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Time, texts, and teaching in vocabulary acquisition: A rebuttal to Cobb (2016)

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I provided data (McQuillan, 2016) to show that there is an adequate amount of reading material that can be read at or above 98% vocabulary coverage to provide sufficient input to acquire most of the word families from the 2,000- to the 9,000-word-family levels. Cobb does not dispute these findings, nor present any evidence to counter them. On the substantive issues addressed in my paper, then, we are apparently in agreement.

Cobb's commentary instead focuses on three other points: (a) acquiring vocabulary via free reading takes too long; (b) it will be too difficult for readers to select the right free reading texts to make adequate progress; and (c) some form of 'teaching,' presumably explicit vocabulary instruction, would be more effective and efficient in promoting vocabulary growth than free reading. I'll address each of these critiques in turn.

Time

In his 2007 paper, Cobb set out to determine just how much reading could contribute to English as a Second Language (ESL) vocabulary acquisition. He proposed a thought experiment in which ESL readers would need to acquire the first 3,000 word families to comprehend 'non specialist' reading materials, have "a year or two" to read, engage in free reading, and read a maximum of 179,000 words (p. 41). These conditions, according to Cobb, would "give the free reading argument optimal chances of succeeding" (p. 41). Cobb then presented an analysis of various texts from the Brown corpora (Kucera & Francis, 1979) that appeared to show that, under the conditions he specified, a reader would not in fact be able to acquire the first 3,000 word families through free reading.

McQuillan and Krashen (2008) questioned that only 179,000 words could be read in a 'year or two,' an estimate for which Cobb provided no source or formula. They then calculated what Cobb's estimate would mean in terms of the amount of daily reading an ESL reader would do. The formula was: Number of Words Read = Time Spent Reading * Reading Rate

McQuillan and Krashen assumed that since Cobb specified 'free reading,' the texts read would be ones that readers would likely choose for themselves; that is, ones they had a reasonable chance of understanding and enjoying. In addition, since Cobb did not provide a reading rate for his estimate, they selected studies of ESL readers who, if not always engaged in free reading, were at least reading the kinds of materials appropriate for their current vocabulary level. Many

of these studies included the reading of graded readers since, for beginning readers, these are usually the only ones that can be read independently and provide sufficient opportunity to acquire the most frequently occurring word families (Nation & Ming-Tzu, 1999).

Using a conservative figure from these studies of 100 wpm, they estimated that a reader would only need to read a little over two minutes a day to arrive at 179,000 words in a 'year or two.' Clearly Cobb's 'optimal' assumptions were in fact quite the opposite.

Cobb (2008) responded that the reading rate McQuillan and Krashen used was not appropriate, since the readers he had in mind would *not* be reading texts they could read independently. He instead was apparently hypothesizing about beginning readers reading advanced, adult-level texts – the equivalent of a second-grader picking up a novel by Dickens or Austin. I would argue that is a very peculiar kind of 'free reading,' at least for most readers.

Cobb gave no reason why his hypothetical ESL readers could not first select something easier to read (including some graded reader series which cover the 3,000-word-family level). However, in a paper not cited in Cobb's commentary (Schmitt, Cobb, Horst, & Schmitt, 2015), he and his colleagues stated quite emphatically that beginning readers are forced to leap from graded readers to academic texts because 'natural text' will "in most cases NOT provide unknown words" in a ratio of less than 2% (p. 10, emphasis in the original). In other words, there are no texts for ESL readers *to* read at 98% vocabulary coverage once they get past graded readers. This is incorrect, as I have shown.

In his comment on Nation's paper and mine, Cobb compounds his error by stating that readers using Nation's mid-frequency readers would require six years to reach the vocabulary levels needed for academic texts, and would need three years of reading the sort of texts I analyzed. This is also incorrect.

My calculation of needing three years of reading to go from 2,000 to 9,000 word families is based on *one hour* of reading per day. Someone who reads three to four hours per day could obviously accomplish that feat in one year, not three: ([11,000,000 words/150 wpm]/60 minutes))/365 days = 3.35 hours per day.

Is this 'wishful thinking'? Consider that students often spend more than five hours a day (plus time completing homework) in an Intensive English Program (IEP) and perhaps as many or more per week in so-called 'cram schools' in their home countries prior to arrival. There is certainly time in the day to do more reading, at least if we substitute reading for some current instruction. Perhaps students could skip their afternoon IEP classes (or cram school courses), grab a good book, and head off to the nearest café for a nice long, enjoyable read. Call it the Starbucks® School of Language Acquisition.[1]

Texts

Cobb's main complaint appears to be that ESL readers will be at a loss as to what to read and in what order. He makes much of a single sentence in my discussion section in which I note that it

is not necessary for teachers to match their students 'exactly' to texts via online vocabulary tests or assessments. Instead, I recommended that teachers spend their efforts making sure students have plenty of materials from which to choose.

Contrary to Cobb's commentary, however, forgoing exact matching of a student's vocabulary level to a text does not preclude teacher recommendations or counsel; nor does it mean one's progress must be unplanned or "unaided" (p. 303). Successful extensive reading programs involve a good deal of teacher guidance, including suggestions on books selection and how to choose books, all of which can be very useful in matching readers to texts (e.g., Krashen & Mason, 2015; McQuillan, 1996, 1998; McQuillan, Beckett, Gutierrez, Rippon, Snyder, Wager, & Zajec, 2001; Shin & Krashen, 2008). However, even with such measures, only the individual reader knows his level of interest, background knowledge, and word knowledge relative to a particular text sufficiently to make the decision whether to read a book or not, as Lee (2007) documented.

Reading comprehension (and by extension vocabulary acquisition during reading) depends on more than just the number of known words in the text (Anderson & Freebody, 1981), so it is unlikely that an 'ideal' sequence of books can be determined for any specific reader *a priori* merely by knowing his vocabulary level. My paper presented one optimal path based upon Nation's (2014) analysis – a 'proof of concept' – but it may take more (or fewer) hours of reading when other factors are entered into the equation.

The path that a reader takes to reach 9,000 word families is unlikely to be perfectly linear under any regime, nor does it need to be. Cho and Krashen's (1994) subjects started out reading books that were too difficult in the *Sweet Valley* series, and so moved down in difficulty to the lower level books, working their way back up as their proficiency progressed. Readers will at times pick books 'above' and 'below' their vocabulary level, as Krashen and Mason (2015) pointed out, since their selections (and comprehension) are influenced by a number of other factors. We should not then assume more knowledge than we currently have about readers and texts in an attempt to, in effect, centrally plan the reader's lexical economy. Providing a wide selection of reading materials at a variety of levels is a better pedagogical approach than attempting to match readers precisely to texts on a single variable, even one as important as vocabulary coverage.[2]

Even if students take a less-than-optimal path and require more than 11,000,000 words of reading, the evidence suggests they will often advance as quickly, if not more so, through free reading than being in a traditional ESL program. Mason (2006) reported on a group of Japanese EFL acquirers in the 400- to 500-point range on the TOEFL, all of whom had participated in an extensive reading class. The subjects continued to read on their own for 10-15 weeks, selecting their own texts (graded readers and popular literature) without specific teacher guidance. Mason compared her subjects' progress on the TOEFL to that of students studying in a 13-week, 390-hour IEP, as reported in Swinton (1983). Swinton's subjects made an average gain of 3.2 to 4 points per week on the TOEFL (also in the 400-500 score range), or about .134 points per hour. Mason's subjects did just as well selecting their own texts and reading, gaining 3.51 points per week. Two of her subjects provided data on the amount of reading they completed. Using a formula proposed by Krashen and Mason (2015), I calculate that 'U' gained 1.3 points per hour and Yoko gained 2.05 points per hour–eight and 14 times more, respectively, than the IEP

students.[3]

Krashen and Mason (2015) also found that their case study informants, all adult acquirers, made good progress via free reading on a measure of the TOEIC by reading a variety of popular literature and graded readers, all without any special software or testing. The researchers reported that the number of hours of formal study (vocabulary study and test preparation) by their subjects did not correlate with gains on the TOEIC, but that hours of pleasure reading did (partial correlation $r = .85$, $p<.05$). This is consistent with studies by Constantino, Lee, Cho, and Krashen (1997) and Gradman and Hanania (1991), both of which found that amount of free reading, but not formal study, predicted TOEFL scores. Readers appear to be able to self-select texts well enough to make more progress reading than they do by engaging in formal study, in or out of the classroom.

Cobb offers McCrostie (2007) as evidence that the process of selecting free reading texts will be too difficult for readers to do on their own. McCrostie asked two groups of native English speakers (21 English teachers and 20 undergraduates) to rank words in order of their frequency in English. Both groups did well on identifying words falling in the 0-2000 frequency range, but not so well on mid- and low-frequency words in the 4,000-10,000 range. Fortunately, deciding on what book to read next does not require knowing if 'grammar' appears in English more frequently than 'guitar,' 'salary' more frequently than 'bitter,' or 'sunny' more frequently than 'delighted.'[4] The suitability of a text can be determined by a much simpler method: open a book, start reading it, then decide if you understand it (and enjoy it) sufficiently to continue reading. No knowledge of corpus linguistics is needed.

Teaching

Cobb recommends 'teaching' in place of free reading to promote vocabulary growth, but gives us no details or estimates as to how his (or anyone else's) proposal to teach words would be faster than free reading, even given the narrow time frame (one year) and small number of readers (IEP students) he hypothesizes about.

The case for more teaching is not a strong one if by 'teaching' Cobb means explicit vocabulary instruction. In making their argument for more vocabulary instruction, Laufer (2005) and Schmitt (2008) cite evidence that certain kinds of explicit instruction can yield gains of up to 99% of what is taught (Laufer, 2005, Tables 3 and 4, pp. 239–240). Most of these studies, however, rely on short-term training with word lists and dictionary definitions, forms of vocabulary instruction that have been found to be of limited effectiveness in aiding reading comprehension (Beck, Perfetti, & McKeown, 1982; Mezynski, 1983; Nagy & Herman, 1984; Stahl & Fairbanks, 1986). In fact, it was precisely due to the weakness of these 'shallow' instructional methods that 'rich' vocabulary instruction was first promoted (Beck & McKeown, 1985; Stahl, 1986).[5]

Direct instruction of vocabulary also tends to produce word knowledge that is more fragile than that which is acquired incidentally through reading, with gains fading more quickly over time. This is consistent with other studies on conscious language learning (Krashen, 2003), and

appears especially true for decontextualized instruction or 'focus on forms' (Laufer, 2005). Chun, Choi, and Kim (2012) studied a group of adult English as a Foreign Language (EFL) acquirers who each read five graded readers (one per week) containing a total of 80 target words. Another group was asked to use bilingual word lists to learn 30 new words per week for five weeks, including the target items. No differences in word knowledge were found on an immediate posttest, but on a delayed posttest (translation measure) five weeks later, word retention had dropped 17% in the reading group, but 44% for the bilingual word list group – more than 2.5 times as much (Cohen's $d = 1.35$). Chun et al. also examined word knowledge with an 'event-related potential' (ERP) measure using an EEG (Frishkoff, Perfetti, & Collins-Thompson, 2010). The ERP results confirmed dramatic differences in word retention favoring the reading treatment over direct instruction (Cohen's $d = 1.70$).

Even in very short-term studies in which the target words often appear only once in the reading passage, declines in word knowledge are greater for explicit instruction or 'reading-plus' conditions than for incidental or 'reading-only' conditions. In Kim (2008), for example, the vocabulary scores of students who were told to write an essay using 10 target words declined 22% more from the immediate posttest to the delayed posttest than those who read a glossed passage with the same target words and answered reading comprehension questions (Table 4, p. 302; combined groups). In Rott (2004), the decline in scores from immediate to delayed posttest for the explicit group was more than four times greater than for the incidental group (Table 4, p. 181, "CO" vs. "RO" groups). Similar results favoring the durability of word knowledge gains made via incidental or reading-only conditions versus explicit instruction were reported in Eckerth and Tavakoli (2012); Herman (2003), Hulstijn and Laufer (Dutch group) (2001); Peters, Hulstijn, Sercu, and Lutjeharms (2009); and Pichette, De Serres, and Lafontaine (2011).

More importantly, previous research has also found that in most cases direct vocabulary instruction is a very inefficient use of time compared to simply reading (Krashen, 1989, 2012, 2013; Nagy, Herman, & Anderson, 1985). Further evidence of this is found in Table 1, which lists several short-term studies that used a delayed posttest design to compare an incidental or reading-only vocabulary acquisition condition, such as reading a text with or without target words glossed, to a more explicit condition, such as doing other input or output activities focused on the target words. Note that in most of these studies, the cards were heavily stacked against the non-instructed/incidental condition: target words often appeared only once in the passage, readings were short (as little as a few sentences), the vocabulary coverage for non-target words was not carefully controlled, and the passages were selected by the researcher rather than the reader, often with less-than-captivating topics ('Procrastination,' 'Sleeping').

Table 1: *Time efficiency of incidental/non-instructed versus explicit vocabulary conditions*

Study	N	Condition	Time on Task (Delay in Posttest)	Score (Words Tested)	Gain Per Minute*	Relative Efficiency: Incidental/ Explicit**
Eckerth & Tavakoli (2012)	30	Reading with glossary, RC (Task 1)	90 minutes (3 weeks)	12.6 (30)	.14 wpm	+55%
	30	Reading with glossary, RC, and composition	150 minutes (3 weeks)	14.2 (30)	.09 wpm	

		(Task 3)				
Hulstijn & Laufer (2001)	20 (Dutch)	Reading with glossary, RC (Reading Group)	45 minutes (1 week)	1.3 (10)	.03 wpm	0%
	34 (Dutch)	Composition with target words (Writing Group)	80 minutes (1 week)	2.6 (10)	.03 wpm	
	31 (Hebrew)	Reading with glossary, RC (Reading Group)	45 minutes (2 weeks)	0.4 (10)	.01 wpm	-400%
	41 (Hebrew)	Composition with target words (Writing Group)	80 minutes (2 weeks)	3.7 (10)	.05 wpm	
Kim (2008)	22	Reading with glossary, RC (Task 1)	15-20 minutes (2 weeks)	14.8/50* (10)	.74-.98	0%
	20	Composition with target words (Task 3)	20-30 minutes (2 weeks)	21.05/50* (10)	.70-1.05	
Peters, Hulstijn, Sercu, & Lutjeharms (2009)	54	Reading with glossary, RC (combined groups)	37 minutes (2 weeks)	6.19 (16)	.17 wpm	-6%
	55	Reading with glossary, RC, translation or definition activity (combined groups)	47 minutes (2 weeks)	8.4 (16)	.18 wpm	
Pichette, De Serres, & Lafontaine (2012)	203	Reading, no glossary	5.5 minute (1 week)	.259 (16)	.05	+150%
		Reading, sentence writing	16.5 minutes (1 week)	.317 (16)	.02	
Rott (2004)	36	Reading, no glossary	21 minutes (5-8 weeks)	2.29 (12)	.11	+57%
	36	Reading, sentence writing	33 minutes (5-8 weeks)	2.36 (12)	.07	
Sonbul & Schmitt (2010)	40	Reading, no glossary	5 minutes (immediate)	1.28 (9)	.25 wpm	-24%
	40	Reading, plus definitions	10 minutes (immediate)	3.1 (10)	.31 wpm	

Notes. * See footnote 6. ** Relative Efficiency % = ((Incidental – Explicit)/Incidental) * 100. RC = Reading Comprehension test.

In addition, some studies included in Table 1 reported 'time on task' estimates for an incidental or reading-only instruction condition that included reading a passage with target words *and* reading, puzzling over, and answering a set of reading comprehension questions. In Kim's

(2008) study, the six multiple choice reading comprehension questions were themselves a third as long as the passage that contained the target items (192 words versus 575 words). Hulstijn and Laufer's (2001) subjects read a 621-word passage and then had to answer 10 multiple choice comprehension questions (no word counts provided). In some instances, these questions may not have required students to go back and read the passage, or required only skimming the passage quickly to find the answer. This conflates time 'doing something' during the experimental condition with time on the actual task of reading a passage that contains the words to be acquired.[6]

As seen in Table, 1, despite this worst case scenario for the incidental/non-instructed conditions, they were still more efficient than direct instruction/output conditions in three comparisons (55%, 57%, and 150%), as efficient in two of the comparisons, and nearly so in one other (Peters et al., 2009). Explicit instruction was a clear winner in only two of eight comparisons: Sonbul and Schmitt (2010) (-24%), for which only immediate posttest scores could be compared; and Hulstijn and Laufer's (2001) Hebrew group, who at -400% relative efficiency, was an obvious outlier given the test conditions were identical to those of the Dutch group in the same study for which no efficiency differences were found.

All of the authors of the studies in Table 1 (with the exception of Rott, 2004) concluded that their results supported more explicit vocabulary instruction; none carried out any similar analysis of time efficiency of their own data, the presumed goal of instruction in the first place.

As a practical matter, any finding of 'no difference' between explicit instruction and reading actually favors reading, as Krashen (2004) has pointed out. Reading is much more enjoyable than vocabulary instruction, and requires considerably less work for both the student and the teacher. Moreover, time spent in vocabulary instruction can only result (at best) in more word knowledge. Time spent reading can result in increases in word knowledge, reading speed, writing fluency, spelling competence, grammatical accuracy, and general knowledge, in addition to creating a habit of reading (and further language acquisition) long after students leave the classroom (Krashen, 2004). For teachers and students deciding how to spend their limited instructional time, the choice seems clear.

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Notes

1. Free reading is also much cheaper than most alternatives. Assume the cost of acquiring 8,000 words at our hypothetical 'café school' is $2,200 (220 books with 50,000 words each purchased at $10 per book). The average cost for a year's study in an Intensive English Program at the University of California, Los Angeles is around $22,000 (excluding room and board). If both approaches yielded a gain of 8,000 words, IEP study

would be 10 times more expensive per word acquired ($0.27/word versus. $2.75/word). IEPs may have many benefits, but good value per word acquired is not among them.

2. Carver and Liebert (1995) is a good example of what can go wrong when researchers think they know best when it comes to text selection and sequencing. Their native English-speaking grade-school subjects participated in a summer reading program in which they were first tested to determine their vocabulary size, then not allowed to read any books that fell 'above' their level. Unsurprisingly, the students made no progress in reading during the program.

3. Krashen and Mason's (2015) formula for calculating reading time is: Hours Read = Pages Read * .033. This assumes a reading rate of 150 wpm and 300 words per page.

4. They don't.

5. Huljistin's (2001) recommendation of adding 'spaced repetition' to supplement shallow instructional methods such as bilingual word lists is unlikely to be successful. First, no one seems to know how many repetitions are needed for what kind of words, or at what interval vocabulary instruction repetitions should be spaced (Carpenter, Cepeda, Rohrer, Kang, & Pashler, 2012). As Cepeda, Pashler, Vul, Wixted, and Rohrer (2006) concluded after a meta-analysis of 317 experiments: "After more than a century of research on spacing, much of it motivated by the obvious practical implications of the phenomenon, it is unfortunate that we cannot say with certainty how long [such spacing] should be to optimize long-term retention" (p. 370).

   Second, the results of at least one attempt at spaced repetitions with paired associate learning are not encouraging. Bahrick, Bahrick, Bahrick, and Bahrick (1993) (N=4) found that recalling the meanings of 50 second language words memorized via flash cards to a level of 90% accuracy required at least 23 repetitions, whether spaced at 14-, 28-, or 56-day intervals (Table 2, p. 319). The researchers provide no time estimates as to how long was spent to learn (or relearn) each word, although they do report that during the initial six sessions approximately 18 exposures were needed to 'learn' the word (Figure 1, p. 318). We also do not know how long was taken in the attempts to remember meanings during the subsequent sessions, since even successful 'retrievals' required some time (trying to remember, checking one's guess). If we assume the time for all learning, retrieval, and/or relearning across the 23 sessions to be eight minutes (a total of 35 exposures at 15 seconds each), the gain would be seven words per hour of study. According to Nation's (2014) estimates, reading also yields about seven words per hour from the 3,000- to 8,000-word-family level (6,000 words/868 hours = 6.9 words/hour). Given reading is more pleasurable than staring at flash cards and requires no complex tracking or scheduling system, why would anyone bother with spaced repetition?

6. For several studies, time on task was not clearly specified by the researchers, so some approximations based on the length of the texts and assigned tasks were required. I used a (relatively slow) 50 wpm reading rate for passage reading (see McQuillan & Krashen, 2008).

–Eckerth and Tavakoli (2012): I estimated that reading the three 1,200 word passages and answering the comprehension questions took 90 minutes total, with an additional 60 minutes for the composition task.
–Kim (2008): I estimated 15-20 minutes for actual reading and re-reading of the passage and comprehension questions. Subjects in the writing task, however, would clearly have been focused during most of their 40 minutes on the list of 10 words and definitions, since all 10 words had to be included in their compositions; a range of 20 to 30 minutes was used. Kim's reported gain scores ranged from 10-50.
–Pichette et al. (2012): I used the average task time reported by the researchers of 22 minutes (24 minutes minus 2 minutes for the vocabulary assessment) and the researchers' estimate that the writing task having taken three times as long as the reading task to arrive at each group's time estimates. Their scoring system used syllables rather than whole words.
–Peters et al. (2009): The average task times were provided by researchers, although both times include reading comprehension questions. I used context recall scores in my Table 1 (from their Table 12, p. 136), since they favor the more explicit instruction group. On the isolated recall test, there were no differences in the gains of the combined groups (.08 wpm each; Table 10, p. 134).
–Rott (2004): I estimated 21 minutes to read the 1,072 words total for the three passages and an additional 12 minutes for the composition group to write 12 sentences. Rott's gain scores are an average of her three vocabulary measures (isolated recall, cued recall, and multiple choice; Table 4, p. 181), with a total maximum score of four each.
–Sonbul and Schmitt (2010): Although a one-week delayed posttest was used, the researchers reported that more than half of their subjects re-read the passage at home, making those results impossible to interpret (some recall scores actually increased from immediate to delayed posttest). I therefore used their immediate posttest results, which biases the comparison in favor of 'reading plus' (direct instruction) words. One 700-word passage containing 20 unknown words appearing only once was read in 10 minutes without glosses, followed by explanations of 10 of the target words that "did not exceed one minute" per word (p. 256). I estimated 30 seconds per instructed word, resulting in five minutes for the read-only words (half the total reading time) and 10 minutes for the reading-plus words (five minutes reading plus five minutes instruction). Word retention estimates are based on the average percent gain for all three vocabulary measures (form recall, meaning recall, and meaning recognition) multiplied by the number of words tested. Since recall scores tend to drop more sharply than multiple-choice recognition scores from immediate to delayed posttest for instructed words versus those acquired in incidental conditions (see Rott, 2004), combining the three measures also biases the comparison in favor of the reading-plus words.

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