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5-2011

# Use of Spaced-Retrieval in Spelling Instruction

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### Recommended Citation

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Dr. Carrie Mills¶  
UH 498: Honors Project¶  
06 May 2011¶  
Use of Spaced-Retrieval in Spelling  
Instruction

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Use of Spaced-Retrieval in Spelling Instruction

Amanda Godsey

According to the Myers Research Institute website, “Spaced-retrieval is a memory intervention that gives individuals practice at successfully recalling information over progressively longer intervals of time.” The Spaced-retrieval technique (SRT) has been cited in numerous studies over the past 35 years and has been used in therapy sessions for patients with dementia and Alzheimer’s disease to improve memory recall. While memory impairment is a symptom of dementia and Alzheimer’s disease, idiopathic mild memory impairment is often found in young normal adults and they too can often be in need of something to improve memory recall. In fact, assessment of SRT was initially conducted on young normal adults. In Hochhalter [and colleagues' \(2004\)](#) study on spaced-retrieval (as cited in Landauer & Bjork, 1978), a technique that uses time delays at increasingly longer intervals was initially [found to improve memory recall for](#) college students. Since then, Hochhalter’s study found, (as cited by Camp, 1989) that the technique has been used effectively with older adults who have memory [impairment](#). Since Camp’s study the majority of SRT studies have [examined the benefit of this technique with](#) memory-impaired adults. An interesting conclusion was drawn by Cherry [and](#) Simmons-D’Gerolamo [\(2010\)](#) based on [their](#) research: SRT appears to be a necessary component in producing improved memory recall in adults with memory impairment, but repetition alone does not seem to be sufficient (147). However, it is evident that SRT has produced benefits and that the use of SRT may not be limited to helping this specific population, but may have benefits across a wide range of people and disorders.

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Specifically, the purpose of this study is to explore the possible benefits and/or shortcomings of utilizing SRT for a proposed spelling instruction and intervention program for normally developing children and/or children with developmental or learning delays. This will begin with a thorough investigation of the current methods of spelling instruction in order to determine if there are certain components that have been proven to be effective and how SRT could be used in conjunction with those components or how SRT already utilizes those components.

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### A Review of Spelling Programs

A common method for performing well on spelling tests is for students to write their spelling words over and over again in attempts to retain the correct spelling. But, according to research done by Audio Visual Kinesthetic Oral Educational Research Foundation (AVKO), this traditional spelling method is not proven to be effective in spelling retention. Instead, they propose that "immediate student self-correction" is generally the most effective technique in teaching appropriate encoding skills. This proposed method supports the SRT because immediately after the student spells the word he/she is able to compare his/her spelling to the correct spelling of the word and correct it if needed. Allowing the student to see his/her error compared to the correct spelling is an important component of many of AVKO's programs and also SRT.

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In contrast with traditional spelling methods, AVKO's Sequential Spelling Program takes a much different approach to spelling instruction. The website provides numerous ways in which their program differs from traditional programs. For example, their goal is to have children spelling unfamiliar words correctly based on their knowledge of the patterns of English. However, there is never

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explicit instruction of these patterns. They offer a program that increases in difficulty from stage one to stage seven. The words are presented in each stage beginning with a root word and then to expanded forms of that root word. An example of stage 1 sequential spelling provided by AVKO's website begins with the root word "all" then to expanded forms, "tall", "stall," "install," and "installment." A more advanced example is seen in the example provided for stage 7 that begins with the word "decorate" and then to expanded forms such as "decoration," and "decorative." The sequential spelling program reinforces the learning of a single pattern by using it in additional words that increase in length and complexity.

According to the *Barton Reading & Spelling System* website, their program focuses on reading and spelling instruction for children who either have a diagnosis of dyslexia or another learning disability. The program is set up to be implemented most effectively in a one-on-one environment with the instructor and student. As with AVKO's sequential spelling program there is a recommended order in which the material is to be presented. Based on information provided by the website, there are 10 levels in the program ranging from easiest to most difficult: Phonemic Awareness, Consonants & Short Vowels, Closed Syllables and Units, Syllable Division & Vowel Teams, Prefixes and Suffixes, Six Reasons for Silent-E, Vowel-R Syllables, Advanced Vowel Teams, Influences of Foreign Languages, and Greek Words & Latin Roots. The Orton-Gillingham Multi-sensory Method is described by Gorman (1997) as a systematic approach that uses auditory, visual, and kinesthetic cues in developing

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phonological awareness in children with learning disabilities, ~~which influenced~~ the approach ~~developed~~ by the *Barton Reading & Spelling System*. However, according to the What Works Clearing House website, based on a review of the studies that have been conducted, no conclusions can be drawn, as to the effectiveness or ineffectiveness of the *Barton Reading & Spelling System*. In addition, none of the research studies reviewed met the evidence standards established by the What Works Clearinghouse.

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The last approach that we will consider is that of the Houghton Mifflin *Spelling and Vocabulary: Words for Readers and Writers*. Each of its (number) units focuses on words containing specific spelling patterns in the English language. For example unit 1 is entitled short vowels with the following subheadings: Read, Think and Sort, Word Analysis/Phonics, Vocabulary: Definitions, Challenge Words, and Spelling-Meaning Connection. There are also words that are called “memory words” in various units that are denoted by an exclamation point. These words are considered to be memory words because they are irregulars and do not follow sound letter correspondence. This is an important component because although the focus is on learning the words that follow sound letter correspondence through various activities there is also highlighting of words that do not.

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Houghton Mifflin *Spelling and Vocabulary: Words for Readers and Writers* combines several approaches in their spelling book. In the subheading spelling-meaning connection the authors of the program, highlighting the difference between two similar words, one of which is listed in this unit: “breath” and “breathe.” They focus the student’s attention on the letters that are the same, but

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the fact that the sound produced by the two letters is different. There is also a section on word families containing the same root word which is a similar to AVKO's approach in sequential spelling. Finally, there is a section to proofread a journal entry in which there are 10 words that are misspelled and the student is to identify those mistakes. The variety of approaches highlights the fact that there are many components available to aid in improving spelling, but there is still not proof that they work.

Despite the numerous programs available, there are no [specific spelling programs](#) that have evidenced based practice to show the program is effective in spelling instruction. It is apparent that more research needs to be done [to establish the components of a program that are proven to improve spelling skills.](#)

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### Potential Role of SRT in Spelling Instruction

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For the SRT technique to prove beneficial for children in spelling it must meet two criteria. First, there must be noted improvement in the spelling test scores. Second, the technique must be feasible and efficient for a child and parent/guardian to do together on a regular basis. Therefore, it is important when developing protocol that an improvement is noted and that the time spent using the technique is sufficient to achieve improvement, but not excessive.

In order to determine the efficacy of SRT in spelling instruction, a pilot study was initiated with a child that was 11 years 2 months and in the fifth grade at a local private school. His mother reported specific difficulty with spelling. She stated he would take the practice tests at home the night before, do well, but

perform poorly on the test given in class the following day. We hypothesized that the words were not sufficiently learned in order to be recalled accurately.

In developing protocol for the technique we wanted to use a SRT protocol with time intervals that proved effective, but also would not be a tremendous time commitment for both the parents and children. We wanted this technique to be a feasible option for busy families. The research available shows that a variety of SRT time intervals have been used in therapy with dementia and Alzheimer's patients and have all seemed to be effective in memory recall. We chose to use intervals of 30s, 60s, 3 minutes, and 5 minutes. In order to move from 30s to 60s and 60s to 3 minutes, the child would have to spell the word correctly 3 times at a 30s interval and 3 times at a 60s interval. Then, if the word was spelled correctly with a 3 minute interval he/she would advance to a 5 minute interval. If, at any point the word was spelled incorrectly the child would start at the beginning at a 30s interval and continue the same pattern. Only one word was targeted during each time interval and the child was instructed to not think about the word during the time delay.

If the child was to spell the word correctly at each consecutive time interval, learning each word would take 12½ minutes. Given that children usually have approximately 20 spelling words a week using the technique on every word would take, at the least, 250 minutes or over 4 hours a week. This is consistent with the period of time the child and his mother reported studying with his traditional technique.

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We began the pilot study by giving the child the WIST spelling test for children ages 7-11 and grades 2-5 in order understand his specific strengths and weaknesses in regards to spelling. We administered the following sections: spell regular words, spell irregular words, pseudo-words, and sound-symbol knowledge. His raw scores from each category placed him in the following grade

level intervals respectively: 3<sup>rd</sup>, 4<sup>th</sup>, 3<sup>rd</sup>, 2<sup>nd</sup>. The chart below shows his level of functioning based on his raw scores for the sections that were tested. Although he was in the 5<sup>th</sup> grade, he was functioning below his grade level in each section,

	<2 below 2 <sup>nd</sup> grade	2 <sup>nd</sup> grade	3 <sup>rd</sup> grade	4 <sup>th</sup> grade	5 <sup>th</sup> grade
Spell Regular Words	<30	30-43	<b>44-56</b>	57-68	69-79
Spell Irregular Words	<12	12-14	15-17	<b>18-20</b>	21-23
Pseudo Words	<25	25-26	<b>27-29</b>	30-31	32-33
Letter	<68	<b>68-69</b>	70	71	72-73

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Although his raw scores placed him below the level of others in his grade level his percentile ranking for spelling was 19<sup>th</sup> with a standard score of 87 and his percentile rank for sound-symbol knowledge was 32<sup>nd</sup> with a standard score of 93. While these standard scores fell within one standard deviation from the mean, they were lower than expected based on his grade level and his overall level of academic achievement.

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In all of the categories tested the results showed that the child was functioning below his academic level. An analysis of his errors in the spelling regular words category is listed below as correct/attempted.

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52/60 Closed Syllable (syllable ending in a consonant)

7/11 Vowel-Consonant-e Syllable (ex: -ode)

12/17 Open Syllable (syllable ending in a vowel)

12/13 R-controlled Syllable (doc **tor**)

3/9 Vowel Team (two vowels together or two vowel sounds as in night)

6/8 Stable Final Syllable (ex: cap **ture**)

17/23 Suffix, other (words not identified in other categories and words ending in suffixes)

The results of the WIST revealed his specific areas of impairment. For example, he would often omit an –e as in explode and rope. We also saw a consistent error in differentiating between vocalic *r* and r blends. The WIST findings were also particularly interesting because he performed the best in the spelling irregular words subtest. According to Moats, only 4% of words in the English spelling system break the established rules and are therefore considered irregulars (12). This reveals a lack of knowledge of the traditional spelling rules.

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After determining that there was in fact a discrepancy in where he should be and where he was, we explained the technique and began using it to see if it could provide some insight into a functional and effective method of spelling instruction. We then began focusing on his spelling word list for unit 21 in the Houghton Mifflin *Spelling and Vocabulary: Words for Readers and Writers* for the following week. We gave him a pre-test to determine the words he already knew and the ones he needed to learn. We began by only using the SRT on the words that he missed on the pre-test. The first of which was the word 'duties.' First, he would look at the word first, wait 30 seconds and then would write the word. Then, he would compare what he had written wrote to the correct spelling of the word. If the word was spelled incorrectly he was given the opportunity to self-correct and then would begin again with the 1<sup>st</sup> 30 second time interval. If he spelled the word correctly he would continue on to the 2<sup>nd</sup> 30 second interval. In addition to the child finding the word 'duties' amusing, he also spelled the word correctly at each consecutive time interval of the suggested protocol during our

session together. We asked that he use the technique for the remaining words of unit 21 and report back the following week.

The unit 21 test, which focused on changing the final *y* of a word to an *i* was given in class on February 11, 2011. For the unit test, the teacher says the word, uses the word in a sentence, and then repeats the word. He scored a 92 on the unit 21 test. He missed two words: dirtier which he spelled 'dritier' and strategies which he spelled 'stratagies.' When we gave him the pretest for unit 21 on February 4<sup>th</sup>, he made the same error for the word dirtier which was consistent with his vocalic *r* error pattern.

Initially, there was a noted improvement using the technique as his score on his unit 21 spelling test improved compared to his scores from previous weeks when he had not used the SRT. However, after noting his inconsistent performance, on words he spelled correctly on the pretest and then missed on the unit test at school he began using spaced-retrieval for all of the words in a given unit instead of the ones missed on the pretest. Our goal was to track the words that he learned using spaced-retrieval and the words he learned using his own method. Then, analyze the results of his unit review test that covered units 19-23. He learned the words for units 19, 20, and half of 23 using his own technique and learned 21, 22, and the other half of 23 using the SRT. An analysis of these results allowed us to see how well he was recalling the words using the SRT versus his own study method. The unit review test was initially administered on March 8, 2011 by Dr. Mills using the review words listed in his

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spelling book for the unit review. Dr. Mills would say the word, use the word in a sentence, and then repeat the word. Before taking the test he had not done any additional studying or reviewing of the words since he had been tested on them initially in school. Of the 50 words given on the unit review test, he had learned 27 using his own method and 23 using SRT. He got 14 out of the 27 correct using his own method of studying which is 52% correct and got 19 out of 23 correct using SRT which is 83% correct. Overall, he got 33 out of 50 correct which gave him a score of 66.

The unit review test was administered at school on March 11, 2011. He got 22 out of 32 words correct on his unit review and scored a 69. Of the 32 words given on the unit review test, he had learned 14 using his own method and 18 using SRT. He got 11 out of the 14 correct using his own method of studying which is 79% correct and got 11 out of 18 correct using SRT which is 61% correct. However, one important distinction between the format of the unit review test given at school and the unit review test we had given him was the format. For the unit review test at school he had to identify the correct spelling of the word when given four choices containing common misspellings. This is an important distinction because this format is not representative to the way that he had studied the words and also not the way he had been tested on them for the unit test. After discovering the format was different for the unit review, we obtained his scores from previous unit reviews and found that his performance on the unit reviews is typically lower than on unit tests. His unit review scores are as follows: 67, 80, 84, and 69.

While focusing on his spelling word lists his vocalic *r* and *r* blend errors continued to be a persistent problem area. We then developed word lists containing both vocalic *r* and *r* blends in attempts to focus our attention on his specific error patterns. The words were given as a test during our session along with an explanation of his errors. The words varied in difficulty from familiar words such as “cried” to unfamiliar words such as “arteries” and “esoteric.” The SRT technique was used at home on the words he missed during our session. We quickly realized that while he was still making errors, his errors were no longer in the category of vocalic *r* and *r* blends.

However, his improvement began to decline while using the technique for unknown reasons. On March 25, 2011 we gave him a list of 10 words during our session and administered a pretest. He got 2 out of 10 correct. The final word was esoteric which he laughed at initially due to the difficulty. He spelled the word incorrectly, but with guidance was able to work through and come up with the correct spelling. His instructions were to use SRT on those words over the next few weeks until our next meeting. On April 15, 2011 we met and began by retesting him on those 10 words. Upon beginning the testing he stated that he had not used spaced-retrieval on the words, but we still administered the test. Without any input from us he got two words correct, one of which was esoteric. After asking him to focus or look at the word again he spelled 2 additional words correctly.

When the session ended, we met with his mother to discuss his performance. When we told his mother that he had not performed well, but that he had also not done spaced-retrieval she was baffled and reported that they had done spaced-retrieval on each of the words over the past few weeks. We do not know if the child could not remember using SRT on the words or if it was an excuse for his poor performance.

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Due to time constraints we were not able to retest him at the end of the school year to determine progress in regards to the WIST, but based on his performance on the unit review with the words he learned using spaced-retrieval I do not believe SRT can be ruled out as a potential part of a successful spelling program. It is possible that some of the inconsistencies found within our pilot study could be attributed to test anxiety as the child is currently undergoing testing for test anxiety.

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### Conclusions

In conclusion, I believe SRT should be pursued in conjunction with other methods in order to produce an effective spelling program. While the technique is demanding, the memory component is crucial and is lacking from the current spelling programs that are available.

In addition, based on the progress we saw in targeting specific error patterns I believe that is an important component of an effective and efficient

spelling program. If there are certain rules that a child does not understand or use correctly, those should be targeted instead of rules the child already understands. Also, age appropriate words should be used in targeting specific error patterns so the words carry meaning for the child. We want the words the child learns to be used and therefore giving words he or she would not use is not beneficial.

Moreover, further research should be conducted to determine whether or not SRT can be used on more than one word at a time. If multiple words can be targeted during the longer time intervals of SRT without affecting the improvement seen in memory recall the technique would prove to be much more efficient. In order to corroborate our findings, further research should be initiated as to the possible benefits of SRT in spelling instruction while also accounting for the observations listed above in order to develop a more efficient and effective program.

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