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DOI: 10.1590/1982-0216201618210615

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Original articles

Rapid Automatized Naming in 6 and 7 years old students

Nomeação Automática Rápida em escolares de 6 e 7 anos

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Conflict of interest: non-existent

Received on: July 11, 2015
Accepted on: January 03, 2016

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ABSTRACT

Purpose: to evaluate the speed of RAN in 6 to 7-year- schoolchildren (1st year of elementary school) and evaluate the difference in Rapid Automatized Naming subtests of colors, letters, numbers and objects.

Methods: 30 children from the 1st year of public elementary schools were evaluated.

Results: indicate significant differences for all tests of colors and letters between the ages. In other subtests there were no significant differences between digits and objects. We notice that the average performance among the four subtests indicated that the speed of RAN was better among 7 year-old children.

Conclusion: the results point to the need of establishing the relationship between the language skills and reading and writing skills for the early identification of the direct impact of rapid automatized naming changes in the literacy process.

Keywords: Mental Processes; Learning; Evaluation; Students

RESUMO

Objetivo: avaliar a velocidade de Nomeação Automatizada Rápida em escolares de 6 e 7 anos, frequentadores do 1º ano do ensino fundamental e avaliar a diferença de desempenho em Nomeação Automatizada Rápida nos subtestes de cores, letras, números e objetos.

Métodos: foram avaliadas 30 crianças, frequentadoras do 1º ano do ensino público fundamental.

Resultados: indicam haver diferenças significantes para todos os testes de cores e letras entre as idades. Nos demais subtestes, não houve diferenças significantes entre dígitos e objetos. Nota-se que a média de desempenho entre os quatro subtestes indicou que a velocidade de nomeação automatizada rápida foi melhor entre os sujeitos de 7 anos.

Conclusão: os resultados apontam para a necessidade de estabelecimento da relação de habilidade linguística com as habilidades de leitura e escrita para a identificação precoce do impacto direto da alteração nomeação automatizada rápida no processo de alfabetização.

Descritores: Processos Mentais; Aprendizagem; Avaliação; Estudantes

INTRODUCTION

Rapid Automatized Naming (RAN) testing continuously measures speed performance in naming sequential common stimuli; in other words, how fast a child verbalizes sequentially a list of basic symbols¹⁻³. This test has already been applied in several populations of readers who suffer from several different degrees of dyslexia and from learning disorders⁴⁻⁷. Access to a mental inventory of words, measured through Rapid Automatized Naming (RAN) is an important predictor for reading skill and relates to abilities of decoding, fluency, and reading understanding. Some research have indicated that children with reading and writing alteration present an inferior performance in Rapid Automatized Naming tasks^{3,5,8-12}.

In their vision, the authors relate rapid automatized naming activities as phonologic in nature, suggesting that rapid naming tasks access the functioning of a “precise mechanism of time” that is important in a complex process involving the phonologic system and visual representations in the form of orthographic codes. The authors even hypothesize that low naming speed for letters or digits may be a sign of an alteration in the automation process¹³.

To be able to read in a language that uses an alphabetic writing system, understanding the alphabetical principle of phonographic correspondence is imperative. This relation is more consistent in languages with a more transparent orthographic pattern, as decoding is realized through a grapheme/phoneme association^{14,15}. Children who present with difficulty during RAN may be less sensitive to orthographic patterns. In other words, despite language’s irregularity, it would be possible to adapt to the incidence of determined sequence of letters. Only letter combinations that were possible in that language would be understood, possibly making reading faster^{3,5,8-12}.

Despite national¹⁵⁻¹⁷ and international¹⁸⁻²⁰ literature pointing to the relationship between phonologic abilities and acquiring and developing reading, studies dedicated to verifying these abilities through formal protocols or evaluation in students in the early phase of alphabetization are scarce in national literature.

The more developed a child’s phonological system, the more perfected their linguistic representations. Authors Snowling and Hulme²¹ claim this perfecting allows a better performance in other cognitive activities such as increased phonologic working memory. In this manner, the gap in phonologic abilities could partially justify difficulties in operational memory²¹. The time

a child takes to process visual information in writing and / or images may point to difficulties in naming and reading, and lead to hypotheses on the development of not only language, but also of cognitive skills. After all, greater competence in recognizing written words in a fast and accurate manner means more cognitive resources available for the task of reading comprehension. The authors suggest the ability to process visual symbols quickly also plays an important role in learning to read and write in an alphabetical orthographic writing system due to participation of the occipital-temporal region, and that a disorder in this ability may constitute a second deficit in phoneme awareness^{7,10,22,23}.

The studies of Denckla and Rudel⁴, and of Geschwind and Fusillo²⁴ are based on nonscientific publications that suggest the existence of cognitive components involved in naming colors and which would also be related to naming “labeled” abstract symbols, visual stimuli which would be important to performance in reading, presenting, therefore, similar cognitive needs. These hypotheses were investigated and developed^{4,25,26} and verified that graphic stimuli (letters and digits) were recovered with greater speed when compared to colors, evidencing the difference between readers and dyslexia and readers with other kinds of reading difficulties. Other studies have shown that children with learning disorders may also eventually present with problems in accessing lexicon due to different levels of processing information and that the speed with which stimuli are named is directly connected to speed of access to short term memory and phonological naming, thus influencing the development of reading and writing^{3,5}.

The ability to quickly process visual symbols is usually evaluated through rapid automatized naming tasks. These tasks evaluate the time spent by the individual in naming a series of familiar visual stimuli (colors, letters, digits and objects) as quickly as possible. Since speed is also an important factor in fluent textual reading, it is not surprising that performance in rapid automatized naming tasks correlates to performance in fluently reading texts²⁵.

With that in mind, the objective of this research was to evaluate the speed of RAN in 6- to 7-year-old schoolchildren (1st year of elementary school) and evaluate the difference in Rapid Automatized Naming subtests of colors, letters, numbers and objects.

METHODS

This study was only conducted after approval from the Ethics Committee of the College of Medical Sciences of the University of Campinas – FCM/UNICAMP under protocol number 20626213.3.0000.5404. It is a transversal, non experimental study.

In this study participated 30 children of both masculine and feminine gender aged between 6 and 7 enrolled in the first year of primary school. The Rapid Automatized Naming – RAN^{4,6} test, composed by subtests of colors, digits, letters and objects naming, was used.

Subtests are composed of 5 different stimuli which alternate between themselves, forming a total of 10 sequential lines in a total of 50 stimuli. Colors subtest is composed by the colors green, red, yellow, black, and blue. Letters subtest is composed by the letters p, d, o, a, and s. Digits subtest is composed by the numbers 6, 2, 4, 9, and 7. And objects subtest is composed by pictures of the following objects: comb, umbrella, key, watch, and scissor. These tasks evaluate the time spent by the individual in naming a series of familiar visual stimuli (colors, letters, digits and objects) as quickly as possible. Inclusion factors were being enrolled in school and not having a complaint of learning or visual or auditive acuity problems, not using neuropsychiatric medication and now complaint of behavioral alterations. Subjects who did not fit this criteria were excluded. Students were chosen based on their academic performance in reading, writing and math, on them not having learning problems, visual and/or auditive deficiencies or behavioral alterations, and on them not using neuropsychiatric medication. These aspects were verified by the teachers in the classroom and also by the students' health information and school chart.

Tests were applied at the same school the students attended in a time slot opposite their usual school period, and each test took 20 minutes. Instruments used included an identification and triage form and the application protocol for the phonological recoding speed test. The test was only applied after orientation and after checking that the child knew all the symbols that were to be used.

After applying the RAN test, results were statistically analyzed through the SPSS 17.0 software.

RESULTS

This study did not verify significant differences between genders. Averages between genders were compared by the Mann-Whitney test, and no significant differences were found for all tests: color ($p=0.561$), digits ($p=0.618$), letters ($p=0.533$), and objects ($p=0.647$).

Averages were compared through the Mann-Whitney and significant differences were verified in all tests of colors ($p=0.003$) and letters ($p=0.011$). There were no significant differences in the other subtest: digits ($p=0.147$) and objects ($p=0.065$). Average performance between four subtests indicated that rapid automatized naming speed was better between subjects that were 7 years old (Table 1).

Table 2 shows a group of 14 boys and 16 girls, totalling 30 students.

Differences between genders were not found in the same age group, therefore there is no need for separate tables of correction and on performance for boys and girls inside each age bracket.

Table 3 is divided by age, 10 six year-old students and 20 seven year-old students.

Table 1. Descriptive statistic on sample performance according to age

	Age	Minimum	Maximum	Medium	SD	Variance
Colors	Six	41.01	96.56	67.2100	14.57208	212.346
	Seven	38.97	71.69	53.1615	8.41963	70.890
Digits	Six	30.97	125.10	56.5060	27.69186	766.839
	Seven	25.28	68.56	42.7685	11.96160	143.080
Letters	Six	32.66	88.07	58.3100	17.14229	293.858
	Seven	25.59	78.75	42.9325	13.66899	186.841
Objects	Six	58.91	106.50	81.0830	14.23168	202.541
	Seven	43.31	135.71	71.1135	20.50186	420.326

Legend: SD = Standard Deviation

Minimum: Minimum speed

Maximum: Maximum speed

Table 2. Subject distribution according to gender

	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Male	14	46.7	46.7	46.7
Female	16	53.3	53.3	100.0
Total	30	100.0	100.0	

Table 3. Subject distribution according to age

Age	Frequency	Percentage	Valid Percentage	Accumulated Percentage
06	10	33.3	33.3	33.3
07	20	66.7	66.7	100.0
Total	30	100.0	100.0	

DISCUSSION

Results from this study show that the Rapid Automatized Naming of colors, letters, numbers, and objects agrees with our findings, as color naming capacity is acquired later in children, and since only 61% of 5 year old children can successfully name colors such as red, blue, yellow, green, and black. Naming letters and numbers come even later, alongside the first years of school, resulting in basic differences in speed²⁷.

Other studies are based in neuroscience, which suggests the existence of cognitive components involved in naming colors and which would also be related to naming "labeled" abstract symbols, visual stimuli which would be an important factor to performance in reading, presenting, therefore, similar cognitive needs²⁴.

Language presents a regular structure in the formation of words. Stimuli can be decoded using a relatively smaller number of phonological abilities. The author references the inexistence of difference in naming speed in normal children²³.

Faster naming of letters and digits in comparison to colors confirm findings, since naming these stimuli requires the use of more effective attention and visual perceptive processes such as discrimination and analysis-synthesis^{25,28,29}.

Denckla and Rudel⁴ demonstrate that a small group of children with severe dyslexia presented with a deficit in naming colors, just like in a study with adults who suffer from alexia the deficit was attributed to slow speed or tardiness in naming colors in comparison to normal individuals

In 1976, Denckla²⁹ evaluated 180 children between 5 and 10 years of age, concluding that children over 6

named letters and numbers with more speed than colors and objects. These findings showed the difference in serial naming of different semantical categories relates directly to stimulation to which the children had been exposed. The author claimed the existence of a small difference in naming speed between boys and girls in the color task. The difference between genders showed that girls are faster than boys, which relates to how girls develop language faster due to an early neurological maturation in the left hemisphere³⁰. Our results showed that digits and objects were named faster than colors, and that letters were named more slowly by 6 year old children. These findings are compatible with the authors', who affirmed object naming capacity is learned precociously, leading to greater speed and ease³⁰.

In another study, with 120 children, authors showed that serial naming tests for several different visual stimuli (colors, letters, numbers, objects) made it possible to differentiate between dyslexic individuals and individuals with learning difficulties, and not only between dyslexic and students with no learning complaints, since dyslexic individuals presented with inferior naming speed in comparison to those with learning difficulties²⁵.

The ability to name letters of the alphabet comes in second place (in a naming ranking) after naming objects as a predisposing factor to reading. Certainly only in a few cases letters are capable of reversability, such as "b" / "d", "p" / "q", which are commonly mistaken up until 8 years of age. The authors also says that fully understanding how normal 5 year old children develop each naming category would certainly bring knowledge to several researchers on how to evaluate dyslexic children or those with reading difficulties²⁷.

Visual stimuli recoding and sound categorization need simultaneously information processing and storage. Sound categorization activities are more effective when there is correct storage in working memory. This capacity is a determining factor in phonological conscience activities and relates to the development of reading skills^{31,32}.

CONCLUSION

This study has led to parameters on evaluating the speed of rapid automatized naming in first grade primary school students without learning difficulties, contributing to research that verifies speed/time in naming in children with normal development of reading during the initial phase of the alphabetizing process.

These results also point to the need of continuity of this study, as lesser knowledge of the profile of students in the early stages of alphabetization in regards to metaphonological skills and reading mastery compromises the teacher's ability to detect in the early stages students who are at risk for difficulties in learning to read and write.

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