

Enhancing orthographic mapping and word learning

**Tiffany
Peltier**



You may have heard of [Dr Ehri's theory of orthographic mapping](#), or the gluing of phonemes to graphemes within words so that the written word is automatically linked to its pronunciation and meaning. This process can involve mapping sounds to print in both phonetically regular words, such as kick (/k/=k, /i/=i, /k/=ck) and words with what we think of as having phonetically irregular parts, such as said (/s/=s, /ē/=ai, /d/=d). This process is also said to account for gluing or mapping chunks of words (for example, syllables such as re-, or, -ture) to sound as well, allowing students to recognise parts of longer multisyllabic words.

You may have also heard of [Ehri's phases of sight word learning](#), a kind of roadmap which students travel in their journey of learning to decode and spell words and to read words by sight. Here is [a piece by UFLI explaining Ehri's phases](#) if you can't access the article.

Sight words are any word that a student has learned to read from memory automatically. This includes phonetically spelled words as well as words with irregularly spelled parts. They can be long words or short words. They can be high-frequency or low-frequency words. As long as the student no longer needs to sound the word out, but has seemingly automatic access to its pronunciation, we call the word a sight word, or a word that has been orthographically mapped, for that student. If the word is a sight word, the Visual-Word Form Area, or [the brain's letterbox](#), almost instantly connects the printed symbols on the page to its pronunciation as well as meaning.

All of the words on this blog are most likely sight words for you, if you did not need to sound them out, part by part, or guess them based on context. The phonemes (speech sounds) and graphemes (written letter(s) that represent each phoneme) are orthographically mapped, or inextricably linked in your memory system, and the letters on the page are then almost instantly connected to pronunciation and meaning. So how do we help students to become automatic word decoders, orthographically map words, and have seemingly instant access to a large sight word bank in memory?

After a recent discussion, Dr Linnea Ehri wrote up and sent over a document with instructional guidelines that follow from her theory of orthographic mapping and research studies. She gave permission to share this with a wide audience of teachers and stakeholders in order to help increase understanding in the Science of Reading.

Following this article are Dr Ehri's guidelines for improving student sight word learning, or what is also commonly referred to as automatic word recognition, based on her theory of orthographic mapping and studies around reading (all emphasis/bolded words are hers). If you find it helpful, please be sure to share it with your colleagues. I am very grateful for Dr Ehri taking the time to write up these instructional guidelines and make them widely available to teachers and other stakeholders to help us better understand the science of teaching word recognition skills. I would highly recommend reading one of her latest pieces, [The Science of Learning to Read Words: A Case for Systematic Phonics Instruction](#). In it, she describes many specific experimental studies testing conditions necessary for optimal word learning.

Another one of her publications, [Orthographic Mapping in the Acquisition of](#)

[Sight Word Reading, Spelling Memory, and Vocabulary Learning](#), has many more helpful explanations and a table that details the phases of word learning progress.

There are so many fun things to learn about how word-reading develops. Let's keep learning more and more ... and keep teaching well!

Dr Tiffany Peltier is the Lead Learning and Delivery Specialist in

Literacy for Northwest Evaluation Association (NWEA) in the United States. She brings over 12 years of experience in the education field, serving as an elementary teacher in three different states, acting as an instructional coach to elementary teachers, and teaching undergraduate pre-service teachers within special education, educational psychology, and literacy coursework at Texas A&M, the University of Oklahoma,

and the University of Georgia. Dr Peltier has also provided professional learning sessions for various schools and districts, and been contracted with a state department of education to develop and provide Dyslexia Awareness training. She has most recently worked as a research scientist specialising in teacher training, early literacy, and reading difficulties like dyslexia at the Collaborative for Student Growth at NWEA.

Sight word learning supported by systematic phonics instruction

Written language is a human invention. It involves the representation of speech sounds with visual symbols. In English, an alphabetic language, there are approximately 44 unique speech sounds called phonemes. These are the smallest sounds forming spoken words. English phonemes are represented by the 26 letters of the alphabet, either individually or in combination. These alphabetic representations are called graphemes. It may seem confusing that there are 44 unique sounds and only 26 letters. This is possible because some sounds, such as /sh/, are represented by more than one letter. The word shop, for example, has three phonemes /s/ /o/ p/, and three graphemes <SH> <O> <P>.

Before children have acquired knowledge of letters and sounds, they may try to use visual memory for letter or word shape cues to try to remember how to read words. However, this approach is ineffective. Words do not have sufficiently distinctive letters or shapes for readers to be able to read thousands of them using visual memory. To accomplish this feat, they need to possess a powerful mnemonic (memory) system that acts like glue to retain all these spellings in memory so they can read words automatically and spell them accurately.

This mnemonic system entails two foundational skills that beginning readers need to acquire. One is phonemic awareness, the ability to segment spoken words into their smallest sounds or phonemes, and to blend phonemes to form recognisable words. The other is mastery of the major letter-sound (grapheme-phoneme) relationships comprising the writing system. These skills enable children to decode unfamiliar words by sounding out letters and blending their sounds to form words. This knowledge also enables children to store sight words in memory by forming connections between individual graphemes in the spellings of specific words and their respective phonemes in pronunciations, called orthographic mapping. Activation of these connections acts like glue to bond the spellings of words to their pronunciations in memory along with meanings. Once retained in memory, students can look at written words and immediately recognise their pronunciations and meanings. Reading words automatically enables readers to focus their attention on the meaning of the text they are reading while word recognition happens out of awareness. All words that are sufficiently practised, not just high frequency words or irregularly spelled words, become sight words read from memory.

A comprehensive systematic phonics instructional program enables children to acquire the foundational skills needed to build a vocabulary of sight words in memory. It should include the following:

- 1 **Grapheme-phoneme relations:** Teaching children the major grapheme-phoneme (GP) relationships of the writing system guided by a scope and sequence chart that covers these relationships sequentially during the first year



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- of reading instruction.
 - This instruction can be facilitated by teaching GP relations using embedded picture mnemonics where the shapes of the letters resemble objects whose initial sounds are the phonemes represented by the graphemes (e.g., letter S drawn as a snake symbolizing /s/).
 - Learning can be facilitated by teaching letter names that contain the relevant phonemes they symbolise in words (e.g., name of B contains /b/) and teaching children to detect these sounds in the names.
- 2 **Phoneme segmentation:** Teaching children how to break spoken words into their smallest sounds or phonemes.
- Helping them detect these separate sounds by monitoring their mouth positions and movements as their articulators shift from one phoneme to the next in pronouncing words. Providing mirrors aids detection.
 - Once they learn how to represent some phonemes with graphemes, teach children to use these GPs to segment pronunciations containing those phonemes and represent them by writing letters or selecting letter tokens corresponding to the sequence of phonemes. This is an exercise in **writing phonemic spellings**, progressing from initial sounds, to initial and final sounds, to internal sounds in words, each taught to a mastery criterion.
 - Once children know a small set of GP correspondences, such as a, m, s, p, f, o, t, they can begin to write phonemic spellings of many words (e.g., mat, pot, Sam, map, mop...).
- 3 **Decoding:** Once students know the constituent GP relations, teaching them to decode unfamiliar written words by sounding out graphemes and blending them to form meaningful words. This creates grapheme-phoneme connections to retain the words in memory for sight word reading.
- Begin with VC (vowel-consonant) words, then CVC words, each taught until mastery. Begin by teaching a small set of GPs to decode. Gradually teach additional GPs to include in words to decode.
 - Begin with continuant consonants (i.e., s, m, n, f, l, r, v, w, y, z) that can be stretched and held. Teach students to decode by sounding out graphemes and blending them to form words without breaking the speech stream (e.g., sssuuuunnn rather than ssss-uuuu-nnnn). Once learned, introduce words with stop consonants (i.e., b, d, g, j, k, p, t). The greater difficulty blending stops without breaks will be surmounted by prior practice with continuant consonants.
 - For students who have learned the relevant GP relations, have them practise reading aloud lists of regularly spelled words containing many shared letters to a mastery criterion with corrective feedback (e.g., mat, bit, tab, tub, bet...). This forces students to process GP connections across all positions within words to read them. It promotes the spontaneous activation of GP connections to secure spellings in memory when words are read. It enhances knowledge of the spelling-sound writing system at the level of words.
 - Once students have learned multi-letter spelling patterns such as syllables and morphemes, teach them to segment multisyllabic words into these subunits to decode them.
- 4 **Spelling:** Teaching children to analyse and remember the GP mappings between each grapheme in the spellings of specific words and its phoneme in the pronunciation to form connections and secure the words in memory for sight word reading and for writing correct spellings of words.
- One way to practise spellings of words in steps: 1. Students pronounce a word and count the phonemes they detect using sounds, mouth positions and movements. 2. Students view its spelling, match up its graphemes to the phonemes they detected, and reconcile any extra or unexpected letters (e.g., they are silent, part of a digraph). 3. The words are covered and students recall their analyses to write the words from memory.
 - For irregularly spelled words, partial connections can be formed linking the regularly spelled graphemes and phonemes (e.g., S and D in said, all but the S in island).
- Once students learn multi-letter spelling-sound units, they can use these to form connections between spellings and pronunciations and store words in memory, for example, morphemic units (e.g., -ED, -TION, -MENT), and syllabic units (e.g., EX-CELL-ENT). This helps in learning multisyllabic words.
 - Special spelling pronunciations can be created to enhance the mapping relationship between spellings and pronunciations to store words in memory (e.g., pronouncing chocolate as choc – o – late).
- 5 **Pronouncing words:** Making sure that beginning readers read words aloud as they are reading text, particularly words that they haven't read before. This enhances the likelihood that grapheme-phoneme connections are activated and spellings become bonded to pronunciations in memory for sight word learning compared to reading words silently.
- 6 **Text reading practice:** Providing plenty of practice reading text at an appropriate level of ease. This is essential for activating and connecting meanings to the spellings and pronunciations of sight words in memory, particularly words whose meanings are activated only when they are read in context (e.g., was, said, held, with).

Dr Linnea Ehri is Distinguished Professor Emerita, Educational Psychology, CUNY Graduate Center. She has published research on how children learn to read, effective reading instruction, and causes of reading difficulty. Her findings reveal the importance of students acquiring grapheme-phoneme knowledge, phonemic awareness, decoding skill, and orthographic mapping to read and spell words from memory. Her alphabetic phase theory portrays the course of development and instruction to promote growth in word reading and spelling. She served on the National Reading Panel and was president of the Society for the Scientific Study of Reading. She has received research awards from AERA, ILA, LRA, LDA, AIM, and SSSR.