On Mon, Feb 10, 2014 at 6:24 PM, Ehri, Linnea <LEhri@gc.cuny.edu<mailto:LEhri@gc.cuny.edu>> wrote:
Dear Charles and others who might be interested,

I am not sure that Charles has understood my theory of sight word learning completely. “Connections” and “automaticity” do not provide the full explanation. It is more complex and involves understanding how orthographic mapping works. Let me see if I can clarify. I draw from a draft in which I have gone to extra lengths to try to explain the orthographic mapping process (see below). In my thinking, this comes close to explaining how typical readers acquire a sight vocabulary that enables them to read words automatically and where struggling readers fall short. Although I do not cite the literature on neuroimaging, it is my understanding that findings are consistent with this theory. I have left it to Shaywitz and others to explain the neuroimaging side of the picture.
If anyone has suggestions for further clarification, additions, or modifications, I would welcome them.
Sincerely, Linnea Ehri, LEhri@gc.cuny.edu<mailto:LEhri@gc.cuny.edu>

Orthographic Mapping. Research has changed our explanation of how sight words are learned. We used to think that readers used visual cues and memorized the shapes of words to remember how to read them. This was the justification for using the look-say, whole word method to teach beginning reading with flash cards practiced by readers before they learned letter-sound relations. But visual cues could not be the explanation for several reasons. You have too many words stored in your mental dictionary. The shapes of words are not sufficiently distinctive to discriminate among all these thousands of words. You should mistake similarly shaped words, yet evidence shows that word reading is highly accurate. Similarly spelled words are not often confused, for example, sick, sink, stick, slick, stink, slink. If visual cues were the basis for remembering words, lots of practice would be required because the connections are arbitrary. However, evidence shows that readers store written words in memory very quickly, without much practice (Ehri, 1980; Ehri & Saltmarsh, 1995). In one study, first graders required four exposures to words to remember how to read them (Reitsma, 1983). In another study, 3rd graders required only one exposure to retain information about the words’ letters in memory (Share, 2004). To explain word learning that occurs this quickly, a powerful mnemonic system is needed, one that works like very strong glue to stick the words in memory. The glue consists of readers’ knowledge of grapheme-phoneme connections (Ehri, 1992).
Readers store sight words in memory by forming connections between the spellings of individual words and their pronunciations. The glue that bonds them is provided by the reader’s knowledge of the letter-sound mapping system, that is, knowledge of grapheme-phoneme relations. This glue secures letters in the spelling of that word to sounds detected in its pronunciation. For example, four connections secure the graphemes in stop to phonemes in the pronunciation, /s/-/t/-/a/-/p/. Three connections secure the graphemes in check to its phonemes, /č/-/Ɛ/-/k/. Connections would not be formed if the spelling bot was given this

pronunciation. Connections between spellings, pronunciations and meanings are stored as amalgams representing individual words in memory. This view is portrayed by Ehri as well as several other theorists (Perfetti, Hulme, Share).

In order to form connections and secure spellings of words in memory, prerequisite knowledge and skills are needed. Readers need phoneme segmentation skill so they can analyze pronunciations of specific words into their smallest sounds. They need knowledge of the writing system, principally grapheme-phoneme correspondences (GPCs). This knowledge provides the glue for the next step. They need to apply their GPC knowledge to connect graphemes in spellings of individual words to phonemes in their pronunciations to bond the spellings to pronunciations and retain them in memory, referred to as orthographic mapping. In addition, the pronunciation or phonological representation of the word has to be sufficiently precise in order for the graphemes to link up to the phonemes that they symbolize. Some imprecision in the pronunciation can be tolerated when readers see the spelling of a word, notice additional or unexpected letters, and alter their pronunciation to conform to the spelling. For example, often pronounced "offen" may get changed to "off-ten" when readers see its spelling, or magazine mispronounced as “maz-a-gine.” Also readers need to know the meanings of the words so they become bonded to their spellings and pronunciations in memory.

It is important to eliminate misconceptions about the source of orthographic mapping’s mnemonic gluing power to connect spellings to pronunciations of words in a reader’s memory. It does not simply result from the experience of an arbitrary association, as when a person’s face is paired with a name. The connection is not arbitrary but is determined by the reader’s knowledge of the grapheme-phoneme writing system. Unlike a face, the spelling cannot be associated with any name but only with a name whose letters follow the system in symbolizing phonemes in the name. Also getting words into memory by mapping does not result simply from a reader repeatedly seeing the spelling of a word and saying its pronunciation. Very little practice is needed for spellings to become bonded to pronunciations in memory because the spelling-sound mapping conforms to the reader’s prior knowledge of the writing system and hence is predictable. A reader does not even need to see a word’s spelling to have definite ideas about its letters. Just hearing a word activates expectations about its spelling. One might think of grapheme-phoneme knowledge as a type of schema (Anderson). A reader who possesses a restaurant schema is much better able to remember the events in a story about a family going out to dinner. Likewise, knowledge of the grapheme-phoneme mapping system provides the schemata to render the spelling-sound mappings of words predictable and hence memorable.

Sight words may be retained in memory as a result of several word reading events. If students decode the word by sounding out and blending letters, this will activate connections and secure the spelling in memory. When students decode

words on their own as they encounter unfamiliar words in text, this strategy serves as a self-teaching mechanism to store words in memory (Share, 1995, 2005). If students analogize, this will also activate connections. If students are told how to pronounce an unfamiliar spelling they are viewing, the connections can become activated in memory (Rosenthal & Ehri, 2008). If students use context plus partial letters to predict an unfamiliar word, connections between the spelling, pronunciation and meaning may be activated.

Learning to read words from memory presents problems for struggling readers. One problem involves phonological difficulties of various kinds. Studies have shown that students with a reading disability may have limited phonemic awareness (Liberman & Shankweiler), weak phonological working memory (Gathercole), and their phonological representations of words may be imprecise (Elbro). Another problem is that they have not mastered the major grapheme-phoneme relations so this limits their ability to phonologically decode unfamiliar words (Rack, Snowling & Olson). As a result, they lack the requisite skills for forming complete connections between spellings and pronunciations of words to store them in memory. The connections are partial and incomplete. When they encounter unfamiliar words in text, they compensate for poor decoding skill by predicting words using partial letters and context cues (Stanovich). As a result, they do not retain fully connected words in memory to support accurate sight word reading.