*Mind*Brain*ed* Think Tank

Reading
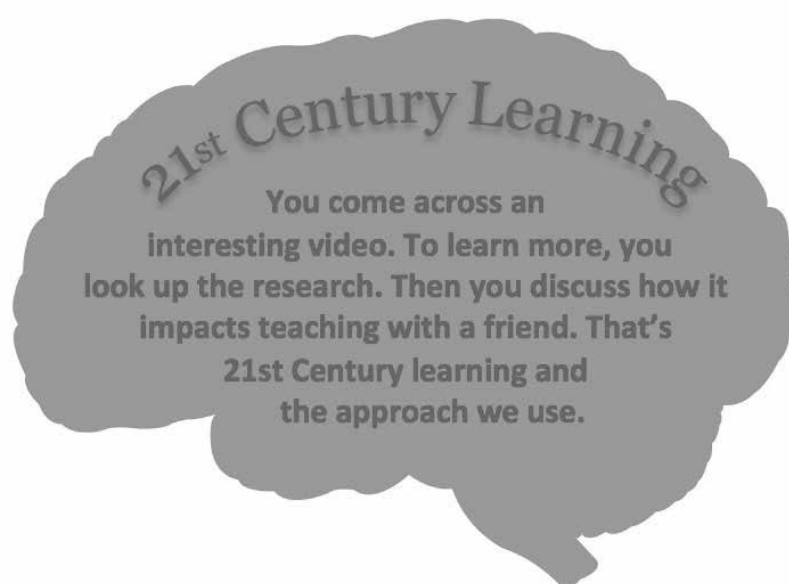
21st Century Learning

You come across an interesting video. To learn more, you look up the research. Then you discuss how it impacts teaching with a friend. That's 21st Century learning and the approach we use.

Dehaene's How the Brain Learns How to Read

Julia Daley

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If you've ever wondered what's going on in the brain while we read, then this month's intro video by Dr. Stanislas Dehaene is definitely one to watch. In his talk titled "How the Brain Learns to Read," Dehaene gives a quick and thorough overview of the neurological mechanics of reading. His audience is practicing teachers, because he is emphatic in his belief that we should understand the minds of our students in order to teach them better.

How the Brain Learns to Read
Stanislas Dehaene
https://www.youtube.com/watch?v=25GI3-kiLdo

How Does Your Brain Learn To Read?
Julia Wilde
https://www.youtube.com/watch?v=zIU9S5maABk

The key concept to remember is that reading begins as visual stimulation—we use our eyes to look at letters. Then, that stimulation moves into what Dehaene calls the brain's "letter box," or the place where we store our knowledge of letters. From there, the brain signal splits into two different areas: our repository of speech sounds and our repository of word meanings. In sum, reading is an "interface" between vision and the spoken language system.

With writing, we can communicate our thoughts to our readers no matter who they are, where they are, or even when they are. Yet reading and writing are not something we are able to do from birth; they're something we must be taught. Dehaene explains that reading is not something the brain has a ready-built area for—it is an unnatural skill, evolutionarily speaking. So, our brains have co-opted the visual recognition system to learn and differentiate letter shapes. This is the same system responsible for remembering the faces of the people you know.

Have you ever seen the problem some early readers have where they will mirror letters—

A modern vision of the cortical networks for reading
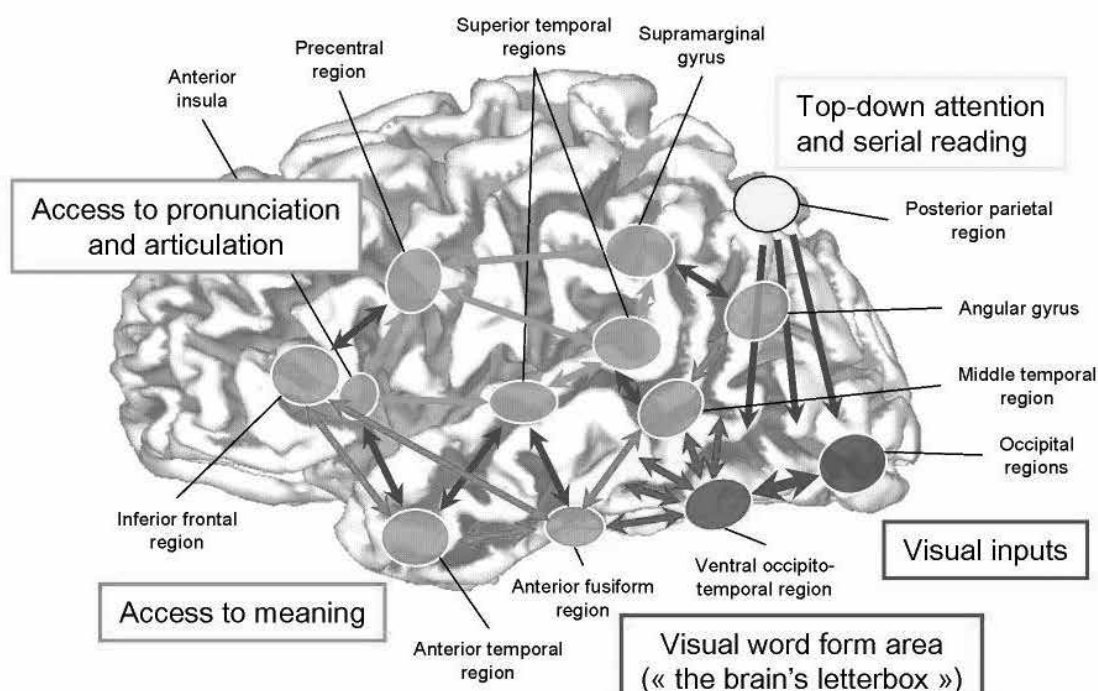
basically, write them backwards? It's a pretty common phenomenon in young children, according to Dehaene. But with our new understanding of the neurological basis of reading, scientists now know the cause of this problem. It isn't dyslexia, as is often believed. Instead, it's a result of that visual recognition system the brain has co-opted for reading. Our brains have the ability to recognize faces regardless of their orientation, known as the facial symmetry system. But our brains have to learn how to turn this system off while reading, because it is not only unnecessary for reading, it can even be detrimental to how we recognize distinct letters, like "d" and "b". Dehaene explains that this is a universal quirk of learning how to read.

The last, and most important point (I think!) of Dehaene's talk has to do with how we can best teach children to read. He is adamant that teaching phonics is key! "Whole word reading is a myth"—those are his exact words. Even advanced readers' brains still look at all of the letters and draw upon their phonological knowledge before connecting the visual "sound" to a known word meaning. For novice readers, they must decode words one letter at a time, and so phonics education is essential for them. We do our students a disservice if we do not allow a proper visual-spoken interface to form in their minds because we insist upon making them memorize each word one at a time.

Dehaene's presentation serves as the foundation of this special issue, and we hope that it will whet your appetite for more information on how the brain reads. There are quite a few gems in there beyond what I've summarized here, but that, due to the extraordinary size of this month's issue, I could not dive into (like his research on how the brain changes at various stages of literacy, which focuses on pre-literate adults). Even the Q&A was enlightening! Without further ado, please enjoy the visual feast that is the rest of this issue.

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The Extensive Reading SIG

Barry Keith
Global Education Center
University of the Ryukyus

The Japan Association for Language Teaching (JALT) Extensive Reading (ER) Special Interest Group's (SIG) mission is to promote the practice and research of Extensive Reading and Extensive Listening (EL) in all levels of education. Extensive Reading is based on the idea that learners need input of the target language—and they need a lot of it! The idea is simple: if a learner has enough exposure to comprehensible language, then they can begin to acquire the forms of language. A growing body of research shows that ER is not only an efficient way to learn a language, but it promotes acquisition of vocabulary, grammatical forms, reading skills, and global knowledge—AND it's fun!

The ER SIG is an active group of about 200 ER practitioners from a range of teaching contexts. Each year, we sponsor presentations and symposia at TEFL events throughout Japan and Asia to promote ER and good teaching praxis. The SIG has three publications: Extensive Reading in Japan (ERJ), which is published twice each year and is aimed at members; the Journal of Extensive Reading (JER), an online, peer-reviewed journal that focuses on research; and the ER SIG e-Newsletter, a digital monthly newsletter. Check the JALT calendar of events to find an ER event near you.

The Phonological Loop: Our "inner ear" and "inner voice" and its Role in Reading

Amanda Gillis-Furutaka
Kyoto Sangyo University

"You can listen to the dead with your eyes because you can read what they wrote two thousand years ago" (Dehaene, "How the Brain Learns to Read," our DEEP lead-in video).

How can we listen with our eyes? Why do we often hear letters and words in our head when we see them on a page? And why is learning to read more difficult for the hard of hearing (Booth, 2019)? In his talk in our DEEP lead-in video, Dehaene explains that sound perception is a crucial factor in constructing the meaning of written languages. He uses scanned images of the brain to show how spoken and written language are closely connected because the same areas of the brain are used for processing both. But what is the underlying system within the brain that controls these processes, and how does this enable us to learn to read?

Working memory and the phonological loop

Experimental cognitive psychologists have been investigating the brain systems that enable us to learn to speak and read our first and subsequent languages since the 1960s, long before modern technology (fMRI and EEG scanning) allowed neuroscientists to "map cognition onto its underlying brain function" (Baddeley, 2019, p, 343). Cognitive psychologists went about this by creating theoretical models of how brain systems work and testing them on people whose brains did not function according to the models, as a result of injury, illness, or an inherited condition. In this way they were able to create and refine their models of brain systems and theories of how the brain can be trained to read.

A cognitive psychologist who contributed greatly to theory about how we learn to read by making the link between visually presented letters and the role of sound in memory was R. Conrad in the 1960s. He was studying the memorability of British post codes and telephone numbers and found that when people were asked to remember sequences of letters, errors tended to be similar in sound to the correct item. For example, *b* would be remembered as *v* even when the letters were presented visually. This indicated reliance on some kind of acoustic memory trace that faded over time. He also found that certain sequences of similar-sounding letters were harder to recall correctly than letters that sounded very different (e.g. *b t c v* and *g* were harder to recall correctly than *k w x l* and *r*). Conrad also demonstrated that people born deaf had reduced capacity for remembering and recalling visually presented sequences of numbers and letters. He demonstrated a link between this problem and the difficulty deaf people have in learning to read, and devoted his life to working with the deaf from then on. We will return to the topic of how people born deaf succeed in learning to read a little later.

In the early 1970s, cognitive psychologists Alan Baddeley and Graham Hitch started working on the relationship between long-term memory (LTM) and working memory (WM). The term "short-term memory" had been used previously, but "working memory" indicates more clearly the dynamic nature of this brain system. Baddeley and Hitch acquired this term from Atkinson and Shiffrin (1968) but it was first used in 1960 by Miller, Galanter, and Pribam. Baddeley and Hitch wanted to highlight how working memory serves "as a cognitive workspace, holding and manipulating information as required to perform a wide range of complex activities" (Baddeley, 2019: 157). They realized that there were at least three components to their WM model: 1) a central executive which is linked to attention and drives the whole system, 2) the visuo-spatial sketch pad, which works with images, and 3) the phonological loop, which relies on sound.

To understand how this works, Baddeley (2013) suggests in his talk that you try to count the number of windows in the house or apartment where you live. How did you go about this? Probably, you created a visual image of your home and took a mental tour around it counting windows to yourself as you went. The central executive devised your strategy, while your visuo-spatial sketchpad provided the images,

and you probably heard yourself mentally counting one, two, three … while using the phonological loop.

The phonological loop is our "inner ear" and our "inner voice," because it stores phonological code temporarily but needs to rehearse this sub-vocally to hold the phonological code in store. For example, if we are trying to remember a phone number, we can store it temporarily, but need to keep repeating it mentally with our "inner voice" to hear it with our "inner ear" and be able to hold it in storage. This is why they call it a "phonological" (related to sound articulation and reception) "loop" (replayed like a sound recording).

Baddeley and Hitch (1974) demonstrated the same acoustic effect with words that Conrad had found with similar-sounding letters. We can easily store up to five dissimilar one-syllable words (pot, map, sock, etc.) for a short time, but holding and remembering five short words is far harder when they are all similar in sound (cat, can, cap, etc.). Similarity in meaning but not sound has little effect on how well we can remember a sequence of short words. However, in trials with ten words to remember, meaning becomes more important for recall than sound. This suggests that the phonological loop focuses on sound and not on meaning. Of course, other parts of the WM system are using meaning, and the fact we are relying on sound doesn't mean we don't understand the meaning. Rather, it seems that we rely heavily on catching and holding sound in memory for as long as we need to work with that information.
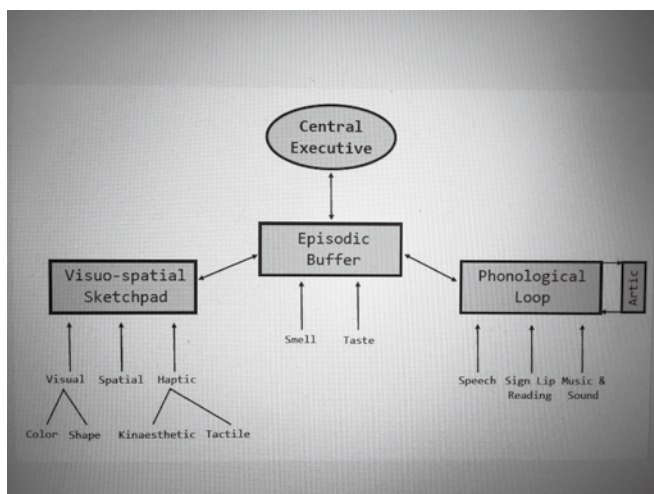
However, if the sound loop is interrupted in some

A revised model of working memory. From "Binding in Visual Working Memory: The Role of the Episodic Buffer," from A. Baddeley, R. J. Allen, & G. J. Hitch, 2011, *Neuropsychologia*, *49*(6), 1393-1400. doi:10.1016/j.2010.12.042.

way, the memory will fade very quickly. This has been demonstrated through experiments using sequences of five longer words (e.g. refrigerator, hippopotamus, imagination). Longer words are harder to remember because they take longer to rehearse in our heads. By the time we have either read or heard the fifth word, we have already forgotten the first one. Baddeley's (2019) results have shown that "people can remember about as many words as they can say in about two seconds" (p. 159) and that faster speakers and readers can remember more words in those two seconds because they can rehearse them more times.

Baddeley and Hitch (1974) demonstrated how the memory trace (the items to be remembered) fades away unless it can be refreshed through sub-vocal rehearsal. They did this by preventing people from rehearsing sub-vocally by making them say aloud something irrelevant while they tried to remember and recall a list of written words. (They had to repeat aloud "the," "the," "the," etc. while they tried to memorize the words). They found that being unable to rehearse with the "inner voice" removes the effect of word length. It also disrupts the phonological similarity effect when material is presented visually because being unable to rehearse sub-vocally interferes with the process of turning the visual stimulus, such as written letters, into phonological code. On the question of why we forget, however, it is very difficult to demonstrate conclusively that this is because memory traces decay or because they are interfered with, and so this point remains controversial.

The role of the phonological loop in language learning

Baddeley and two colleagues (1998) wanted to find out if the phonological loop was involved in language learning. They worked with an Italian patient who had a very clear phonological loop deficit, and so they were able to investigate what she couldn't do. She had normal intelligence, long-term memory and Italian (her native language) skills, but she could not repeat back telephone numbers. In other words, she could not listen to and then recall a sequence of nine numbers because she was unable to mentally rehearse and store them. The researchers wanted to find out if the phonological loop was a system for acquiring new language and so attempted to teach her Russian vocabulary. They presented her with a

sequence of eight Russian words, both visually and auditorily, and she had to learn the Italian translations of these words. As a control, she was given the task of learning to associate eight pairs of unrelated words in her first language, Italian. This control task was based on her semantic memory (her stored knowledge of the world), which was unimpaired. They also compared her performance with that of eight other people who did not have a phonological loop deficit and who were the same age as her, and of matching intelligence. Although she had no problem learning the pairs of unrelated Italian words, at the end of ten trials, she had not mastered a single Russian word. The control group, however, had learned the Russian vocabulary with ease. This gave a strong hint that the phonological loop is involved in acquiring new language.

It's always important to replicate experiments, but they didn't have access at that time to another person with the same deficit. So, they used their undergraduate students and blocked their phonological loop. They did this by making the students learn vocabulary in a foreign language while suppressing sub-vocalisation (i.e. by making them repeat aloud a word like "the," which interfered with their use of their "inner voice" to repeat the foreign words and keep them in mental storage). They found that, like the Italian woman, this didn't interfere with paired association in their own language, but it did interfere with the acquisition of new material. This demonstrated a clear association between the phonological loop and the ability to learn a foreign language.

Baddeley et al. (1998) then looked at first language acquisition, by studying children who had normal development except that their language, especially their vocabulary size, was about two years behind what it should be. They tested these children and found that they had a particular problem in learning new and unfamiliar word forms, such as nonsense syllables. This suggested they had a phonological loop deficit. Then they asked them to listen to and repeat back non-words of different lengths e.g. *ballop* or much longer words like *woogalamic*. They found that children of the same age with age-appropriate language and other children at their language age (i.e. two years younger than them) were quite good at this (although longer words were harder). However, the

children with this specific language impairment had great difficulty, particularly as the words got longer. They concluded that: "If a child cannot temporarily maintain the form of a new and unfamiliar spoken word, it is perhaps unsurprising if their vocabulary development is slower" (Baddeley, 2019, p. 243).

Furthermore, they used this Non-word Repetition Test on a sample of 118 children and found there was a robust association between their phonological loop measure and the number of words the children knew. Of course, showing that non-word repetition ability is correlated with vocabulary size does not mean that the link is causal. It could be argued that having a good vocabulary helps people cope with and repeat back unfamiliar new words. They investigated this by following up on the children they had tested over several years and found that at first, non-word repetition ability appeared to drive vocabulary growth, suggesting that the phonological loop is crucial, but as vocabulary develops, the association between a child's phonological loop level and their vocabulary size becomes more equal, suggesting that "although the phonological loop plays a dominant role during the early years, existing word knowledge does in due course begin to help the child learn new words" (Baddeley, 2019, p. 244).

Although the phonological loop seems to provide an important tool for the acquisition of first and foreign languages, it is not the only tool. People with a reduced phonological loop, like the Italian woman, can develop extensive vocabularies, probably because later stages of language acquisition depend on other factors, such as executive resources and exposure to a rich language environment.

Baddeley's team (1998) also tested dyslexic people and found that they tend to have both poor digit span (the ability to hear and repeat back a series of numbers) and poor performance on the Non-word Repetition Test. It is therefore highly likely that an impaired phonological loop is a contributing factor

to the difficulties many developmental dyslexics experience when learning to read. The hearing and repeating back of non-words words is therefore now a standard test that is part of a diagnosis for dyslexia or specific learning impairment. It is also used to predict how well the vocabulary of children without any learning impairments will develop and is more accurate than measuring their general intelligence.

The role of the phonological loop in reading

To find out more about the role of the phonological loop in reading, Baddeley's team asked volunteers to read sentences (like example 1 below) and decide whether they made sense or not. Half the sentences contained irrelevant words (e.g. example 2) or (example 3) had the order of words switched (Baddeley, 2019, p. 234):

She doesn't mind going to the dentist to have fillings, but does mind the pain when he gives her the injection at the beginning.

She doesn't mind going to the dentist to have fillings, but does mind the rent when he gives her the injection at the beginning.

She doesn't mind going to the dentist to have fillings, but does mind the when pain he gives her the injection at the beginning

The volunteers were allowed to read normally and then had to read while suppressing sub-vocal rehearsal by repeating aloud a word ("the") as they read. The results showed that suppressing the phonological loop did not slow the speed at which they read, but it did increase the number of errors they made in identifying nonsense sentences. The same effect was also found when longer prose passages were used. However, other potentially distracting tasks, such as tapping a pencil while reading or ignoring spoken words had no effect on reading accuracy. It seems that sub-vocal articulation provides a backup by checking for accuracy and

explained for me a mystery that I have long puzzled over. Now I understand why I hear my voice when reading something hard or something I have to pay full attention to, like proofreading. It seems my phonological loop kicks in to reinforce accuracy.

To investigate further the form that the inner voice backup takes, they tested people to find out if suppression of sub-vocal rehearsal affected their ability to judge whether a cluster of written letters represented a word (e.g. carrot) or a non-word (currot). They also asked people to decide whether two written words sounded the same (e.g. scene and seen) or different (e.g. scone and scene). They found that sub-vocal suppression did not prevent people from performing these tasks quickly and accurately and they could even judge whether non-words sounded similar (e.g. chaos and cayoss). In other words, they could still make an auditory representation with their inner ear. However, they could not decide whether words rhymed or not (e.g. bean and seen) when sub-vocal articulation was suppressed. This suggests that the need to remove the initial consonant sound before recognizing the rhyme relies on articulatory coding (the inner voice) and this is disabled when sub-vocal articulation is suppressed. This demonstrates the existence of two types of coding: the "inner ear," based on the auditory representation of a word or non-word, and the "inner voice," based on articulatory coding.

How people with hearing disabilities learn to read

If sound is so important in learning to read, how do people who are born deaf or hard of hearing learn to read? Tens of millions of children across the globe are hard of hearing (Booth, 2019) and most children with severe hearing loss find it very hard to learn to read. Many are able to read only at elementary school level when they graduate from high school. However, there are also many children who are deaf or hard of hearing who read very well. What are the reasons behind these great differences in reading ability?

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Research indicates that children who communicate predominantly in signed language use different brain mechanisms when reading compared with those who communicate predominantly in oral language. (For two very easy-to-read explanations, see Azbel, 2004 and VOA, 2011).

We have seen already in Dehaene's talk that reading success depends initially on phonological awareness of spoken language and understanding of the visual shape-sound correspondence. The findings of cognitive psychologists have shown that building reading skill depends on the size of one's vocabulary as well as other executive functions. Children with mild to moderate hearing loss often use oral communication as their main mode of communication and so can obtain some (degraded) phonological awareness of language to facilitate reading acquisition. Lip reading also can contribute to the phonological awareness skills in children who are hard of hearing. However, children who are profoundly deaf have little or no access to undistorted sound, and so they cannot use phonological awareness of spoken language when learning to read. So, they have to learn how to read without knowing the pronunciation of words. They need to learn instead that a certain visual sign in the sign language system they use refers to a written word. Good deaf readers are able to activate signed language automatically when reading, and recent neuroimaging research in deaf adults (Booth, 2019) has shown that those who predominantly use signed language use different brain regions when reading compared to those who predominantly use oral language.

As a result of these findings, teachers of children who are deaf or hard of hearing tailor reading instruction according to the child's communication mode. Children who use mainly oral communication are taught how to read in a similar way to hearing children, while for children who use mostly signed language, reading instruction focuses on the signed translations of the written words. It is therefore important that children who do not have access to sound in their first months of life be provided with structured language input in the form of signed language. This puts a great deal of responsibility on caregivers, because 95% of deaf or hard of hearing children are born to hearing parents (Booth, 2019).

Vocabulary, the phonological loop, the visuo-spatial sketchpad, and EFL learners

In his talk, Dehaene describes reading as an interface, a way of connecting vision and spoken language and shows how learning to read changes the anatomy of the brain. Learning to read additional languages leads to further changes in our brain. People learning to read an alphabetic language first learn to change their mental representation of phonemes, the elementary components of speech, by gaining the capacity to attend to the individual phonemes of the language and to attribute letters to them. Once they are able to decipher the sound and letter correspondences and recognize words auditorily, they begin to build direct connections between vision and meaning, and bypass the auditory circuit. When the speed with which English L1 and FL readers are able to make these connections increases sufficiently, they achieve what Richard Day calls reading fluency.

The size of a learner's vocabulary is related to their speed and efficiency in learning to read. Clearly, the more words beginner readers know, the greater the resources they have at their inner ear's disposal when making sense of the shapes and sounds they are decoding. Learning to read an additional language, therefore, is harder than learning to read a first language because of the reduced vocabulary store available in the foreign language. Even if your learners have managed to decipher the words accurately and can hear them with their inner ear, they still cannot make sense of what they are reading if they have no idea of what the words mean.

Richard Day explains the role of Extensive Reading (ER) in reinforcing and building vocabulary. In my opinion, the aim of ER is to build reading fluency. What is this exactly and how do we recognize it in our EFL learners? In my own research (Gillis-Furutaka, 2015) with Japanese students, from beginner to upper-intermediate level, they reported that in reading ER materials free of taxing vocabulary, they start to be able to forget about the words on the page and just see the scenes unfolding in their mind's eye (i.e. their visuo-spatial sketchpad), like a movie. This happens about the time they reach upper-intermediate level (CEFR B1), provided they are reading easy books below their actual reading level (Gillis-Furutaka, 2015). It seems that this is close to the experience

of native English-speaking fluent readers as well, and marks the moment when reading a great story becomes purely enjoyable.

We have seen how the brain's working memory system makes it possible for us to learn to recognize the sounds of our first and subsequent languages and to derive meaning from these sounds. When learning to read, sound is of primary importance because the brain learns how to match visual symbols to the sounds of the language(s) we are reading and to derive meaning through this process. A normally functioning phonological loop makes this process fast and efficient, but loss of hearing or a defective phonological loop do not inhibit the brain's ability to learn to read. The brain is a highly plastic organ and so other brain systems, such as visuo-spatial systems or semantic memory can take over the work of the phonological loop and enable such people to read. Reading is a vital learning tool for first and additional language learners because once we have learned to read, we can begin reading to learn and can derive knowledge and pleasure from this unique human ability.

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Reading Trivia Quiz

1. What classic children's book uses only 50 different words?

2. What are the three most read books in the world?

3. What rather outspoken expert was probably the most influential in getting ER started?

4. (How many) in 10 adults in the world are non-literate.

5. Who wrote the best-selling Amazon book of 2018, *Becoming*?

6. Order these countries in terms of most hours per week of reading for pleasure:

USA, UK, Japan, India, China, Thailand, Philippines, Egypt

(Hint 1: This author also invented the word "nerd" in If I Ran the Zoo.)

(Hint 2: "HB" "Q from CMT" "HP")

(Hint 3: "comprehensible")

(answers page 45)

ER: Learning to Read by Reading

Richard Day

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What if there were an approach to studying English that focused on mastery of the first most common thousand words of English, which make up 75% of the Oxford English Corpus, rather than the following thousands, which average less than 5% each (Oxford, 2014)? And what if Japanese university students using that approach showed an increase in TOEIC scores equivalent or higher to their peers who had studied abroad for ten months (Nishizawa, Yoshioka, & Fukada, 2010)? There is. Welcome to extensive reading!

Extensive reading (ER) in a foreign language (FL) context is an approach to teaching reading which aims to get students reading in the FL and enjoying it. It is based on the premise that we learn to read by reading. In ER, students read large quantities of easy material (usually books) in the FL. They read for overall meaning, for information, and for pleasure and enjoyment. Students select their own books, and are encouraged to stop reading if a book is not interesting to them or is too hard. When students engage in ER, they learn to read in the FL. In addition to learning to read, they also learn vocabulary and increase their writing, listening, and speaking skills. Moreover, students develop positive attitudes to and increased motivation for learning the FL.

ER is based on the well-established premise that we learn to read by reading. In an ER approach, students read, read, and read some more. A widely accepted view of ER involves Day and Bamford's ten principles (2002, pp. 137-139):

1. The reading material is easy.
2. A variety of reading material on a wide range of topics must be available.
3. Learners choose what they want to read.
4. Learners read as much as possible.
5. The purpose of reading is usually related to pleasure, information and general understanding.
6. Reading is its own reward.
7. Reading speed is usually faster rather than slower.
8. Reading is individual and silent.
9. Teachers orient and guide their students.
10. The teacher is a role model of a reader.

There has been a great deal of research on ER. It has been shown that students who read a great deal of self-selected, easy, and interesting books in the FL learn to read (e.g., Rodrigo, Greenberg, & Segal, 2014). By "easy" is meant material that is well within the learner's ability in the FL.

Reading easy books helps FL learners read without stopping to figure out the syntax or the meanings of words, and they do not have to translate into their first language (L1) to understand. This allows learners to read extensively, which leads to the development of sight vocabulary–those words that readers recognize automatically, correctly, every time, regardless of context. When learners develop their sight vocabulary, their reading rates increase because they do not have to stop to think about the meaning of words. This, in turn, results in the development of reading fluency. A fluent reader reads effortlessly and confidently at a level of understanding and a rate appropriate for the purpose or task and the material, seldom using a dictionary.

Being a fluent reader is critical because reading fluency is the basis of reading comprehension. When FL readers gain fluency, their comprehension increases. Slow readers, those who read word-for-word, do not understand as much as fluent readers. To sum up, ER helps students learn to read.

This is very important because of the impact of fluency has on the affective side of FL reading: motivation and attitude. A number of studies have found students who engage in ER become motivated to read in the FL (e.g., Takase, 2007). The same impact of ER on learners' attitudes toward reading in the FL has been demonstrated (e.g., Ro & Chen, 2014).

There are a number of factors that have to be considered and addressed if ER is to be effective. These include program or course planning, teacher involvement, and student roles.

Planning either an ER program or course is done well in advance of the first day of instruction, as it involves selecting and ordering the material that the learners will read. Another issue is the storage of

the materials. Some ER programs have the reading materials in the school or university library, while others simply have the material in the classroom.

📖 In addition, a key consideration is how to integrate ER into the FL program. There are at least four ways that this can be done:

📖 It can be added to an existing course; this does not have to be the FL reading course; it can be any FL course (e.g., a four-skills course).

📖 A new course can be developed that focuses exclusively on ER.

📖 ER can be incorporated into an after-school club. Students would meet two or three times a month to read books and discuss them.

📖 ER could become part of the school's homeroom period. Students select and read books during their homeroom time.

If either of the first two options is used, adding ER to an existing course or creating a new course, reading targets need to be established. A reading target is basically the amount of reading that the learners are expected to have done by the end of the course. There are a number of possible ways of setting and using reading targets. An extensive reading target can be expressed as a number of books, pages, chapters, or even a length of time–two hours a week, for example. Extensive reading targets are flexible and can be adjusted to fit the reading abilities and schedules of the students.

The target then can be linked to the grading system. For example, if the reading target is 30 books for a ten-week period, then a certain percentage of the final grade for the course is set. If the ER component of an existing course is worth 15% of the final grade, then a student who reads 30 books receives 15%). Students who do not achieve the target of 30 books receive a smaller percentage or fewer points (e.g., 25 to 29 books read = 14%; 20 to 24 = 13%).

One way of tracking students' reading is through ER logs. Having students complete a weekly ER log helps them to stay on track and allows teachers to monitor their reading. Figure 1 is an example of an ER log. Students complete their logs every week and turn them in to their instructor.

Another way to track student reading and to grade them is an Internet program, Mreader. This has comprehension questions on a huge number of books (in English), and is freely available for use by educational institutions. Students must answer correctly a set percentage of comprehension questions to show they have read the books. See http://mreader.org for details.

One of the key issues of a successful ER program is the material that the students read. Day and Bamford (1998, pp. 63-79) introduce the term language learner literature (LLL). By this they mean reading material that has been written for FL learners. They see LLL as a genre, analogous to genres such as young adult literature or science fiction, established genres in their own right. It includes "fiction and non-fiction, original writing, and text adapted for language learners" (p. 64).

The most widely-used type of LLL in ER is the graded reader. Graded readers are books, fiction and non-fiction, written especially for FL students who are learning to read. In general, most series of graded readers by the major publishers follow a set of linguistic guidelines which lays out the permitted vocabulary, grammar, length, plot complexity, and so on. The content (e.g., vocabulary, grammar, plot, length) is controlled to match the FL ability of the learners for whom the book is intended (e.g., beginner, low intermediate, advanced).

There are two types of graded readers, original and adapted. An adapted grader reader is a book, fiction or non-fiction, that was first written for an L1 audience and then modified for the FL reader at a particular grade or level. An original is one that was only written for the FL reader.

If graded readers are not available, children's

NAME: _____

WEEK: _____

TARGET: _____ books / pages (circle one)

Date	Name of Book	Pages Read	Comments

Figure 1. Extensive Reading Log: Books (or Pages) per Week

literature may be an acceptable alternative for beginning readers. For higher level students, other possible sources include adolescent literature. If the target language is English, the Internet may be a viable source, as it contains a wealth of material for learners of English. There are "easy English" news sites and a "simple English" version of Wikipedia.

An ER library has a wide variety of high-interest books and materials and a wide variety of different genres of books because students' tastes in reading vary greatly. For example, some students might want to read detective or mystery stories; other students might enjoy romance or science fiction. Others might be attracted to non-fiction, such as biography. Ideally, the reading material in an ER library is subdivided into readability levels to allow learners to locate material that they can easily understand.

Finally, in planning to integrate ER into the FL program, another curricular decision involves where students read. Because ER requires students to read in quantity, most reading is done outside of class. However, it is recommended that time be set aside for students to read in class to demonstrate the value that is placed on reading and to give prestige to the activity of sustained, silent reading.

Teacher involvement concerns ensuring that the instructors or teachers who use ER in their classroom understand what ER is, what their roles are, and what the roles of the students are. ER teachers realize that students learn to read by reading, and that the teacher's task is to help students read, read, and read some more. In addition, as captured by Day and Bamford's tenth principle of ER, they are models for their students. They demonstrate their commitment to reading in the FL by doing what they ask their students to do–to read–and to share their enjoyment with their students. One way of looking at this is through a metaphor: *An FL reading teacher is a drug dealer!* That is, the instructor gets her students hooked on books; they become addicted to FL reading.

Further, ER instructors let go of some of their authority, their control, over their students. Instead of telling students what to read, how to read, and when to read, they allow their students to select what, when, and where to read.

The roles of students in ER are very different from their roles in intensive reading (IR). In ER, students have a lot of control over what they read,

when they read, and when to stop reading. They also read easy books. Given the major differences between ER and IR, students are oriented to ER at the start of the program. The instructor tells them about the benefits of ER (e.g., learn to read, learn vocabulary), introduces the ER library, and explains that they should choose easy books that are interesting to them. The selection of easy and interesting books is stressed, as students are used to reading difficult material given to them by their teachers.

ER instructors guide their students during the course. They make sure that their students are reading, and that what they read is easy. Students can easily be confused about the balance between reading easy, enjoyable books and challenging themselves with books at a slightly higher level to expand their reading comfort zones. Some learners might want to challenge themselves too much, too soon. So, ER instructors monitor, through ER logs, what their students are reading, and make sure that they are not struggling with texts that are too difficult. It makes more sense to help build learners' confidence and fluency with easier books, bearing in mind that books that were at one time too difficult, later become

easier to read. As students engage in ER, they ladder up. As they read more and more, their reading ability improves, and their reading comfort zone expands.

A challenge that may confront ER teachers is how to know with confidence that their students are actually reading and understanding the books that they report they read. There are a number of ways that this can be dealt with. The first is through the use of Mreader, as mentioned above. Another way to monitor students' reading and comprehension of their reading is by incorporating extensive reading activities in the classroom. ER activities are based on the books that students are reading or have read.

To check to see if a student has actually read what she reported in her ER log, the teacher briefly interviews her about the book while the rest of the class is reading (e.g., asks about her favorite character or the ending). It becomes apparent rather quickly if the student has read and understood the book.

An equally effective activity involves the instructor making a photocopy of a page in the book. Then, during silent reading in the class, the instructor gives the photocopy to the student and asks her to tell the instructor what comes next. Again, it becomes apparent rather quickly if the student has read and understood the book.

Other ER activities can be done to increase students' vocabularies, and their listening, speaking, and writing skills. For example, a writing activity that can be done with FL students at all levels is *The Gift* (Reiss, 2004): after finishing their books, students write about gifts that they would like to give the characters in their books. Students who have read the same book can get together to discuss their presents. For a collection of ER activities, see Bamford and Day (2004).

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Altering Viewpoints: Raising Scores by Changing Learner Schemata of Reading Tests
Cognitive Linguistics and Student Perception

James D. Dunn
Tokai University

Are your students slogging through a reading test like zombies through mud? No thought given to how best to achieve a higher score? Changing their schemata, or how something is viewed from a brain's perspective, of the test might just be the way to get them to increase their scores and get them thinking through a reading exam.

Cognitive linguistics, a somewhat new conglomeration of psycholinguistics, cognitive science, and language acquisition theory, has given English language education new ways of looking at how knowledge is stored, and how reality is experienced by human beings (Rogers & Wolmetz, 2016). From this innovative collection of theories, we are starting to build a cognitive model of how language is used in life and how this knowledge can influence what is learned in the classroom. What happens when we start looking at reading comprehension instruction through the lens of embodied cognition and the manipulation of student schema? We can start to see what is going on in the student brain and can use this insight to design a methodology to change the way students understand and view (their schemata) an activity like a reading comprehension exam. This approach to methodology design is supported by Cognitive Linguistics in that how a student uses language in life, a usage-based approach, can positively influence language learning and promote better language usage (be it during a test or face-to-face).

The Target Audience

As a usage-based approach is dependent on a student's experience with the language, we must first define our target test-taking audience. Since the author is currently working in a private Japanese university, we will look at students who are predominately Japanese and have had the typical Japanese schooling experience when it comes to learning English. That is, they were primarily focused on passing tests to enter junior high school, high school, and university. These students are used to taking reading tests and, for the most part, go into an automatic mode where they read the test passage, questions, and answers, and finally review the passage again to find the answers.

In fact, brainwave pattern recordings obtained through portable EEG headsets, with the permission of the students, show that the average Japanese student doesn't experience a high level of stress during standardized reading testing (Dunn, 2017a, 2018). Their composure is most likely due to a long history of test preparation and test taking (Aspinall, 2013).

A Methodology to Change Student Schemata of the Test

Cognitive linguistics theory (Verhoeven, Reistma, & Siegel, 2011) suggests that students have a view of a test as something they need to drag themselves through. This view of testing as a burden that must be endured to get to the next stage of education has been reinforced time and time again throughout Japanese students' educational careers (Akiyama, 2004; Bartlett, 2017; Gorsuch, 1998). This is counter to the focus on critical thinking, production, and global skills the Ministry of Education, Science, and Technology (MEXT) has stipulated for English education going forward. I would like to suggest a strategy that changes student schemata of a reading test from something that must be slogged through line by line to that of a puzzle, where they search out patterns to put the puzzle together.

Phase 1: Understanding the Test Items - Knowing the Question Types

The first area of schemata manipulation is in relation to the test items, meaning the question prompts and multiple-choice answers. We want to change the student's viewpoint from a test-taker perspective to that of a test-maker. We can do this by showing what types of questions standardized reading tests usually use, and how they are made from a text. ETS, the maker of the TOEIC and TOEFL iBT tests, gives us a little insight (Trew, 2008) into how they make reading

test questions by categorizing them into the following four types:

Type 1: Positive Information Questions

Type 2: Vocabulary Questions

Type 3: Inference Questions

Type 4: Negative Information Questions

One thing to keep in mind is that once learners understand there are different types of questions to answer, it makes sense to read the questions first even before looking at the reading passage as they can organize questions in an order of "quicker to find an answer" to "slower to find an answer" which can help them use their time more effectively (Trew, 2008). It also allows for the identification of keywords for important terminology which is described in phase 2.

Type 1 questions are a "skimming" type that contain question words like: who, what, when, where, why, and how. Type 2 questions are the "meaning" type where students are asked to think about closest meanings, synonyms, and antonyms. Type 3 questions require students to think a little more and put two or more pieces of information together to find an answer. Type 4 questions are the opposite of Type 1, in that they are asking students to find information that is not present in the text. This is indicated by the keyword NOT in the questions. These question types are ubiquitous among standardized reading tests and, once better understood, can be exploited by a student "planning their attack" by answering easier questions first and then the more difficult ones.

Phase 2: Seeing the Connections - Keywording for Speed and Accuracy

The second phase in altering how students perceive the reading exam is getting them to perceive the test items and reading passage in a way that shows how they are connected. Each reading test item has a corollary in the text. Be it obvious, as in a Type 1 "wh" question, or less obvious, as in a Type 3 inference question, there is going to be somewhere in the passage that it connects to. This realization alone can give students an "A-ha!" moment as they start to see the test as an interconnected entity, rather than a collection of questions and answers independent of each other. The question is, however: How do we get students to start looking at the test in this way?

The first way is to have students notice the keywords used in the questions and answers. Again, we want the students to read through the questions and answers before they read the passage, in order to prime the keywords that will make scanning easier. Priming vocabulary, especially when keywords across question items and the text are related semantically, can be an effective use of short- to mid-term memory (Stolz, Besner, & Carr, 2005; Yap, Hutchison, & Tan, 2017). This priming may be a way to do Type 1, 2, and 4 questions but may have limited effectiveness on Type 3, as direct corollaries may be difficult to find. We can have students begin keywording by having them identify the following types of words: nouns, verbs, and adjectives. This is to allow students to better identify words that are similar or exactly the same in the text, which could indicate where a test item answer may lie. This priming, or "keywording", gives students a way to have the most important words ready to help find the answers when they move from reading the questions and answers to reading the passages.

While it is true that our brains are noisy and uncoordinated when it comes to processing semantic links and vocabulary (Stolz, Besner, & Carr, 2005), a focus on identifying words that help to identify answers in the text, combined with identifying questions types, helps students keep those keywords ready in memory in order to connect them to the main text (Yap, Hutchison, & Tan, 2017).

Phase 3: Drawing the Connections - Justifying the Answer Choice

The third and final phase in altering how students perceive a reading exam is asking them to do a metacognitive exercise where they justify their answers to themselves while they are taking the test (or a practice quiz). This is done by asking students to draw a line from their chosen answer to the sentences in the passage which have the keywords. That's it. While this simple, self-checking methodology might seem like overkill, simply including this "self-check" strategy in two basic-level 1st year reading and writing courses resulted in a 15 percent increase in reading comprehension scores (Dunn, 2017b). When combined with phases 1 and 2, it can have a strong influence on student test scores.

Drawing lines to justify answers is something that would be most useful during classroom practice and when taking quizzes, but the idea is to encourage

students to think this way during a reading test, even if it is a computer-based one. Again, it is about changing the way students view the test, gaining mastery over it and no longer just stumbling through it like a zombie searching for brains. Type 1 questions will usually require only one line to show where the answer was found. Type 2 questions may need one or more lines to accurately show how the student came to the answer chosen. Type 3 questions may require lines all over the text, as questions like "Find the main idea/ theme" will require information to be compiled from large areas of the passage. Type 4 questions, ideally, would have three lines, one for each "true" answer. So, you have a reading test that ends up looking like the illustration shown. It may look like a mess, but it is actually the student creating order out of what the test is presenting to them.

Conclusion

Cognitive linguistics looks at how language is used in life and how we can use this knowledge to influence how students learn in the classroom. Embodied cognition and the manipulation of student schema allow for change in the way students view a reading comprehension test. The field of Cognitive Linguistics is becoming more and more recognized as a unifying theory that brings together the realms of cognitive science, psycholinguistics, first and second language learning, and linguistic theory. While still a developing field of research, it gives us an opportunity to look, in a new way, at everyday language experiences and the cognitive processes used to complete them. In relation to teaching, it gives us new approaches to solving old problems.

This three-phase approach for reading comprehension is designed to help students adjust their construal of what a test is and change their schema on how best to engage with a reading comprehension test like the TOEIC part 7 or university comprehensive reading exams. It is this author's hope that this article can help other English as a Foreign Language educators become interested in the budding field of applied cognitive linguistics, not only in looking at grammar and metaphor, but in the everyday scenarios of in-class teaching and testing as well.

It should also be noted that this type of methodology could easily be adapted for listening comprehension tasks as well, but that is a topic for another Think Tank.

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The English Alphabet is Not "as Easy as ABC"
Ugly worms. Chicken guts.

Pauline Bunce

In Hong Kong it is not uncommon for the written English script to be described in a derogatory way by its school-aged Chinese learners. They describe it as looking like "ugly worms" or "chicken guts." No doubt there are other labels, but these are the ones that my secondary-school students were willing to share with me. One Chinese teaching colleague, newly returned from a self-driving holiday in Europe, told me that he had developed "alphabet headaches" from all the road signs that he was obliged to read.

When you have been immersed in a particular written script your whole literate-life, it speaks to you. Seeing is reading. You have reached what is known as automaticity.

It is almost impossible to ignore what is right in front of you–unless, perhaps, the font is particularly challenging, or parts of the lettering have been worn away.

As a famous Chinese expression puts it, you cannot ask a fish to explain water. We are all steeped in our first-literacy writing system and it has a powerful effect on how we learn (and teach) a new one.

Most English learners today come from non-alphabetic backgrounds. Spare a thought for the world's newest learners of English—for it is now a global commodity. Think of a map of the world and focus on the vast swathe of countries that spans the lands between Morocco in the far west, through North Africa and Eastern Europe, the Middle East, Central and Southern Asia, across China to Korea and Japan. Add Russia to that, and you have the overwhelming majority of today's English language learners. Yes, there are also large numbers of English learners in the Pacific, the Americas, Sub-Saharan Africa and Western Europe, but they (in the main) have become literate via the Romanised alphabet–and their numbers cannot begin to compete with those in Asia.

Everyone who is already literate in this wide sweep of countries has gained their literacy in a written script other than the Romanised alphabet.

How much do we know about these other writing systems?

How much insight into the English alphabetic system do we provide to these, our biscriptal learners?

Sadly, not enough. Unfortunately, the major insights that we could provide to biscriptal learners largely remain in the research domain, rather than in their English-language classrooms. Current EAL (English as an Additional Language) practice is in urgent need of some major "shots in the arm" from recent developments in English-language literacy research and from neuroscience.

EAL practitioners who work with biscriptal learners are often, like myself, secondary-trained teachers and/or they hold TESOL certifications of various kinds. Only a minority have been trained as primary school teachers, equipped with the skills and the experience of teaching people how to read from scratch. Hats off to them!

Most current EAL practitioners have, as a result, probably escaped all the controversy that accompanied the so-called "reading wars" of the 1990s and earlier, when the proponents of phonics did battle with the followers of "whole-language" methods of teaching reading to English-speaking youngsters. This was largely a stand-off between the teaching of sound-letter correspondences and the teaching of whole-word recognition. While this war is now over, thanks to thorough, sophisticated scientific research on the side of phonological awareness, EAL practice is still somewhat stuck in the "communicative allure" of the whole-language approach. In my opinion, EAL practice also remains stuck in a kind of trans-Atlantic (i.e. alphabetic) myopia when it comes to the reading-specific needs of biscriptal learners (see: Bunce 2016a, 2017).

After a brief introduction to the letter-and-sound system of English and possibly some handwriting practice, we move rather too quickly into the teaching sequence of those all-too-familiar graded course-books that have become the staple diet of English Language Teaching (ELT) around the world.

Oh, the assumptions we make!

So much ELT practice and research has grown out of the practical teaching experiences of (mainly adult) learners in the UK and the USA in the late twentieth century. In those settings, the vast majority of learners came from alphabet-scripted language backgrounds. There was barely a Chinese student in sight. The very notion of "bilingual" in so much of the literature of this time mainly referred to Western European or Hispanic-heritage learners of English.

Too often, we have been told by ELT "gurus" (e.g. Jim Cummins, Stephen Krashen, David Nunan) that prior literacy skills can be directly transferred across to English. This is not necessarily so. Any potential transfer will depend on the orthographic distance of the learner's first written script from the English alphabetic system. Written scripts operate at quite different linguistic levels, such as phonemes, syllables, words, or sentences. They have completely different design principles, using different letters, symbols, complex characters, diacritics, different directionalities, and their use (or not) of spaces between written symbols.

EAL instructional practices can also reflect their teachers' first-language scriptal assumptions. Take dictation as an example. In Hong Kong, Chinese teachers of English commonly practise Chinese-style dictation in English classes. In this method, learners are sent home to memorise a section of English text from their coursebook. The next day, the teacher will read out this text in short chunks, and the students will transcribe it. This may look and sound like English-style dictation, but the students pay very little attention to the teacher's voice and frequently finish long before she does. They are reproducing it all from memory. Students who don't prepare either write nothing at all, or they produce impossible spellings. Their errors are almost all visual, and have next to nothing to do with sound. Frequently, students are held back at lunchtime or after school to memorise and re-take these tests.

This practice is strongly defended by many

Hong Kong teachers who claim to have learned their own English in this fashion. How sad. The whole purpose of English dictation is to listen closely to the sounds in the words and encode them into written letter-combinations. There is really no place at all for "seen dictation" in English learning. By contrast, in the learning of written Chinese, sound plays quite a minor role, with shape and form being all-important. The worst example I ever saw of "seen dictation" in Hong Kong was a boy on my morning bus desperately trying to memorise the spelling of the words in Lewis Carroll's The Jabberwocky. I kid you not!

The alphabetic principle

Mastery of literacy in an alphabetic script depends on the learner's grasp of the alphabetic principle (Byrne, 1998)—being able to both decode (read) and encode (write) combinations of letters in order to "capture" the individual sounds (phonemes) of the spoken language. In English, these sounds are tiny, yet they must be clearly perceived by the learner in order to distinguish even simple words such as hot, hat, and hut.

For the biscriptal learner, with pre-existing literacy skills in another writing system, the core principles on which their first script is based will almost certainly be applied to the learning of a new script. For example, first-language speakers of English who wish to learn another script will naively enquire about its "alphabet," and may find it odd to begin

reading a book "from the back page," The principles on which our first literacy is based form the invisible "water" in which we all swim.

The "communicative allure" of whole-language approaches to reading, referred to earlier, sometimes encourages English learners to skip over new words in a text in the rush to achieve a modicum of meaning at the level of the sentence. Unfortunately, this plays right into the hands of many Chinese learners of English, for example, who may use their first-scriptal visual memory skills to memorise the shapes and spelling sequences of English words. In this way, word-level work for these learners becomes mere "vocabulary," in which every new word is seen as a "one-off" and a further burden on the learner's memory. This is the origin of the "ugly worms" and "chicken guts" expressions–English words are just not "speaking" to such learners.

Unfortunately, there are next to no adult-level resources available to teach the fundamental alphabetic skills that are needed by older, biscriptal learners of English. If such learners cannot decode and encode new and unknown English words, they will not fare well in higher learning programs–which are packed full of new terminology. In Hong Kong, I have had students with IELTS scores of 6 or 7 (on a scale of 9) who lacked these essential word attack skills (see: Bunce, 2016a, 2016b, 2017).

The contributions of neuroscience

The human brain is an amazing instrument. It is continually adapting to do what we ask it to do. Reading and writing are not innate human skills. Literacy in any language requires instruction and practice, and a range of complex neural adaptations. When we ask the brain to do something it already "knows," but in a different way, we need to be strategic in how we approach this new learning. Biscriptal learners need to be in no doubt that they are "changing gears" and embarking on a new literacy adventure that is quite different from their first. It is vital that they have an early introduction to the contrastingly different principles upon which their
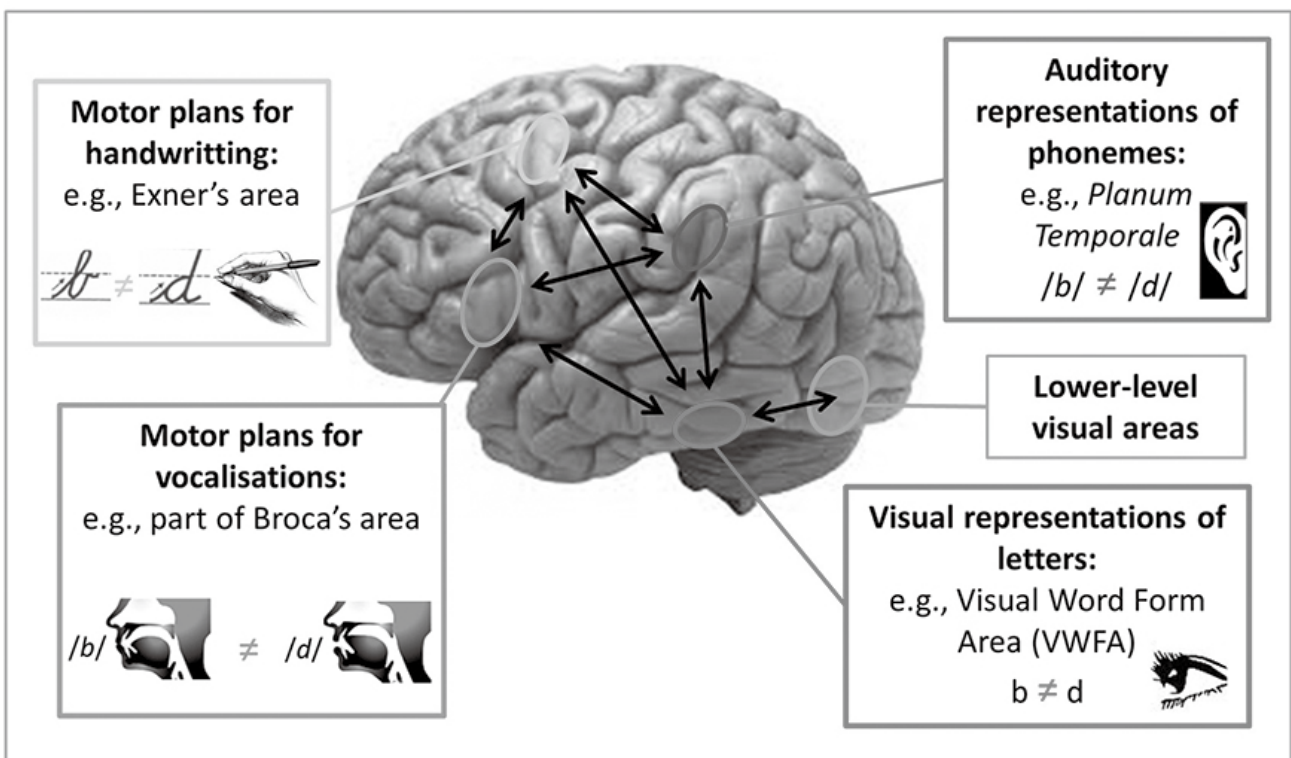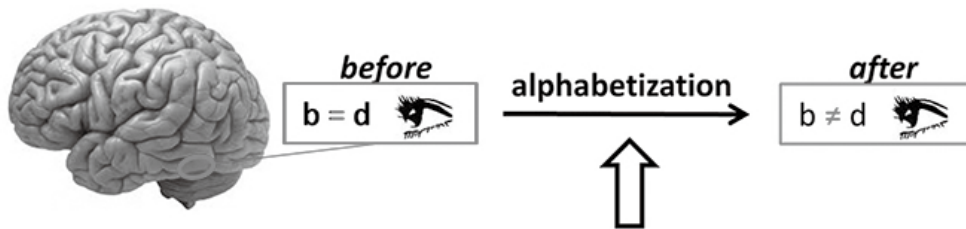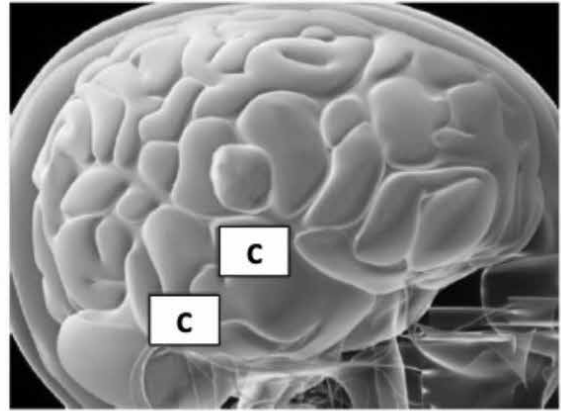
Brain Systems of Language

(Including speaking, listening and reading)
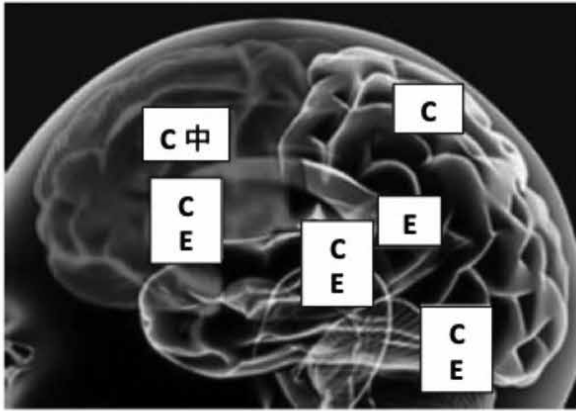
C, 中 = Chinese; E = English

two scripts are based. They need to be fully prepared for the challenges ahead, and expect things to be different.

Systematic scientific research into the fundamentals of the alphabetic reading process was the final key to the resolution of the "reading wars" in the early twenty-first century–in favour of the importance of phonological skills development. This research continues to provide fascinating insights into the human brain's capacity for additional language learning today. Contrastive studies of readers' eye movements during the reading of English and Chinese texts have shown that the two scripts required different "visual spans" (or saccades). The strings of equally spaced, equally sized, square-shaped, complex Chinese characters require narrower visual spans and longer fixations than alphabetic scripts, which have linear groupings of varying lengths and shapes (i.e. words) (Chen, Song, Lau, & Wong, 2003). Not all written scripts make use of spaces as word boundaries, so here is a fundamental, first-order adjustment that many biscriptal learners will need to make.

Now, neuroscience can identify the regions of the brain that are activated and engaged during reading. Increasingly, it is showing us important differences between non-literate and literate individuals and the finer distinctions between the processes involved in reading different scripts. Reading literally changes the brain. A lot of work in this field has been conducted in Hong Kong and China with adult literates in Chinese and English.

[Readers are strongly encouraged to follow the amazing work in this field that is being done by Li Hai Tan, Wai Ting Siok, and Charles Perfetti.]

The YouTube video of a talk by Stanislas Dehaene, recommended at the top of this issue, explores the idea that the part of the brain that was previously solely responsible for visual recognition has been adapted in literate individuals to accept the recognition of print. Dehaene calls this area the brain's "letterbox" (otherwise known as the Visual Word Form Area or VWFA).

In English literates, this area is shown in the above diagram from Pegado, Nakamura, and Hannagan (2014).

In Li Hai Tan's neuropsychological studies, he has found a great deal of similarity in the processing of written English and Chinese—with the added involvement of a couple of different areas. In the Chinese script, spoken syllables are mapped onto complex characters, which are also morphemes (units of meaning). This is quite different from the English script, in which spoken phonemes (units of sound) are mapped onto letters.

In functional MRI scans, it seems that native Chinese speakers use more areas of the brain for speaking and listening than English speakers do.

This may have something to do with the presence of tones in the spoken language. Readers of Chinese also show relatively more engagement of the visual-spatial areas, the right superior temporal cortex and the left middle frontal regions, than English readers. This may be necessary to provide the time and space it takes to recognise the complex, sometimes homophonous, square-shaped Chinese characters whose pronunciation has been memorised, rather than directly converted via the letter-sound correspondences of English (Perfetti, Liu, Yiez, Nelson, & Bolger, 2007).

Li Hai Tan has provided a very clear comparative diagram of these areas (2013). Here, the left middle frontal region has two symbols (a C and the Chinese character 中 , representing the written code). Two areas in the right hemisphere are shown here as well.

Functional MRI studies of dyslexic individuals have also provided insights into the differences between English- and Chinese-language dyslexics. The central importance of handwriting to the learning of Chinese is another important area of interest (and possible future concern) to all educators (Tan, Spinks, Eden, Perfetti, & Siok, 2005)–particularly in this increasingly digital age (Wolf, 2018).

Brain imaging studies have also been carried out with literate subjects in Japanese, Korean, Hindi, and Arabic languages.

All of this research points to the central role that writing systems play in the establishment of any literate person's neural circuitry. Our brains are forever being changed by our language use. If we are to add the alphabetic English script to a bilingual person's literacy repertoire, then we need to be quite deliberate in helping to "set them up" for this "rewiring" by continually emphasising that the English alphabet is all about sound.

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Sharing Brain Science via Narrow Reading: The Brain Book Project

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There's an adage common among reading teachers: The love of reading is caught, not taught. I'm a reading teacher. I've been using extensive reading for over 35 years. I also love learning about the brain. I wondered if I could somehow share that interest with my students.

Last fall, I came across several graded readers that deal directly with brain science. Their titles are below. They are in Cambridge University Press' Discovery Education Readers series. This series of graded readers was developed along with the Discovery Channel. As such, they are beautifully produced, with stunning color photographs.

I asked students in a second-year, elective reading class to read at least two of the books. Some read as many as five or six. Their main criterion for choosing the books was personal interest. After reading each book, they rated it for interest on a 5-point Likert scale. They also answered three questions:

Did you learn anything about the brain, mind, psychology or human behavior? What?

What surprised you? (My motivation with this question was both a real interest in knowing what students did and didn't know before they read the books and also, by asking them the question, to focus their attention on their own interest and learning.)

If you could ask one question to the author, what would it be? (This question was sort of a "fishing expedition." I had no idea what they would write but it might lead to insights about their thinking.)

When I started the project, some of the books had on-line MReader.org quizzes, available for free from the Extensive Reading Foundation (ERFoundation. org). Some did not. For those books that didn't have quizzes, the students wrote a short summary of the book. There are now MReader quizzes available for all these books.

The project is consistent with "narrow reading," which encourages students to read books and articles on similar topics so vocabulary and ideas are recycled, leading to greater fluency.

This article includes a short synopsis of each book, along with my students' ratings, and a few of their comments and questions. CEFR levels and word counts are also listed.
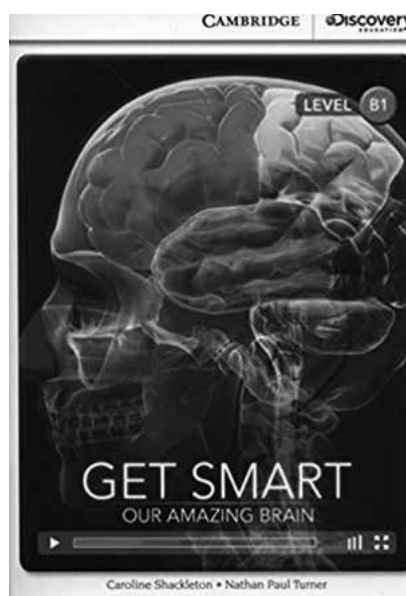
**Get Smart: Our Amazing Brain**

B1 2319 words. Caroline Shackleton and Nathan Paul Turner

Not surprisingly, this is the title that deals the most directly with brain science. It begins with a preview to activate general vocabulary and pre-teach specialized vocabulary (parts of the brain). Chapter 1 is about facts and myths. Common (mis)understandings: a good hook to get the reader interested. Other chapters are on brain and personality, language, movement, and the senses. The last chapter is a short "personality test" related to previous information.

Student rating: 3.3

Student voices:

• Bilingual people develop more gray matter than people who only speak one language.

• I was surprised that speaking a second language is not only useful, it may also be healthy! (Multiple students commented on this).
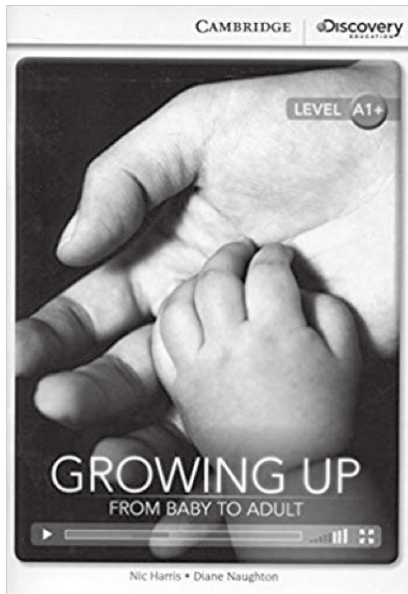
Growing Up: From Baby to Adult

A1+1595 words. Nic Harris and Diane Naughton

This deals with all stages from birth to adulthood. Perhaps for us and our students, adolescents and the beginning of adulthood are the most important. It does explain the role of the amygdala (emotion) but doesn't say that it is fully developed by age 15. It simplifies prefrontal cortex (PFC) to "cortex" (OK, this is a graded reader after all). It points out that teens tend often to get angry or sad quickly and that they make bad, dangerous decisions. It doesn't point out that the PFC isn't fully developed until age 25.

It ends with an interesting checklist, asking the reader to decide at what ages someone should or shouldn't be able to do things.

Student rating: 4.25

(author note: most highly rated of the series).

Student voices:

• Between the ages of 16 and 19 (adolescence), more people die in accidents than at any other time.
• Animals other than people also experience adolescence.

What Are you Afraid Of: Fears and Phobias

B1 1480 words Diane Naughton

This book starts, unsurprisingly, with the amygdala and its survival responses: fight, flight, or freeze. Or, in words better designed for language learners: fight, hide or run away. But it also points out that fear can have positive results. Like any other features related to evolution, it is trying to keep us alive. The book also explores phobias, even introducing a new one, nomophobia (fear of not being in contact with others by cell phone). Although it does not explain much of the brain chemistry, the book also deals with the fun of (and business of) fear. Things that give an adrenaline rush, from extreme sports, to horror movies to roller coasters (the present author's personal favorite).

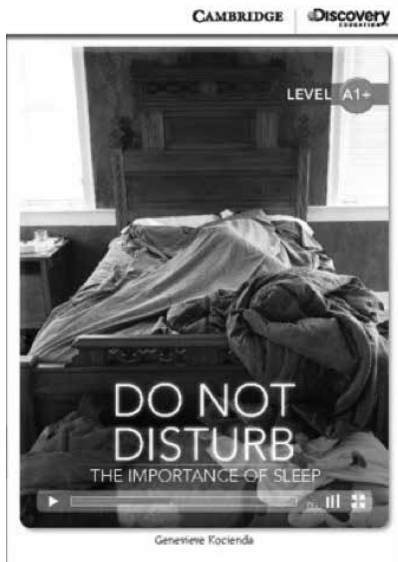Student rating: 3.5

Student voices:

• We learn fear. We are not born with it. I want to know more about activities where people enjoy fear.
• When the danger that causes fear disappears, the memory of that danger is kept in the amygdala. •
I was surprised that women are more interested in horror movies than men.

Do Not Disturb: The Importance of Sleep

A1+ 1679 words. Genevieve Kocienda

This is a big issue for so many of our students who are literally, sleep deprived. It starts with our bodies' need to sleep and quickly points out that people of different ages have different sleep needs. Note that teens need MORE sleep (9 hours) than older people.

It also makes the point about sleep being essential for memory. Also included are examples of problem solving through dreams. Unfortunately, it goes into dreams and symbolism which, as far as I know, is not backed up by any science. Interpreting dreams is an interesting topic, no doubt, but I don't think it belongs in a series related to science.

Student rating: 4.0

Student voices:

• I realized that harm to the body happen if I don't sleep.

• I was surprised that too little sleep could make me fat. I will try to sleep a lot!!!

• How can I sleep well? (Author's note: Actually, the book does discuss this. But since sleep is such an important issue for students, it might be useful to teachers to download the lesson on reading an infographic about sleep and the brain HERE. Also, the first two issues of our Think Tank were about sleep.
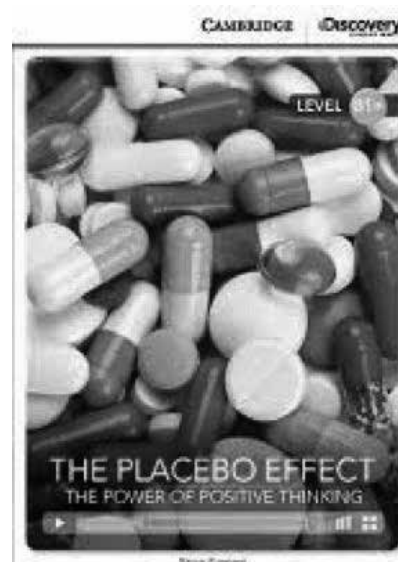
The Placebo Effect: The Power of Positive Thinking

B1+ 2729 words. Brian Sargent

This book starts with placebos in medicine. It asks students to infer why placebos are used in medical studies. I like the fact that they are requiring inference at a fairly basic level.

In hypnosis, like other uses of placebo, the power of suggestion plays a role. The book demonstrates this with a Stroop test (color words, written in other colors. This mental disagreement happens in the anterior cingulate cortex. Under hypnosis, highly susceptible people do better at correctly stating the word written rather than the color of the word. Brain scans show less activity in the anterior cingulate cortex.

It also touches on medical uses of visualization. The book ends with a tough question: You have a friend who has been using visualization to help himself with sports. Now he finds out he has cancer. He wants to try visualizing the cancer retreating. What is your advice for him?

Student rating: 3.0

Student voices:

• I learned that placebo and visualization help what we imagine become true.

• I was surprised to learn that there is research indicating that the doctor's white coat may have a negative effect (the "white coat effect").
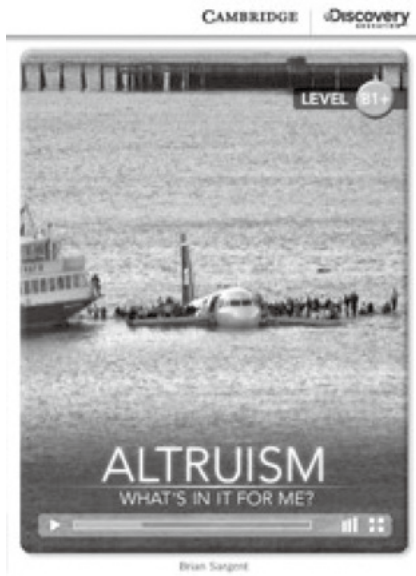
Altruism: What's in it for Me?

B1+ 3007 words Brian Sargent

Many examples of altruistic behavior, and the book ties them to studies that indicate mental rewards for doing good. It also reports on different reactions after people played violent, as opposed to cooperative, video games.

The book does point out that while there are scientific explanations for altruism, it is sometimes very complicated.

Student rating: 3.5

Student voice:

• Good faith is an important thing that money can not buy. Can we prove good faith scientifically?
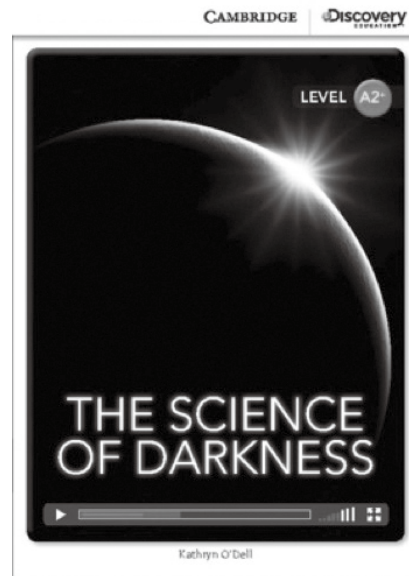
The Science of Darkness

A2 2425 words Kathryn O'Dell

A companion book to the Science of Light (below), this book includes the darkness/depression link and SAD (Seasonal Affective Disorder, which results from a melatonin imbalance). Even if it is less brain focused than the other books, it probably makes a good addition to any library in that it gives readers information about things that impact mood and emotion.

Student rating: 4.0

Student voice:

• I thought the universe still has many mysteries.

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1. *Green Eggs and Ham* uses 50 words. Dr. Suess's editor, Bennet Cerf, bet Suess he couldn't write a book using only 50 words after he released the classic "*Cat in the Hat*" which uses 225 words. (Remember this was back in the early '60's when many of us were being given books like, "Dick, Jane and Sally.")

2. The most read books are *Holy Bible, Quotations from Chairman Mao Tse-Tung, Harry Potter* series

3. Stephen Krashen is usually credited for his widespread influence on ER.

4. Two in 10 adults are non-literate.

5. Michelle Obama was author of *Becoming*, the most popular book in 2018 in France, Spain, Denmark, Norway, Finland and Greece.

6. Top countries in hours reading for pleasure: 1) India; 2) Thailand; 3) China; 4) Philippines ... 22) USA ... 26) UK ... 29) Japan (out of 30 countries surveyed in 2005 and 2006 by NOP World Culture Reports Worldwide survey).
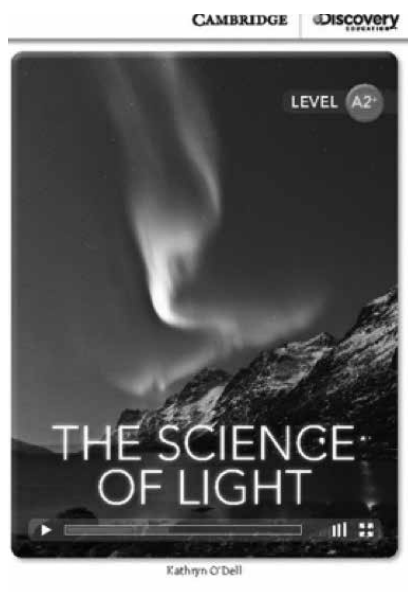
The Science of Light

A2 2670 words. Kathryn O'Dell

The Science of Light (like The Science of Darkness) deals with the brain and with psychology less directly that the other books. It does, however, touch on brain science. This book points out the connection between a lack of sunlight and depression, and talks about the "daylight" lamps some people need in places without much sunlight at certain times of the year.

Student rating: 4.0

Student voice:

• I was surprised to learn that some people are allergic to the sun.

The high interest ratings by the students and their questions and comments seem to indicate that it is indeed possible for a "heavy" topic like brain science to be of interest to a general reading audience. No doubt the high production value of the books contributed to the positive learner evaluation–the books are very attractive and inviting. It is also likely that my own positive feelings about both graded reading and about brain science contributed at least to the students being open to reading these books that they might otherwise have not picked up. In mainstream publishing, non-fiction far outstrips fiction in terms of sales (Rowe, 2018). Yet, there are far more fiction graded readers available than non-fiction, perhaps because fiction lends itself to narrative presentation which may make the stories more accessible. This project could be interpreted to suggest we as teachers should be giving non-fiction readers another look.
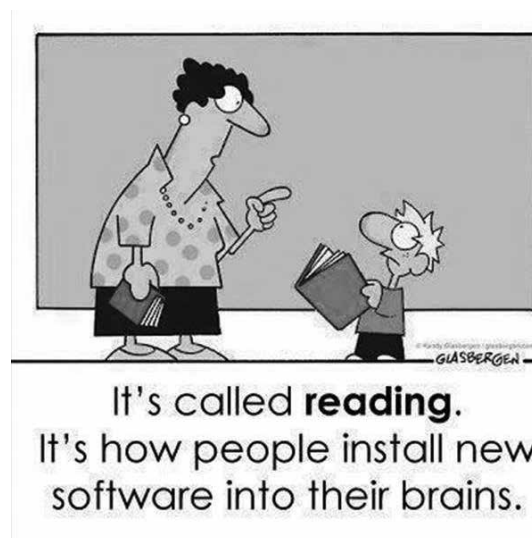
Note: as mentioned above, when I started the project, not all of the books had MReader.org quizzes. To make this set of readers more useful to teachers and students, I added quizzes for those that were missing (with an assist from Jason William, Notre Dame Seishin University, Okayama, Japan, who was in the process of writing quizzes for some books in this series). I think it is a shame that publishers don't automatically take responsibility for adding quizzes. Last year over 83,000 students in 48 countries took over 1.3 million quizzes on MReader. The website was accessed nearly 3 million times. It is huge. Many teachers won't buy readers that don't have MReader quizzes because the quizzes provide evidence that a book has been read and understood. The quizzes form the basis for many teachers' grading. And they are a source of data for people researching Extensive Reading.

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