X) işareti koyarak değerlendiriniz.

- Dışından (sesli) heceleyerek okuyor _____
- Kelime kelime okuyor _____
- Karma okuyor _____

  (Okurken bazen heceler, bazen kelimeleri atlar bazen de akıcı okuyabilir vs.)

- Akıcı okuyor _____
- Okuyamıyor _____

Öğretmenin Yorumu (eklemek istediklerinizi):

Başarı durumu:

Türkçe ders notu (birinci yarıyıl): _____

Öğrencinin her iki dersteki başarısını aşağıda belirtilen ölçütlere göre değerlendirerek uygun gördüğünüz seçeneğe X işareti koyunuz.

	YETERSİZ	YETERLİ	ÜSTÜN
TÜRKÇE			
MATEMATİK			

KATKILARINIZ İÇİN TEŞEKKÜR EDERİZ. ☺

APPENDIX B

READING PASSAGES

Örnek Parça:

Şirin'dir benim adım.
Sevimli bir kediyim.
Yüzmeyi sevmem.
Ama denizi çok severim.
Sabah erkenden gelir
Kıyıda beklerim.
Balıkçılar gelince,
Düğün bayram ederim.

1. sınıf

Herkesin bir evi var.
Kuşlar ağaçlara yuva kurar.
Çalışkan karıncalar
Yerin altında yaşar.
Balıkların evi kayalar.
Ayıların ini olur.
Maymunlar ağaçlarda oturur.
Kimi hayvan evini sırtında taşır.
Solucanlar toprağı karıştırır.
Atlar ahırda yaşar.
Tavukların kümesi var.
Demek ki herkesin bir evi var.
Peki ev ne işe yarar?
Ev bir barınaktır.
Ama en güzeli
Evlerde sevdikleriyle
Aileler yaşar.

2. sınıf

Mehmet annesiyle birlikte köyde yaşardı. Bir de köpeği vardı. Kerpiç bir evde otururdu. Evleri tek oda idi. Mehmet okula gidiyordu ama şimdi okul kapalıydı. Tatilde şehirdeki teyzesine gitmek istiyordu. Kent çok başka bir yer. Koca caddeler, otobüsler, arabalarla dolu. Evlerin çoğu çok katlı, balkonsuz ve bahçesizdi. Mehmet'in teyzesi iki katlı bir eve taşınmıştı. Kent merkezinden epey uzaktı. Ama güzel bir ev. Bahçesi de var. Teyzesi çok seviniyor. Mehmet'i uzun zamandır görmemiş. Sarılıp sarılıp öpüyor. Mehmet çok sevinçli ama köyünü de özlüyor. Köyün yeşilliğini, kaval sesini özlüyor. Mehmet en güzel yer kendi evim diye düşünüyor.

Çetin kaldırımın kenarında yürüyordu. Bir elinde çantası, öbüründe önlüğü vardı. Önlüğünü hava sıcak olduğu için çıkarıp eline almıştı. Zaten okulun son günlerinden biriydi. Bir hafta sonra yaz tatiline gireceklerdi. Artık okula gitmemeyi düşünüyordu. Çünkü öğrenilebilecek her şeyi öğrenmişti. Eve gelince bunu annesine söyledi.

Akşam olup da babası eve gelince, Çetin her şeyi öğrendiğini ve artık okula gitmesine gerek kalmadığını ona da söyledi. “Bu doğru değil” dedi, babası, “hiç kimse her şeyi bilemez”. “İnsanlar sürekli olarak bir şeyler öğrenirler. Ben bile her şeyi bilmiyorum.” Çetin düş kırıklığına uğramıştı. Babası bile her şeyi bilmiyorsa, kim bilebilirdi? Çetin babasını ilgiyle dinlemeye koyuldu. Dinledikçe de, ne çok şey bilmediğini anlayıp şaştı.

4.sınıf

İlkbahar geldiği zaman Kaçkarlar bir başka güzel olur. Eriyen karların suları, zaten büyük bir enerjiyle akan derelerin gücüne güç katar. Karların kalkmasıyla bir anda doğa canlanır. Çiçekler, o rengârenk başlarını toprağın altından hemen çıkarmaya başlarlar. Kuşların cıvıltısı ve derelerin gürültüsüne az da olsa yaylalardan gelen horon sesleri katılır. Göllerin, derelerin, yaylaların, dağların yalnızlığı yavaş yavaş sona ermeye başlar. Artık Kaçkar Dağları özene bezene yeni mevsimin konuklarını karşılamaya hazırdır. Baharla birlikte buralar, Kaçkarlara çeşitli amaçlarla gelen insanlarla dolmaya başlar. Kimi fotoğraf çeker, kimi tırmanış yapar. Kimi ise orman içine kurduğu kampta, doğanın sessizliğinde kendini bulmaya çalışır.

Bilindiği gibi Kaçkar Dağları çok değişken bir iklime sahiptir. Yakıcı bir güneşin hemen ardından sağanak yağışlar başlayabilir. Bu nedenle Kaçkar Dağları'na gelenlerin her mevsime uygun giyecek ve yağmurluk bulundurmaları zorunludur.

5.Sınıf

Sonbahar, bana hep göç mevsimini hatırlatır. Havaların soğumasıyla artan göçleri. Bu dönemde, başımı kaldırıp göğe baktığımda toplu halde hareket eden kuşları görmeyi hem severim hem de bu toplu gidişten biraz hüzünlenirim. Sonra, yazın yeniden geleceğini ve onların bize geri döneceklerini düşünerek rahatlarım. Leylek, kırlangıç, kara çaylak, boz şahin, boz kaz gibi kuş türleri kuzeyden güneye göç ederken ülkemizin üstünden geçer.

Göç eden kuşların en şaşırtıcı özelliklerinden biri, aradan geçen zamana karşın daha önce kurdukları yuvaları rahatça bulmalarıdır. Göçmen kuşlar, büyük su kütleleri olan okyanus ve denizler üzerinden değil, kıtalar üzerinden geçmeyi tercih ederler. Bunun nedeni, yeryüzü şekillerinin varlığıdır. Dağlar, tepeler, vadiler, sulak alanlar, göl kıyıları, ırmak kıyıları, sahiller göçmen kuşların dayanak noktalarıdır. Yön belirlemeye yardımcı bir diğer dayanak da Güneş ve yıldızların gökyüzündeki konumlarıdır. Dünyanın Güneş etrafında dönmesi ile Güneş'ten Dünya'ya gelen ışınların yerküre ile yaptığı belli açılar vardır. Işınlardaki bu mevsimlik değişmeler, kuşlara göç hareketlerinin başlama ve bitme zamanları hakkında mesajlar verir.

APPENDIX C

OFFICIAL CONSENT

İstanbul İl Milli Eğitim Müdürlüğü'ne,

Araştırmalar, okul yıllarının başlangıcından itibaren, okuma ve yazmada güçlük çeken çocukların giderek artan akademik sorunlarla karşılaştığını göstermektedir. Bu durum, sadece okul yılları ile sınırlı kalmamakta, kişinin tüm yaşamını olumsuz etkileyebilmektedir. Bu nedenle, eğitimin ilk yıllarında görülen okuma sorunlarına erken yaşta tanı koymak önem taşımaktadır. Buna karşın, Türkiye'de okuma güçlüğü olan çocukları saptamada, erken tanı ve tedavisinde yararlı olabilecek ölçme araçlarının eksikliği görülmektedir.

Araştırma, okuma başarısının saptanmasında kullanılan Denckla ve Rudel'ın geliştirdiği ("Rapid Automatized Naming Tests") "Hızlı Otomatik İsimlendirme Testlerinin" Türkçe'ye çevrilmesi, geçerlik ve güvenirlik çalışmasıdır. Denek grubu 5-10 yaş arası çocuklardan oluşacaktır. Bu testler bireysel uygulanmakta, 30 dakikayı aşmamaktadır.

Tez çalışması Boğaziçi Üniversitesi Rehberlik ve Psikolojik Danışmanlık Yüksek Lisans Öğrencisi F.Hande Bakır tarafından, Yrd. Doç.Dr. Nalan Babür gözetiminde yürütülmektedir. Tez çalışmasının İstanbul ilinde aşağıda adı geçen okullarda yapılması planlanmaktadır. Tez için kullanılacak anket ve testler ekte sunulmaktadır.

Anket ve testlerin aşağıdaki okullarda uygulanması için gerekli iznin verilmesini saygılarımla arz ederim.

Yrd. Doç. Dr. Nalan Babür
Boğaziçi Üniversitesi

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READING PASSAGES:

The first and second grade's reading passages were written by Prof. Gülçin Alpöge. Other passages were selected from different textbooks stated as below.

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