Breaking Tradition in Kindergarten: Using Movement to Facilitate Students’ Accurate and Automatic Recall of Phoneme/Grapheme Associative Pairs

Sharon Delgado. M.Ed.
Reading Specialist
Jacksonville Elementary School, Baltimore County, Maryland

In his influential paper describing the “Matthew Effect” Stanovich (1986) explained that children who fail to understand and apply the phonological features of language are off to a poor start in reading and unless intervention occurs quickly they seldom catch up. Strong beginnings are important. The letter recognitions skills taught in Pre-K and kindergarten are important prerequisites for the word identification work done in first grade and beyond.

By definition adult fluent readers are unaware of the unconscious processes their brains are using as their eyes move quickly across the page to gain meaning from text. Numerous cognitive systems are in play. The reader’s semantic and morphological systems assist in understanding word meaning. The syntactic system guides the reader's recognition of the grammatical relationships between words. The reader's phonological system promotes fluent word decoding (Wolf, 2007).

Adult fluent readers may have forgotten that their acquisition of the early phonological skills really wasn’t as easy as ABC. English is an opaque language. Although there are only 26 letters in the English alphabet those letters are combined in a multitude of ways to spell its 44 sounds. It is hard to learn to read and to spell English. Hoping to make the teaching of the letters and their sounds more engaging and age appropriate, most kindergarten programs and teachers embed the learning of phonemes and graphemes within a variety of “hands-on” experiences. In her description of a typical primary classroom, Neuman noted the many multi-sensory activities that
were taking place during “Nn Week”:

“Over the next 55 minutes these children learned to point, circle, and underline the letter N. They recited it, drew it, and looked around the room for it. They heard it, saw it, even felt it, having it traced on their backs by peers. And after sitting for what seemed to be an interminable amount of time in the circle, they were allowed the choice of tracing it, cutting it, or rolling modeling clay into the shape of it” (Neuman, 2006).

Traditionally most observers would applaud these fun play-like activities and lament the long time the children spent sitting in the big group circle. However after discussing research reports from the neurosciences, kindergarten teachers at Jacksonville Elementary School in Baltimore County, Maryland decided not to follow the eclectic reading methods described above and instead chose to try something different. They decided to be a little less multi-sensory. In kindergarten this was quite a break with tradition!

Some Research Findings from Neuroscience
Expanding on their well-known investigations of the causes of dyslexia Sally and Bennett Shaywitz recently proposed that attention issues as well as phonological disabilities may be related to a student’s failure to accurately and automatically decode text (Shaywitz & Shaywitz, 2008).

The Shaywitzes referenced the work of LaBerge & Samuels (1974) who developed a theory of reading as automatic information processing. LaBerge & Samuels proposed that the reader progresses through a series of stages. At each stage the reader should be automatic as well as accurate. According to these researchers “accuracy in reading a letter or word alone is insufficient as a criteria for readiness to the next step......amount of attention required should also be used as a criterion for readiness” for the next stage along the continuum of phonological skills (LaBerge & Samuels 1974, Samuels, 1988).

As further evidence that dyslexia may be related to attention issues as well as phonological disabilities, the Shaywitzes cite Logan’s “Instance Theory” which is a framework for learning. Logan points out that in order for learning to decode to take place initial episodic memories must be formed.
Attention is critical at each of the stages of the episodic memory formation process. These include “encoding, instance representation (a memory), and retrieval”. Although eventually fluent decoding becomes part of an individual’s implicit memory system, “instances” or memories of the individual phonological elements must first be formed episodically. A breakdown in attention during any of the stages could interfere with the initial formation of the baseline episodic memories of phoneme-grapheme correspondences (Logan, 2002).

Another group of researchers Sweller & Chandler in their article “Why Some Material Is Difficult to Learn” explain that learning becomes difficult when the cognitive load required to understand content material or do an activity becomes too heavy. Cognitive load refers to the amount of a student’s cognitive capacity or working memory that will be needed to succeed at the task. They caution that a “split-attention” effect may interfere with learning if multiple elements of information are presented simultaneously. When multiple elements of information interact, the cognitive load of the learner increases. Sweller & Chandler recommend that teachers analyze the cognitive load requirements of individual learning tasks as they design learning activities (Sweller & Chandler, 1994).

**Breaking with Tradition**
The kindergarten teachers’ decision to be “less multi-sensory” was not taken lightly. However it seemed that every September a contingent of former kindergarteners started first grade with a very shaky understanding of the basic code of the alphabet. To mitigate this, as recommended by Sweller & Chandler, an examination of current teaching methods was undertaken.

The first step was to determine exactly what is going on in children’s brains when they are attempting to master the alphabetic principles. Essentially to learn the “basic code” children simply engage in straightforward paired-associate memory formation (McGuinness, 2004). They memorize the sight of a letter symbol along with the sound of its matching phoneme. To accurately decode a regularly spelled word they must be able to recognize the letters while recalling the memory of the matching sounds which when blended together produce the word. It is very important to note that in order to read a line of text successfully this decoding must not only be accurate, it
must also be automatic.

Why was something so simple so hard for some children? By providing the children with so many fun activities were teachers distracting them from their core learning task: the forming of strong paired associative bonds between the letters and sounds? Considering Logan’s “Instance Theory” perhaps the memory of the simple letter/sound bond for “Nn & /n/” was lost amid the myriad of activities. Did the children remember rolling out clay “N’s” while forgetting the sound of /n/? Was their attention “split,” as Sweller & Clay might suggest, among a multitude of simultaneously presented elements of information?

Reflecting on the theory of LaBerge & Samuels, it is evident that beginning readers who are experiencing difficulty with the basic code are not ready to “go on to the next steps” in the curriculum. These children may be able to produce the correct sounds when presented with the matching letters, but they can only do so with much extended attention. Certainly they need to be fluent in the basic code before tackling long vowels, variant vowels, and the other complex spelling patterns that are quickly presented in first grade.

**Move to Learn**
Thus at our school the kindergarten teachers began to believe that automaticity was as important as accuracy. In order for the students to retrieve their recollections of the simple letter/sound bonds in a “fast, effortless, and unconscious” fashion, it was decided that the up-front encoding portion of the children’s memory work had to be adjusted. So instead of bringing in bringing in blueberries for the students to taste, pictures of Bb words for them to look at, or things that start with “Bb” (like bears & balls) for them to hold, the teachers emphasized one sense over all other as the chief memory cue – movement. The formula to help the children develop strong, automatic memories of the phoneme-grapheme correspondences of the basic code was simple: use movement as the associative cue to bond letter to sound.

**A Change in the Up-Front Encoding**

*Grapheme + Movement + Phoneme = Strong Associative Learning*
Each week during the first two months of school three letters, sounds, and movements were introduced to the students within the framework of a simple story. Because the school system already used a published explicit and systematic phonics approach, the program’s suggested movements and sequence of letter introduction were employed. For example, the simple story that formed the core episodic memory for the letters/sounds/movements for “B, A, & C” was: One day while Sam was bouncing a ball (/b/), s/he heard the sound of a little lamb (/a/). The lamb was so cute that Sam got a camera and clicked a photo of it (/c/). The letters, sounds, and appropriate movements for B, A, and C accompanied the initial telling and multiple retellings of this story.

Other aspects of the school system’s published program were deemphasized. For example, worksheets were deemed to be less appropriate for five year olds. Because the teachers wanted to promote the children’s use of their phonological processor, less attention was paid to activities that addressed semantic and syntactic processing. These activities include looking around the room for things that start with Bb, using Bb words in sentences, or sorting pictures that start with Bb. In fact children are often confused by what exactly pictures are picturing, so instead of exercising their phonological processors their confused semantic processors are engaged. For the same reason, less time was spent with the program’s “letter introduction poems” because the poems contained a lot of vocabulary unfamiliar to the children.

By week two after the first six letters were introduced, a game was invented that gave the children multiple opportunities to rehearse the memories of the graphemeophoneme/movement associative bonds. In following weeks, as new letters were introduced, more new games put the children’s phonological processors quite literally “in play” - the movements acting as key mnemonic cues between the letter/sound associations. (For more examples and explanations of the stories, activities, and games please see the PowerPoint that accompanies this article.)

In short, by understanding a few basic principles of neuroscience, the teachers were able to work smarter not harder. This very simple change in the up-front encoding resulted in excellent outcomes. By Winter Break nearly all the kindergarteners could accurately and automatically recognize, recall, and reproduce all the sounds and letters of the basic code – the short vowels
and the regular consonants. By Spring Break they were easily reading and spelling regularly spelled three and four letter words. As French neuroscience Stanislas Dehaene states, “If teachers, like repairmen, can gain an understanding of all the internal transformations, I am convinced that they will be better equipped to discover new and more efficient educational strategies....Every teacher bears the burden of experimenting carefully and rigorously to identify the appropriate stimulation strategies...” By breaking with tradition these teachers tried to do just that.

References


Stanovich, K. (1986). Matthew effects in reading: Some consequences of


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