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Editorial



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Decoding automaticity in reading process and practice

How much influence does summer vacation have on children's reading abilities in primary school?

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✎ **ABSTRACT.** La presente ricerca si prefigge di indagare quanto possa incidere l'esercizio nell'incremento dell'abilità di lettura a voce alta nei bambini in fase di apprendimento. Il metodo scelto per verificare l'importanza dell'esercizio è stato quello di misurare le conseguenze che scaturiscono dalla sostanziale riduzione di questo durante il periodo estivo. Il paradigma adottato prevede la somministrazione di tre diverse prove di lettura standardizzate (liste di parole, non parole e brano) a gruppi di bambini dalla classe 1^a alla classe 5^a elementare, in tre momenti dell'anno (fine anno scolastico, inizio anno scolastico e a distanza di 2 mesi da questo). Dati in letteratura mostrano che la sospensione dell'esercizio causata dalle vacanze estive produca effetti dannosi per la matematica e l'ortografia, mentre i risultati riguardanti l'abilità di lettura sembrano essere discordanti (Cooper, 1996; Allinder et al., 1992). I risultati della presente ricerca mostrano che i parametri di velocità e accuratezza risentono diversamente sia della diminuzione che dell'aumento dell'esercizio. Per tutte le classi esaminate si assiste ad un aumento costante della velocità e la sospensione dell'esercizio sembra non eserciti effetti significativi sulla prestazione. Tale incremento della velocità di lettura sembra accompagnarsi, nelle prime classi, ad un aumento della percentuale di errori in seguito al riposo estivo. Pertanto la comparazione dei diversi dati emersi porterebbe ad ipotizzare l'esistenza di meccanismi indipendenti sottostanti allo sviluppo e all'automatizzazione dei due fattori analizzati.

✎ **SUMMARY.** This research intends to investigate the impact of reading practice on children's read-aloud abilities during the learning phase. In order to assess the importance of reading practice, the researchers have examined the possible adverse consequences arising from the substantial reduction in exercise during the summer vacation. According to the model adopted, groups of children from grade first to fifth in primary school have been given three different standardized tests (lists of words, pseudo-words and a text), in three distinct times of the year (end of school, beginning of school and two months after that). The available literature on the subject demonstrates that summer vacation can have a detrimental impact on maths computation and orthography whereas the results relating to reading abilities seem to be considerably disparate (Cooper, 1996; Allinder et al., 1992). The outcomes of this research prove that speed and accuracy parameters are affected differently by both the decrease and the increase in reading practice. All assessed classes have shown a regular increase in reading speed, and the suspension of the learning practice does not seem to have influenced the performance significantly. This improvement in reading speed apparently comes with an increase in the percentage of mistakes made after summer vacation, especially in the first classes. Therefore, the comparison of the provided results might suggest the existence of independent mechanisms lying behind the development and automaticity of the two examined factors.

Keywords: Reading practice, Standardized test, Summer vacation

INTRODUCTION

The definition of ability refers to the capacity of a person to execute a procedure, consisting of a series of acts, in a rapid and standardized way with the minimal waste of cognitive resources. Therefore, a person is considered capable of performing an act when he/she can perform it repeatedly, adequately and effortlessly. This definition of ability assumes that automaticity is an essential process since it implies a reduction of the explicit control required for the performance of the overall task (Stella, 2001).

Some learning abilities such as reading and writing are called instrumental as their acquisition through automaticity gives access to conceptual knowledge. Reading and writing abilities are usually learnt through the constant repetition of specific procedures administered by the teacher. The acquisition of such skills requires the child to practice continuously from time = 0 to time = N depending on the adopted frequency. Repeating procedures is, then, the unavoidable condition required to acquire the procedural abilities. In other words, a child will not be able to improve his abilities without a regular practice (Tressoldi et al., 2001).

The learning progress of instrumental abilities follows an increasing linear trend, which is directly proportional to the type of stimuli provided, their frequency and the way they are provided. This linear development is quite frequent in the majority of cases. It makes it possible to foresee the time needed to develop a skill and to evaluate the effectiveness of the acquisition methods (Tressoldi, 1996).

In addition, mastering a skill coincides with the achievement of a full behavioral efficiency in a particular domain (reading or writing). In her model *Representational Redescription*, Karmiloff-Smith stresses the importance of automaticity acquired through a constant practice that she terms as “behavioral mastery” (Karmiloff-Smith, 1995).

The study European Co-operation in the field of Scientific and Technical Research (COST), by Carriero et al. (2001) has shown that the time required to develop reading skills seems to vary depending on the European country considered.

The development of decoding skills in some languages (like French, Portuguese, and Danish) is slower compared to the general average, and this language delay becomes increasingly evident when referring to English language.

A different comparative study between various European languages (Saymour et al., 2003) has shown that the majority of children were accurate and fluent in reading before the end of the first school year, with the exception of French, Portuguese and Danish children.

However, English-speaking children, whose results were notably dissimilar to those of the other groups, have delivered the worse performances. In fact, children who learn to read in English take twice as long to acquire the first reading basics than the others.

The percentage of the correct phonological recoding decreases as the orthography consistency of the language decreases. In opaque orthographies, such as English, the main problem is not the reading speed but the accuracy and the correct phonological recoding (Share, 1995; Ziegler-Goswami, 2006). This language delay is due to both syllabic complexity, which affects pseudo-words decoding, and orthographic depth, which affects both word and pseudo-words reading. Hence, it is reasonable to assume that learning to read in a shallow orthography is easier than learning to read in an orthographically opaque language.

Ellis & Hooper (2001) have confronted the writing-reading skills in parts of the North Wales, which is a single geographical, social, scholastic and administrative context with two different languages, English and Welsh. They have pointed out that after the same amount of instructions received, Welsh-speaking children could read correctly more than double the number of words than English-speaking children.

If it is true that the effects of the learning process speed depend on the characteristics of the orthographic systems, it is also true that the quantity of practice is another significantly influencing factor.

Recent studies relating to the potential positive effects of consistent practice on children performance in math, orthographic and reading tests have concentrated on the impact of practice reduction. They have observed the variations occurring after the “summer vacation”, analyzing the children’s performances after the practice reduction that occurs during the summer months. As reported previously, summer vacations can have detrimental impacts on math and orthography (Cooper, 1996; Allinder et al., 1992) while the results related to reading abilities seem to be less clear and quite discordant. In particular, Cooper and colleagues (1996, 2000) carried out a revision of 39 studies in order to examine the summer vacation effects on children’s performances.

Summer loss for all students was estimated to be equal to about one month, and this loss was most acute in mathematical computation rather than in reading. In reading, substantial differences were found between middle- and lower-class students (Allington & McGill-Franzen, 2003; Borman et al., 2005; Schacter & Jo, 2005). In particular, outcomes have shown that reading tests performances were fairly even between the two groups over the school year. Although, after the summer break, performances were significantly different, presuming that lower-class students had received a lower environmental stimulation during the summer months.

Helf, Konrad & Algozzine (2008) have recently carried out researches in order to analyze the summer vacation effects on the early learning abilities of children leaving the kindergarten and entering primary school until 2nd grade. The authors have examined the potential changes caused by a gap of about ten weeks. Children have not experienced any setback after the summer break, not even those who had delivered poor reading performances during the previous school year, and for whom the school had developed a particular intensive intervention.

In connection with these last findings, the present research aims to answer a significant question about learning to read: how much influence does the practice factor have on children's reading aloud abilities in primary education? This study wants to analyze the effect of practice reduction on the reading abilities of Italian children from first to fifth grade of primary school. The fundamental hypothesis is that the decoding processes are strictly related to the amount of practice during the learning stage, and it is significant to examine the effect of practice reduction caused by summer vacations. Most teachers assume that learning loss can halt the learning process. Many evidences prove and confirm this theory in relation to writing and calculation; there are no significant data confirming it in relation to reading abilities.

METHODS

The method used in this research aims to measure the consequences arising from the substantial reduction in practice during the summer vacation. According to the paradigm adopted, groups of Italian children from grade first to fifth in primary school have been given three different

standardized tests in three distinct times of the year: end of school (May), beginning of school (September) and two months after that (November).

The summer gap is about two months long, precisely the time between the administration of the first test in May and the one in September.

The following are the dependent variables examined in the three separate phases:

- X1: reading time (in seconds) of a list of words;
- X2: number of mistakes in reading a list of words;
- X3: reading time (in seconds) of a list of pseudo-words;
- X4: number of mistakes in reading a list of pseudo-words;
- X5: number of syllable per second in reading a text;
- X6: number of mistakes in reading a text.

Participants

This research has been carried out on a sample of 289 primary school children from Emilia Romagna (North Italy) respectively divided as follows:

- 74 1st grade children;
- 105 2nd grade children;
- 52 3rd grade children;
- 46 4th grade children;
- 12 5th grade children.

Participants or their parents or legal representatives gave informed consent. It is significant to underline that children move on to the next grade between the first test administrated at the end of the school year and the second and third tests conducted after the summer vacations. For example, 1st grade pupils who completed the first test at the end of the school year were in 2nd grade during the second and third test administration phases, after the summer vacations.

Materials

The following standardized reading tests have been administered to all children: list of words and pseudo-words from the *DDE-2 Battery for the Assessment of Developmental Dyslexia and Disorthographia-2* (Sartori, Job

& Tressoldi, 2007) and a text from *MT Reading Test for the primary school-2* (Cornoldi & Colpo, 1995). The selected excerpts differ depending on the grade and progressively increase in complexity.

Here is a brief description of the three tests administered:

- 1) *Word reading assessment*: the test consists of 4 lists of 28 total words (281 syllables). The first two columns show high-frequency words and the other two show low-frequency words.
- 2) *Pseudo-word reading assessment*: the test consists of 3 columns of 16 total pseudo-words (127 syllables), which are not part of the Italian vocabulary as they have no meaning.
- 3) *Reading text assessment*: as stated above, passages are selected depending on the grade. First grade pupils have been given the text “The caterpillar and the geranium” (140 syllables). Second grade pupils “The bell-ringer mice” (301 syllables). Third grade pupils “The empty barrel and the full barrel” (332 syllables). Fourth grade pupils “One eye, two eyes” (430 syllables). Fifth grade pupils “Houses and buildings” (507 syllables).

Procedure

All tests have been carried out individually. Children were taken separately to another room and were asked to read aloud as rapidly as possible without making mistakes. They all followed the same order (words, pseudo-words, and text reading), and the administrators tested the reading time (speed) and the number of mistakes (accuracy).

All administration phases have been carried out with the same procedure and the same order (May, September, November). In order to simplify the outcomes evaluation, the phases have been respectively named T1 (May), T2 (September) and T3 (November).

RESULTS

Three within-subjects designs have been used for each class, examining the effects of practice during the school

year. A between-subjects design has also been adopted for grade first to fourth. Both examinations have been carried out considering two criteria: reading speed and accuracy. In other words, the tests have examined how the two variables may vary analyzing the children’s performances in the three distinct phases and between classes.

The following tables show the mean value and the standard deviation of time and mistakes of the three tests, at each stage and for each year. Tables also display the results obtained by the t-test used to compare the means. For the lists of words and pseudo-words, the raw scores allow a comparative analysis of the classes. For the text, the outcomes have been turned into a benchmark score (syllable per second).

Speed and accuracy indicators are assessed separately since they measure two different aspects of the child’s reading ability. Studies on dyslexia, though, have shown that the two indicators tend to balance each other during the reading learning process (Morlini et al., 2013, 2015).

Finally, the research shows the results obtained by the between-subject design used for classes 1st to 4th.

FIRST CLASS

Speed

Table 1 shows the mean values and the standard deviations. We can notice a constant reduction in reading speed between the test administration intervals. Reading times do not increase after summer vacation and the consequent practice reduction. On the other hand, there is a significant increase in reading speed between T2 and T3 for word decoding ($T = 3.96$, $p = .001$), pseudo-word decoding ($T = -3.34$, $p = .005$) and text reading ($T = -3.82$, $p = .001$). The reading speed decrease is not steady, but it seems to improve after school recommencement (word decoding $T = 5.99$, $p = .000$, pseudo-word decoding $T = 3.84$, $p = .001$, text reading $T = -5.20$, $p = .000$).

Accuracy

Table 2 shows a significant increase in reading mistakes in T2 compared to T1 for word decoding ($T = -2.53$, $p = .006$), pseudo-word decoding ($T = -3.66$, $p = .002$) and text reading ($T = -2.31$, $p = .011$). Thence, it is possible to assume that this is a potential effect of summer vacation. In T3, there is a substantial reduction in reading mistakes compared to T2, but not as significant if compared to T1.

Table 1 – Descriptive Statistics for Speed, 1st class

Words			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	284	250	195
Standard Deviation	111	103	64
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	158	156	125
Standard Deviation	62	70	38
Text			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	1	2	2
Standard Deviation	1	1	1

Table 2 – Descriptive Statistics for Accuracy, 1st class

Words			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	12	16	14
Standard Deviation	8	8	6
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	10	13	12
Standard Deviation	5	6	5
Text			
Phase	T1	T2	T3
N. Subjects	74	74	74
Mean	4	5	4
Standard Deviation	3	4	3

SECOND CLASS

Speed

Table 3 shows a significant speed reduction in T1 to T3, with an improvement after T2, presumably due to school recommencement (word decoding T1-T2: $T = 2.76$, $p = .003$, T2-T3: $T = 3.03$, $p = .001$, T1-T3: $T = 5.73$, $p = .000$; pseudo-word decoding T1-T2: $T = 1.64$, $p = .05$, T2-T3: $T = 2.57$, $p = .005$, T1-T3: $T = 4.06$, $p = .000$; text reading T1-T2: $T = -2.40$, $p = .008$, T2-T3: $T = -3.69$, $p = .001$, T1-T3: $T = -6.36$, $p = .000$).

Accuracy

Table 4 displays means and standard deviations. The increase in reading mistakes is evident in all reading tests. There is an improvement in T3 compared to T2, which is significant in text reading ($T = -2.92$, $p = .002$) and pseudo-words decoding ($T = 1.84$, $p = .03$). The text reading accuracy improves even more in T3 compared to T1 ($T = -4.98$, $p = .000$).

THIRD CLASS

Speed

Table 5 shows a trend similar to that of 2nd class, with a progressive decrease and a considerable improvement in T3 (words decoding $T = 3.75$, $p = .001$; pseudo-words decoding $T = 3.65$, $p = .002$; text reading $T = -3.30$, $p = .007$).

Accuracy

Table 6 displays means and standard deviations. As opposed to the previous classes, there are no evidences of summer vacation. As previously observed, there is a considerable improvement in T3, in support of the demonstration of the positive effect of practice (word decoding $T = 5.02$, $p = .000$; pseudo-word decoding $T = 4.24$, $p = .000$; text reading $T = -3.29$, $p = .007$).

FOURTH CLASS

Speed

In Table 7, we can observe a constant decrease in reading speed. Examining T1-T3 is significant in all

reading tests (word decoding $T = 2.13$, $p = .018$; pseudo-word decoding $T = 1.95$, $p = .027$; text reading $T = -2.55$, $p = .006$). As for the previous classes, there are no evidences of summer vacation.

Accuracy

Table 8 displays means and standard deviations. There is neither increase nor decrease in reading accuracy in all tests. However, it appears to be a considerable improvement in word decoding ($T = 1.78$, $p = .039$) in T3.

FIFTH CLASS

Speed

Table 9 displays means and standard deviations. This class produced stable scores, even though there is still a slight and insignificant decrease in speed. In word decoding ($T = 2.12$, $p = .022$) and text reading ($T = -2.73$, $p = .006$), the comparison between T1 and T3 supports the demonstration of the positive effect of practice.

Accuracy

Table 10 displays means and standard deviations. The accuracy parameter does not show a substantial decrease in reading mistakes. Only in word decoding, the comparison between T2 and T3 is particularly relevant ($T = 1.78$, $p = .044$): in fact, accuracy worsens slightly in T2 and improves again in T3.

Between-subjects design 1st-2nd grade

This examination shows many notable differences in all tests.

With relation to both speed and accuracy, children advancing from one grade to the other have shown significant improvements.

Speed: word reading ($T = 3.19$, p -value = .008); pseudo-word reading ($T = 3.00$, p -value = .001) text reading ($T = -4.51$, p -value = .000).

Accuracy: word reading ($T = 4.17$, p -value = .008); pseudo-word reading, even though not below 5% ($T = 2.22$, p -value = .013) text reading ($T = -6.71$, p -value = .000).

Table 3 – Descriptive Statistics for Speed, 2nd class

Words			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	165	143	124
Standard Deviation	61	51	38
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	108	100	89
Standard Deviation	37	32	28
Text			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	3	3	3
Standard Deviation	1	1	1

Table 4 – Descriptive Statistics for Accuracy, 2nd class

Words			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	9	11	10
Standard Deviation	7	8	7
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	10	11	10
Standard Deviation	5	6	5
Text			
Phase	T1	T2	T3
N. Subjects	105	105	105
Mean	9	10	12
Standard Deviation	6	6	5

Table 5 – Descriptive Statistics for Speed, 3rd class

Words			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	126	112	98
Standard Deviation	39	38	26
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	90	81	70
Standard Deviation	31	29	22
Text			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	3	4	4
Standard Deviation	1	1	1

Table 6 – Descriptive Statistics for Accuracy, 3rd class

Words			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	6	5	2
Standard Deviation	4	4	2
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	6	6	3
Standard Deviation	3	4	2
Text			
Phase	T1	T2	T3
N. Subjects	52	52	52
Mean	3	4	1
Standard Deviation	3	4	1

Table 7 – Descriptive Statistics for Speed, 4th class

Words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	102	98	88
Standard Deviation	35	32	28
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	77	73	68
Standard Deviation	20	24	22
Text			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	4	4	5
Standard Deviation	1	1	1

Table 8 – Descriptive Statistics for Accuracy, 4th class

Words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	5	4	3
Standard Deviation	4	3	3
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	7	6	7
Standard Deviation	4	4	4
Text			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	5	5	4
Standard Deviation	3	3	3

Table 9 – Descriptive Statistics for Speed, 5th class

Words			
Phase	T1	T2	T3
N. Subjects	12	12	12
Mean	78	72	67
Standard Deviation	10	12	14
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	57	56	48
Standard Deviation	15	19	17
Text			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	4	5	4
Standard Deviation	1	1	1

Table 10 – Descriptive Statistics for Accuracy, 5th class

Words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	2	2	2
Standard Deviation	2	2	2
Pseudo-words			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	3	3	3
Standard Deviation	4	3	2
Text			
Phase	T1	T2	T3
N. Subjects	46	46	46
Mean	3	2	2
Standard Deviation	3	2	2

Between-subjects design 3rd-4th class

This examination shows many significant differences only in relation to the accuracy parameter, but in all three tests: word reading ($T = -3.43$, $p\text{-value} = .000$); pseudo-word reading ($T = -5.51$, $p\text{-value} = .000$); text reading ($T = -6.48$, $p\text{-value} = .000$). Reading speed performances have been stable and have not caused significant variations. On the other hand, mistakes have considerably decreased.

DISCUSSION

The findings suggest that both the reduction and the increase in reading practice during and after summer vacation affect the speed and accuracy development processes in a different way.

All the examined classes have shown a constant increase in reading speed; thence the interruption of reading practice during the summer break does not seem to alter the performance significantly. There has also been an overall speedup after returning to school (higher in T3), and a constant reduction in reading time in the three administration phases (T1, T2, T3). Therefore, reading time does not worsen with the interruption of the reading practice; it remains steady and can even achieve a physiological improvement, probably due to the child's growth and development. On the other hand, practicing during the school year, significantly improves reading speed.

These results demonstrate that reading speed improves with practice, but at the same time, practice suspension does not jeopardize the reading speed progress, at least for periods no longer than three months (summer vacation length). This finding is consistent with the study carried out by Helf, Konrad & Algozzine (2008), and it can be partially explained by the fact that there is not a total lack of reading practice during the school holidays. The child uses the acquired skill (more and more from first to fifth grade) in different ways as the everyday life includes a variety of activities involving reading. There is not such a natural environment of practice for numbers and calculation. That is why the available literature on the subject suggests that summer vacation has a detrimental effect on the math computation (Allinder et al., 1992; Cooper, 1996).

With reference to accuracy, results reveal that summer vacation has a detrimental effect on the overall spelling performance, compared to the one delivered at the end of the previous school year. Hence, the comparison of the two factors lends credence to the argument that the decrease in reading time coincides with an increase in spelling mistakes. It is important to underline that this circumstance tends to decrease starting from third grade, and it is essentially nonexistent in fourth and fifth grade. Apparently, summer vacation has a detrimental influence on first and second grade students, who make more spelling mistakes at the very beginning of the new school year. From third to fifth grade spelling and speed performances do not seem to be affected by summer vacation. More precisely, the reading speed process prevails on accuracy control in first and second grade children.

These findings are consistent with those of Morlini et al. (2014). Their researches reveal that external elements, such as reading exposure and sociocultural background, have a significant impact on reading acquisition in children of first and second grade. From third grade, students' performances are more consistent, and speed and accuracy parameters start to coincide, indicating that automaticity has been nearly achieved. In older children (fourth and fifth grade), summer vacation has no effect on speed and accuracy, confirming the fact that at this evolutionary stage, the two processes act together.

In conclusion, the results of this study lead to the hypothesis that as the child grows old, reading practice has less influence on his performance.

CONCLUSION

The purpose of this study was to examine the importance of regular reading aloud practice, in order to improve the performance. Tests have been carried out on children first under school training and then after the summer vacation, when they go back to school after a period of total or semi-abstention from the regular practice.

The findings suggest that practicing is an important factor in developing speed reading (observing the progress always occurring between T2 and T3). At the same time, they reveal that summer vacation does not affect speed-reading at any learning level. This result can be explained considering the modular structure of this particular skill.

Once started, this ability tends to improve naturally and the regular practice only accelerates the learning process. It is possible to assert that reading skills are automated over time and until full automaticity is acquired, exercising helps to improve them significantly.

By comparing the results, it is reasonable to believe that independent mechanisms lie behind the development of the two analyzed factors (speed and accuracy). In fact,

the reduction and the increase in reading practice during and after summer vacation affect both the speed and the accuracy development differently. The speed acquisition process activates and establishes a quicker and/or more stable result. On the other hand, the accuracy development process confirms the predictions made, validating the hypothesis of deterioration in performance after summer vacation and the resulting total or partial interruption of reading practice.

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