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6 THE IMPORTANCE OF SPEED IN ADULT L2 READING

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Abstract

As observed by Kurvers, Stockmann, & Van de Craats (2010), many adult first time readers of Dutch as a second language never progress beyond a very basic level of reading. They understand the sound-letter correspondence, can read simple words and very short sentences, sometimes with many restarts and errors, but, in the end, they often do not succeed in fully understanding the meaning of what they read. It will be argued that the mental steps to be taken for reading a word or a sentence take so much time that hardly any space in working memory is left for building up meaning. This article is an argument for a more structural focus on fluency in literacy courses. A small-scale pilot classroom experiment with gathering reading speed shows enhanced fluency and illustrates that automatization can be attained with simple tools.

Keywords: reading process, reading speed, training, computer-assisted intervention

6.1 Sketching the Problem

In this contribution a well-known problem will be addressed which is familiar to those who teach beginning readers how to read, particularly adult first time readers in a second language. They often attain a very basic level of reading after 400 to 1200 or more hours of instruction in oral and written skills (Kurvers, Stockmann, & Van de Craats 2010), that is to say, they can read simple words,

word strings or simple and short sentences, but they do not seem to understand the meaning of what they are reading, whether it is a word group, an entire sentence, or a small text. They read aloud, by preference, with much subvocalization, many restarts and errors. Sometimes their decoding reading skills are considerable, but a lack of fluency prevents them from successfully participating in a regular L2 class of readers.

In the Netherlands, where the Common European Framework (CEF) of Reference for Languages (Council of Europe 2001) is used in second language education, this framework has been extended with three literacy levels at the lower end of the six CEF levels.[22] This has been done because the European framework is not tailored to adult learners with a low or no level in reading and writing. By adding these literacy levels the progress of adult literacy learners could be measured and become visible to the learners themselves, to teachers, and stakeholders. The literacy framework – added to the CEF and illustrated in Figure 1 – consists of three levels (A, B, and C) for the decoding and encoding steps and three levels for the related functional skills.[23] The three levels for literacy can be characterized as the following can-do statements:

- Level A: can read words consisting of CVC (consonant-vowel-consonant) and words that are learnt as sight words for functional purposes.
- Level B: can read (without sounding out individual sounds) and write highly-frequent words with consonant clusters and grammatical morphemes such as the nominal plural marker *–en* (e.g. boek*en*).
- Level C: can read short and simple texts on familiar subjects; the reading of those texts is automatized.

With regard to fluency, it can be noted that fluency does not play a role at level A. It does play a role at level B, where fluent reading (after visual and auditory analysis and synthesis) of highly-frequent words is required in simple sentences, and at level C, where fluent reading (decoding and blending) of short and simple texts on a familiar subject is required. We abstain here from the description of the functional reference levels as they are irrelevant for the present article.

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22 The Common European Framework describes three main levels: that of Basic User (A1 and A2), Independent User (B1 and B2) and Proficient User (C1 and C2), each divided into two sublevels. See Janssen-Van Dieten (2006) for a concise overview.

23 The L2 Literacy Framework and the related Literacy Portfolio (Stockmann & Dalderop 2005) are successfully used in practice and were also introduced in the Scandinavian countries. See also Stockmann (2006) for an overview.

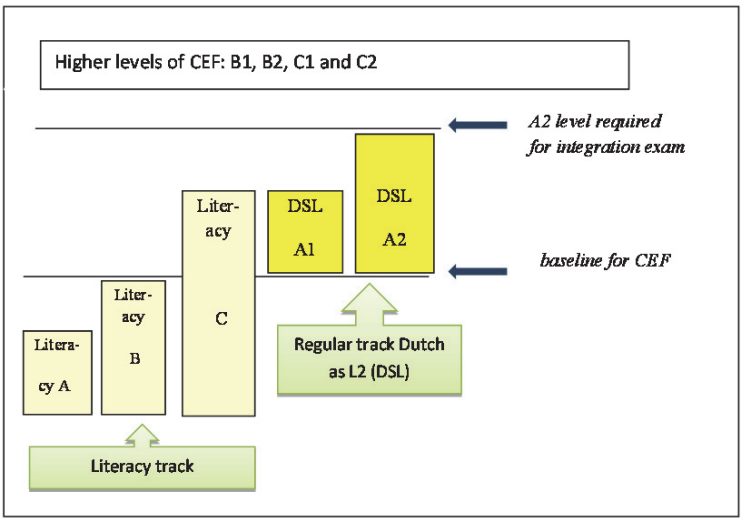

FIGURE 1 The literacy track for Dutch as L2 (DSL) in relation to the basic levels (A1=Breakthrough and A2=Waystage) of the Common European Framework of Reference (CEF).

The problem roughly sketched above is particularly observed in learners at the B-level. Most adult learners attain a basic level of reading but do not succeed in attaining level C (Kurvers, Stockmann, & Van de Craats 2010).

In the Netherlands a phonics approach is most often used in the literacy classroom, as Dutch has a rather transparent orthography. This implies that the instructor teaches how to decode the letters of a word one by one and helps to synthesize (or blend) the sounds again into a word. This is done aloud in the classroom often with the help of paper strips on which the structure of the word is printed or in a similar way using a computer program. After a variable amount of time (variability seems much larger with adults than with children) the learners are able to automatize the blending process and read the word as a whole without spelling the letters one by one. Most learners, however, get stuck in the B-phase. For them the decoding of words is still problematic: many errors, restarts, subvocalizations (spelling) occur, and/or the meaning of the sentence(s) is not (fully) understood.

For an explanation of these phenomena we first focus in section 6.2 on the reading process and the function of working memory in relation to the age of adult first time readers in a second language. In section 6.3, we report on an experimental pilot study on enhancing the speed of reading in the classroom. In section 6.3.1 the design is presented. Section 6.3.2 provides information on the participants. The reading practices in the classroom and the materials we used, including the reading software are discussed in section 6.3.3. Section 6.4 describes the procedure. The results for this experiment, for which computer software for dyslectic readers was used, are given in section 6.5. We close off in

section 6.6 with tentative conclusions on the use of this software for enhancing automatization of the reading process.

6.2 The Reading Process in Relation to Working Memory

When we speak words are used making sentences and sentences are combined making discourse. In doing so, we start by associating phonetic forms (sounds or phonemes) with meanings (for example of the word 'book'). Other speakers of the same language can recognize the word because they have stored in their minds the phonological and semantic representations of the word 'book'. However, a word also has properties that link it to other words (syntactic properties), or combine it with various morphemes (morphological properties). Speakers – also non-literates – have stored these properties of words in their long-term memory and activate them when speaking. Neither literates nor non-literates are aware of using this knowledge.

When children, as mother tongue speakers, learn to read and write in an alphabetic script, they learn how to link sounds to letters (or phonemes to graphemes). After a relatively short time (depending on transparency of orthography) they will have developed also a visuo-graphical representation of a word. Normally, it is not a problem for young children to activate also the semantic representation when they spell the sounds of a (CVC) word one by one because the phonological representation is already linked to the semantic representation (or sound is already linked to meaning). However, when the adult first time reader starts reading in a new language, not only is the visuo-graphical representation new, but also the sound-meaning linking has been recently established, and so is the phonological/phonetic representation (how to pronounce a word). From this short sketch it may be clear that the task of learning to read and write is much more challenging in an L2 than in the L1. Reading a sentence is still more difficult than reading one word because more has to be done. Apart from reading words and retrieving the meaning from the mental lexicon, a syntactic representation has to be built up, a meaning has to be assigned to the whole string of words, and this string (or sentence) has to be linked to the context. Again this task is more difficult and time consuming in the L2 because, having a low oral proficiency, the learner has not yet completely discovered the syntactic and morphological properties of words, nor is the process is yet automatized to the same extent as in the L1.

Processing and analyzing speech-based information takes place in a component of working memory: the phonological loop which repeats and stores spoken language and can be considered an on-line capacity for language processing (Baddeley 1999, 2003). Working memory is also assumed to play a role in learning to read (Baddeley & Gathercole 1992; Goswami, Ziegler, Dalton, & Schneider 2001). The capacity of working memory, though, is limited. Miller (1956) claimed that there is individual variation in the number of unrelated elements, such as digits, letters, or words that a person can recall in correct

order after presentation. The memory span of young adults is approximately seven items ('The magic number 7'), with a variation of plus or minus two. This implies that one's working memory may vary between five and nine unrelated elements, e.g., letters, syllables, words or sentences, or what can be considered a unit or an element. It is evident that the size of an element (for instance, the number of syllables) and also other factors (for instance, the extent to which a word is known) also play a role. Also, more recent research comes forward with other limits of cognition. According to Cowan (2000) there is a limit of four elements in adults, but two elements according to Gobet & Clarkson (2004). In general, the memory span of young adults is higher than that of children and older adults, but this does not hold for non-literate adults (see Kurvers & Van de Craats 2007, 2008: 51).

In addition to differences in capacity, the availability in real time of new information – here the spoken elements – is very restricted, with a variation between one and two seconds, if recall happens. Written material is first converted into an articulatory code (Baddeley 1999, 2003). A third limitation is age-related. According to Salthouse's (1994, 1996) processing-speed theory increased age in adulthood is associated with a decrease in the speed with which many processing operations are executed. Some functions such as spatial visualization and speed of thought are already in decline at age 27 (Salthouse 2009). Consequently, cognitive performance is degraded when processing is slow. Due to limited time relevant processing cannot be successfully executed and the products of earlier processing may no longer be available when later processing is complete. In relation to reading this means that the memory of the words at the beginning is gone by the time the words at the end are read. This sounds rather dramatic for adult first time readers: how can they learn to read words of more than four letters (cf. Cowan 2000) or seven letters (Miller 1956) when an average working memory cannot store more than four or seven elements with a decreasing processing speed. The problem is solved by clustering or chunking two or more elements into a new unit, for example, by dividing a telephone number of nine digits 1-6-2-4-5-7-3-6-4 in three groups of three digits. The same can be done with words: e.g., the five sounds of *t-r-e-k-t* can be combined into an onset (*tr*) and a rhyme (*ekt*): *tr-ekt*, and next into word groups forming a sentence.

As we assume that the problems sketched above – too much subvocalization and insufficient reading comprehension – seem to be related to working memory, we have searched for training procedures for the development of fluency and reading speed. Training aimed at fluency and automatization belongs to the standard repertoire of methods for emergent child readers, as evidenced by the existence of fluency tests for children (e.g., Jongen & Krom 2010; Verhoeven 1992), but such training is rare in courses for adult readers. The functionality, that is to say, the ability of reading a word has been considered more important than the fluency with which this was done. Much research in this area has been done with poor child readers and dyslexic children (e.g., De Jong & Van der Leij 2003; Steenbeek-Plantinga, Bon, &

Schreuder 2012), but there is hardly any research with regard to emergent L2 readers. Children learning to read transparent orthographies (like Dutch) make fewer errors than children reading opaque orthographies (Aro & Wimmer 2003; Patel, Snowling, & De Jong 2004; Seymour, Aro, & Erskine 2003). Impairment in reading speed is the main characteristic of reading disorders in languages with a transparent orthography (De Jong & Van der Leij 2003; Huemer 2009). Huemer successfully trained words at the sublexical level (consonant clusters and syllables) with repeated reading. Why should we wait until a disorder emerges? Instead, we should integrate such training also in regular L2 literacy lessons. In the present pilot study we did use such training with adult L2 learners to enhance reading development.

6.3 The Study

6.3.1 Design

This study was set up as a small-scale pilot study to test a simple technique to be used in the adult classroom for improving reading speed and fluency. It has a pre- post-test design with a short treatment.

6.3.2 Participants and their Classroom

In this particular classroom fourteen L2 literacy students had been sent to class by the municipality of Rotterdam to learn how to read and write in Dutch. They were all female; most of them were mothers between 20 and 50 years of age. They invariably had a 540 hour contract to provide them with the instruction needed to reach the next literacy level (Literacy level A, B or C; see Figure 1). Some students in this class had a schooling background in their country of origin and were considered literate in their own language, but not in the second language; others had no formal schooling background at all as, for instance, Jamina. The proficiency level for oral skills varied, but was below A2 for all of them and below A1 for most of them. Five out of the fourteen students took part in the present experiment. Their learner characteristics are given in Table 1.

TABLE 1 Learner characteristics of the five participants of the fluency experiment

Name	Age	CEF level oral skills	Country of origin	Literacy level in L1	Literacy level	Years of education in native country
Jamina*)	43	< A1	Morocco	Non-literate	0	0
Nadifa	40	< A1	Morocco	Non-literate	A	0
Roon	34	< A1	Somalia	Non-literate	< A	3
Rahma	41	< A1	Morocco (Berber)	Non-literate	0	0
Zula	45	< A1	Eritrea	Literate	B	12

*) The names are not the real names.

In the curriculum about 40% of the available time was spent on oral skills to help the learners 'survive in daily life', and to support their literacy acquisition. The actual reading and writing instruction took place in the remaining time. This instruction encompassed functional reading as well as decoding and encoding through a phonics approach. As this article is concerned with the role of speed and fluency, the focus is on the decoding and encoding skills. For basic decoding and encoding skills an '*indiflex*' method was used. The concept of *indiflex* is best illustrated by identifying the words that form the acronym: '*individualisation*', '*differentiation*' and '*flexibilisation*'. The method implied that students had their individual route (a necessary approach in a heterogeneous class with various levels of literacy) and pacing, as well as their own set of pre-structured practice materials. Instruction was shaped through the use of task forms, booklets with audio support and enhanced by computer software.

6.3.3 Materials: Exercises for Improving Blending and Increasing Speed

The most basic type of exercise was the one of reading in clusters instead of letters one by one. The teacher made a list of words (the majority of which are known words) with the same onset or the same rime. The first column of words in Table 2 are CVC words with an identical rime, the second column consists of CCVC words with an identical onset. This also holds for the last column in which the onset consists of two sounds (*s* and *ch*) of which the latter is a digraph. The hyphen indicates how the words should be split into two clusters. The aim of the exercises is to promote the clustering of sounds within the word.

TABLE 2 Three exercises for reading words in clusters instead of spelling the graphemes one-by-one

CVC with same rime	CCVC with same onset	CCVC with same onset
p-ak	st-ok	sch-ool
z-ak	st-ak	sch-aap
b-ak	st-op	sch-ep
t-ak	st-ip	sch-ip
l-ak	st-ik	sch-uur
v-ak	st-ap	sch-oen

The next step was reading the same words without a pause (indicated by the hyphen), then the same words but faster, and finally in a different order. Most success was booked when every learner got his own exercise with his individual problematic letters and words. The target was reached when all words of a row were read as a whole (without spelling), without errors, and at higher speed than before. The list could be practiced at home where much repeated reading could be done. To stimulate the learners in the automatization, the teacher had a couple of timers in the classroom: egg timers, stopwatches, kitchen timers etc. It might even happen that learners became so fanatical that they bought their own timer (which is very cheap) and started practicing at home. Similar exercises can be constructed with longer words divided in syllables, as Huemer (2009) did with Finnish children, but is less functional for Dutch.

Similar lists were composed as rehearsal of the key words from a text or as extra practice for the most difficult words. When these problematic words are read faster, the whole sentence will be processed faster and reading comprehension will improve. The students had individual goals, all of which applied to each learner at some point in the learning process:

- Students who needed to practice blending and automatizing. They used standard 16-word lists, directly taken from their own *indiflex* booklets (see Appendix 1).
- Students who needed to practice specific phoneme-grapheme combinations, because these combinations had proven to be difficult for them to master. They use made-to-measure word lists (see Appendix 2).

We saw a teacher who brought together a set of keywords and administered them isolated from the text to a couple of students who had trouble with fluency. They were asked to note how many words they could read within one minute measured with an egg-timer. Their homework assignment consisted in reading the list every day. The teacher told them: "When you practice every day, you will read five words more in the same time.'' This assignment was repeated several times and after two weeks the pace doubled. It is not the case that older, adult students cannot read with a certain pace, but they often do not see that it is necessary to do so. As it is difficult to explain that to them, it is easier to make it a game (e.g., with a stopwatch or an egg timer).

6.4 Procedure

In accordance with the *indiflex* model the various fluency exercises were presented to the individual students. A sheet of paper was attached to function as a medium between the instructor, the learner and the word list to be practiced. The sheet was divided into four numbered columns, each providing

space for inserting a date (= Time 1, etc.) and the reading time (see Table 3, in which five tables are shown for each of the five students). The first column, named Time 1, was for the first date and the first measured reading time for (almost) spontaneously reading the word list. The remaining three columns distinguished between the target time (TT) on a set date and the actual reading time (T) measured at that date. The obvious goal was to gather speed without losing accuracy between the first and the last reading sessions, generally spanning one or two weeks. The instructor could reinforce the reading behavior by pointing to the students' achievements, by providing immediate feedback about the accomplished reading tasks and by giving suggestions for future tasks. Student achievements were notable speed gain without losing accuracy, successfully incorporation of a difficult phoneme-grapheme combination into one's personal repertoire (that was read incorrectly before, as noticed by the teacher or by the student herself), or a display of perseverance. One example of reinforcing students' efforts to improve fluency with texts was offering them the possibility to read a text aloud in the group. Other students in the class tended to reward this display of growing skills with spontaneous applause.

So, what are the successive steps of practicing? The instructor or an experienced student uses a simple timing device to measure the opening reading time. Instructor or student writes down the resulting time and the date in the first column. The instructor then provides the reader with feedback and suggestions for further practice and sets a new target time and a date for the next session. Some learners have a sense of realistic targets and they are allowed to experiment, others have no clear idea; in that case, the instructor decides. Then learners can start practicing, using classroom timers, working with peers in class, with family members at home, and with the instructor. The process of setting new speed targets and new dates, of providing oral feedback about accuracy or the learner's task approach, is repeated for every step, up to the final reading session.

For the recordings in this classroom experiment a smartphone was used. The poor sound quality, however, was not satisfactory for analyzing accuracy results between Time 1 and Time 4.

FIGURE 2 Training with timer with *Sprint* software.

FIGURE 3 Training.

In addition to a timer, reading software meant to support dyslexic readers called *Sprint* (Jabbla n.d.) was used in this classroom. The basic version of *Sprint*, originally meant to support dyslexic readers, is in essence a speech synthesizer that uses real-speak voices to read different types of text in Dutch and French (it is a program developed in Belgium where Dutch and French are the two official languages). The more elaborate 'plus' version also reads texts in English and German, and offers the user additional support functions such as 'word prediction' and 'spell check'. The core characteristics of the software are interesting for beginning readers. The synthesizer can read the separate sounds that constitute a word on the screen and blend them and in this way models the reading process. It can also read parts of words, whole words, sentences and whole texts. The reading speed can be controlled in different ways. The instructor can set the reading speed as well as the length of the pauses before actual reading takes place, preferably after a very short trial to check if the speed settings suit the student's needs. The word list or the text will then be read out at a fixed speed. Students control the reading speed in a different way when working on their own: they often use the 'read next' button to jump to the next word and use the 'read previous' button and 'repeat' button to reread words they find difficult. For practicing fluency with word lists, students often start off with the blending function of the program and continue with reading the words as units. Students who have to read a whole text often use the instructor's speed settings combined with the function 'reading the text from the beginning'. Difficult words in the text are read separately by clicking on them. In this way the reader practices overcoming obstacles that prevent him or her from fluently reading the text and then reads the text again and again.

6.5 Results

Table 3 shows five students and the results of their individual learning tasks – all wordlists. We did not include readers working with reading texts.

TABLE 3 Examples of learners' progress with gaining speed at reading; (TT=Target time; T=Time measured)

Student	Learning task	Time 1	Time 2		Time 3		Time 4	
Jamina	16 monosyllabic words standard blending and automatization	06-11-2012 T 38s	06-12-2012 TT -	T 14s	06-14-2012 TT 14s	T 13s	06-14-2012 TT 13s	T 10s
Nafida	16 mono- and disyllabic words with diphthongs /ei/ and /ui/	10-11-2102 T 48s	10-12-2012 TT 45s	T 35s	10-16-2012 TT 35s	T 34s	10-18-2012 TT 34s	T 18s
Roon	16 monosyllabic words standard blending and automatization	09-25-2012 T 37s	09-27-2012 TT 30s	T 16s	10-01-2012 TT 14s	T 14s	10-15-2012 TT 12s	T 13s
Rahma	16 monosyllabic words specific vowels /e/ and /a/	11-8-2012 T 25s	11-12-2012 TT 25s	T 23s	11-15-2012 TT 23s	T 21s	11-20-2012 TT 21s	T 19s
Zula	23 monosyllabic words specific consonants /g/ and /k/	09-20-2012 T 52s	09-24-2012 TT 52s	T 49s	09-27-2012 TT 48s	T 47s	10-11-2012 TT 45s	T 41s

The difference between the time measured on Time 1 and Time 4 is the actual speed gain in seconds. The results of the first three students are striking. Jamina is a beginning reader from Morocco. She managed to read the same word list almost four times faster within a period of only four days. Introducing the concept of gathering speed propelled her into action and the target time was the 'fuel' that made her focus on the activity. This resulted in a more active attitude towards reading. Nafida is a more experienced reader. She told the instructor that she had difficulties reading words with the Dutch /ei/ and /ui/ sounds (diphthongs). Her speed gain after extensive practice with the reading software and the use of the timer was 30 seconds. Like Jamina, Roon from Somalia, practiced with a standard list taken from the *indiflex* material. She improved her speed by 24 seconds in about three weeks' time. Rahma and Zula practiced with made-to-measure lists. They were having difficulties with specific phoneme-grapheme combinations: /e/ and /a/ for Rahma, a speaker of Berber and /g/ and /k/ for Zula, a speaker of Eritrean. Both were struggling with their pronunciation. Their measured speed gains were less spectacular than those of the other learners mentioned. A reason for this may be that it takes more time to automatize a 'new' sound, to discriminate it from sounds already known in the L1, and to pronounce it while linking it to the grapheme and combining it with other sounds, than to read a list without focus on a specific sound. Rahma gained six seconds and Zula eleven through extensive practice with the reading software and the instructor.

Faster readers may, however, become less accurate readers. A trade-off effect between speed and accuracy may occur in such exercises. Many students have proven to be able to read faster without reading less accurately. Accuracy is one thing the instructor should address when providing oral feedback and feed-forward: for the reader it is a matter of focusing on accuracy while gathering speed. Accuracy can even improve when the student learns to read faster, as was proved by Nafida practicing a standard word list of 16 words over a period of three days, reading ten seconds faster, but improving the accuracy rate by 7%. For some beginning readers in this class, however, the instructor observed a considerable trade-off effect between speed and accuracy. In these cases the fluency exercises were postponed, but not the exercises with the software that focused on synthesis. This indicates that the learner is still in the earliest stage of reading (cf. the stage model of e.g. Chall 1983, 1999) in which familiar words are necessary for attaining fluency, while in later stages reading can be used for learning new words and extending reading comprehension.

6.6 Discussion and Conclusions

In order to make more robust claims about the influence of a cyclic approach of this type of fluency training in the adult literacy classroom with scheduled reviews of the completed exercises and measurement of speed gain, it is clear that we should repeat the experiment with more subjects and use better recording equipment in order to better assess the read words and make claims on accuracy. We should also know more about the long term effects: Does this training have effect on the development of reading comprehension?

Nevertheless, the results of this pilot study have important implications for classroom instruction: benefits for both learner and teacher can be seen. The student senses that practice leads to results in terms of speed gain and that speed gain leads to reading more text or reading the same amount of text with more space for constructing meaning. The teacher should reflect and enhance this process consciously by only asking questions about a text when the student reads the text with sufficient fluency.

In our opinion, there are more pros than cons with regard to this type of automatization or fluency exercises as an addition to the regular reading education. In the first place, these exercises are individual exercises. The students practice on their own, as much as possible with their individual problems, which is time spent efficiently, more efficiently than when only one student is spelling or reading aloud and the others are listening (or not!). The next advantage is that such exercises have a short term target, but a clear and feasible one for the student. A third advantage is that students begin to understand that speed in reading is important and might even experience – in the most favorable case – that they better and sooner understand the meaning of a sentence/text. Unfortunately, we cannot provide evidence for this because

the present experiment was a working procedure in the classroom rather than a carefully prepared research experiment. And last but not least, the students can experience success with such small tasks.

There is also a disadvantage. Students practice without immediate formal feedback on potential reading errors. This disadvantage, however, can be compensated for by building in some alternative forms of feedback. We mention here some simple and less simple forms of feedback:

- The student may ask someone or something to read a word aloud. This reader may be a partner, teacher, or a child, but also a synthesizer built in a computer program, e.g., in reading aloud software for dyslexic readers.
- The reader may also use a reading pen (synthesizer) that reads the words causing difficulties.
- Difficult words are written down by the teacher in a rehearsal program on internet and can be read aloud by a synthesizer. A con is that this might not be easy to find for a low-literate learner.
- The teacher or a colleague reads the words aloud in a voice recorder or MP3 player (or other variants) and links the sounds to the words on the computer, puts it on a memory stick and gives the memory stick to the student as homework or assignment for the coming week. Another student with similar reading problems might use it at a later moment.

A disadvantage is that synthesizers do not have natural voices and that for teachers it involves more work when preparing exercises on memory sticks.

The theoretical background in this article can help instructors understand why certain readers do not seem to grasp written messages. It also provides instructors with sound ideas with which to work, and to remove, at least in part, the obstacles that prevent them from becoming better readers. The experimental method used in this classroom is one way of doing this. Several other ways are conceivable, especially when developments in reading software and the use of internet as a medium are considered, but even without these developments, this theoretical background proves useful for practice. The onset and rime principle can, for instance, be used by the instructor to stimulate the students' awareness of clustering when they start reading word rows early in the learning process. In later stages when students start reading whole sentences, the limited space in working memory and short availability of new information can explain why those students cannot read and understand, for instance, ten-word-sentences. Fewer words in a sentence may help. Making use of the theoretical concept of working memory opens the door to multiple ways of training students in gathering speed. Computerized exercises are ideal for this purpose.

REFERENCES

Aro, M. & Wimmer, H. 2003. Learning to read: English in comparison to six more regular orthographies. *Applied Psycholinguistics*, 24, 621–635.

Baddeley, A.D. 1999. *Essentials of human memory.* Hove: Psychology Press.

Baddeley, A.D. 2003. Working memory and language: an overview. *Journal of Communication Disorders,* 36, 189–208.

Baddeley, A.D. & Gathercole, S.E. 1992. Learning to read: The role of the phonological loop. In J. Alegria, D. Holender, J. Junça de Morais & M. Radeau (eds.), *Analytic approaches to human cognition.* Amsterdam: Elsevier Science Publishers, 153–167.

Chall, J.S. 1983. *Stages of reading development*. New York: McGraw-Hill.

Chall, J.S. 1999. Models of reading. In D.A. Wagner, R.L. Venezky & B. Street (eds.), *Literacy: An international handbook*. New York: Garland Publishing, 163–166.

Council of Europe 2001. *Common European Framework of Reference for Languages*. Cambridge University Press.

Cowan, N. 2000. The magical number 4 in short-term memory: a reconsideration of mental storage capacity. *Behavioral and Brain Sciences,* 24, 87–114**.**

De Jong, P.F. & Van der Leij, A. 2003. Developmental changes in the manifestation of a phonological deficit in dyslexic children learning to read a regular orthography. *Journal of Educational Psychology*, 95, 22–40.

Gobet, F. & Clarkson, G. 2004. Chunks in memory: Evidence for the magical number four … or is it two? *Memory* 12, 732–747.

Goswami, U., Ziegler, J.C., Dalton, L. & Schneider, W. 2001. Pseudohomophone effects and phonological recoding procedures in reading development in English and German. *Journal of Memory and Language*, 45, 648–664.

Huemer, S. 2009. *Training reading skills: Towards Fluency.* An unpublished doctoral dissertation. Jyväskylä: University of Jyväskylä.

Jabbla (no date). *Sprint* [Computer software]. Gent, Belgium. [Retrieved June 1, 2012]. Available at http://www.sprintplus.be/EN/index

Janssen-van Dieten, A. 2006. The European framework of reference and L2 learners with a low level of education. In I. van de Craats, J. Kurvers, & M. Young-Scholten (eds.), *Low-educated adult second language and literacy acquisition. Proceedings of the inaugural symposium.* Utrecht: LOT, 143–150.

Jongen, I. & Krom, R. 2010. *DMT en AVI*. Arnhem: Cito.

Kurvers, J. & van de Craats, I. 2007. Memory, second language reading, and lexicon: A comparison between successful and less successful adults and children. In N. Faux (ed.), *Low-educated second language and literacy acquisition. Proceedings of the Second annual forum*. Richmond, VA: Literacy Institute at Virginia, Commonwealth University, 65–80.

Kurvers, J. & van de Craats, I. 2008. What makes the illiterate language learning genius? M. Young-Scholten (ed.), *Low-educated second language and literacy*

acquisition. Proceedings of the third annual forum. Durham: Roundtuit Publishing, 49–60.

Kurvers, J., Stockmann, W., & van de Craats, I. 2010. Predictors of success in adult L2 literacy acquisition. In Th. Wall & M. Leong (eds.), *Low-educated adult second language and literacy acquisition. Proceedings of the 5th symposium.* Calgary, Alberta: Bow Valley College, 64–79.

Miller, G. 1956. The magical number seven plus or minus 2: some limitations on our capacity for information processing. *Psychological Review*, 63, 81–97.

Patel, T.K., Snowling, M.J., & de Jong, P.F. 2004. A cross-linguistic comparison of children learning to read in English and Dutch. *Journal of Educational Psychology*, 96, 785–797.

Salthouse, T. A. 1994. The aging of working memory. *Neuropsychology,* 8, 535–543.

Salthouse, T. A. 1996. The processing speed theory of adult age differences in cognition. *Psychological Review*, 103, 403–428.

Salthouse, T.A. 2009. When does age-related cognitive decline begin? *Neurobiology of Aging* 30, 507–514.

Seymour, P.H.K., Aro, M. & Erskine, J.M. 2003. Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, 94, 143–174.

Steenbeek-Plantinga, E.G., Bon, W.H.J. & Schreuder, R. 2012. Improving word reading speed: Individual differences interact with a training focus on successes or failures. *Reading and Writing*, 25, 2061–2089.

Stockmann, W. 2006. Portfolio methodology for literacy learners: The Dutch case. In I. van de Craats, J. Kurvers, & M. Young-Scholten (eds.), *Low-educated adult second language and literacy acquisition. Proceedings of the inaugural symposium.* Utrecht: LOT, 151–163.

Stockmann, W. & Dalderop, K. 2005. *Portfolio Alfabetisering NT2*. Arnhem: Citogroep.

Verhoeven, L. 1992. *Drie-Minuten-Toets* (DMT). *[Three Minutes Test.]* Arnhem: Cito.

APPENDICES

Appendix 1: Standard 16-word list, directly taken from an *indiflex* booklet

- gaan	koud
- kuiken	schoon
- voeten	kijkt
- duur	koffie
- tafel	stoffer
- zingen	schrift
- fiets	groot
- deuken	koken

Appendix 2: Made-to-measure word lists for specific reading problems (oe – uu)

- oer	uur
- boer	koer
- luur	snoep
- moer	buur
- loer	stoer
- oen	stuur
- boen	koen
- kuur	loep
- stoep	muur