SECTION B: FORMULAIC LANGUAGE AND PEDAGOGICAL ISSUES

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Experimental and Intervention Studies on Formulaic Sequences in a Second Language

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In this article we review experimental and intervention studies published since 2004 on formulaic sequences in a second language (L2). There is plenty of evidence that learners have a lot to gain from building a sizable repertoire of L2 formulaic sequences language, but formulaicity is an area where learners are known to be slow to close the gap on native speakers. Pedagogical treatments proposed to help close that gap can be divided into three groups: (a) drawing learners' attention to formulaic sequences as they are encountered, (b) stimulating lookups in dictionaries and the use of corpus tools, and (c) helping learners commit particular formulaic sequences to memory. We gauge the efficacy of treatments in these three categories by reviewing the (quasi-) experimental studies that put them to the test, and we refer to Laufer and Hulstijn's involvement load hypothesis to frame the discernible trends. The article concludes by suggesting avenues for much needed further research.

Formulaicity, which we treat in this article as the use of word strings[1] that have become conventionalized in a given language as attested by native-speaker judgment and/or corpus data, is an area where second language (L2) learners only very slowly close the gap on native speakers (e.g., Kuiper, Columbus, & Schmitt, 2009). Several cross-sectional studies have shown that only very advanced learners, typically language majors and/or learners who have benefited from an extended period of immersion in an L2 community, display knowledge of formulaic sequences that resembles that of native speakers (see Laufer & Waldman, 2011 regarding verb-noun collocation and Forsberg, 2010 & Nekrasova, 2009 concerning conventional word sequences in general). In active usage even highly advanced learners may still rely more than native speakers on a relatively narrow range of high-frequency word strings (Durrant & Schmitt, 2009). Longitudinal data confirm that the development of a learner's formulaic sequence repertoire over the course of their L2 language program tends to be slow, even in the case of a program for language majors (see J. Li & Schmitt, 2010 with regard to adjective-noun collocations and Qi & Ding, 2011 concerning conventional sequences generally). In cases where advanced learners do seem to have mastered a repertoire that resembles that of native speakers in

terms of size, this does not necessarily mean their knowledge of the formulaic sequences therein is similar to that of native speakers in terms of depth. For one thing, their intuitions about the commonness of formulaic sequences and about which of their usage patterns are sanctioned are likely to be less reliable (see Siyanova & Schmitt, 2008 about adjective-noun collocations). In addition, advanced learners may have good receptive knowledge of a range of formulaic sequences, but still fail fully to deploy this resource (see Bardovi-Harlig, 2009 on social routine formulae and Siyanova & Schmitt, 2007 on phrasal and prepositional verbs) and resort to non-native-like sequences copied from first language (L1) (concerning collocations, see Laufer & Waldman, 2011; Yamashita & Jiang, 2010).

In this article, we review studies published since 2004[2] that were set up to assess the effectiveness of pedagogical interventions intended to help L2 learners make better progress in their mastery of (types of) formulaic sequences. But before embarking on that review, let us note the respects in which L2 learners can benefit from mastery of formulaic language. We borrow the metaphors *width* and *depth* of knowledge from vocabulary research as umbrella terms under which we can subsume the advantages afforded by knowledge of formulaic sequences. *Width* will be taken to refer to the quantity of L2 formulaic sequences that the learner is familiar with, without specifying how familiar (e.g., learners may recognize a given word string as a recurring sequence, but they may not use it themselves or may not fully appreciate its pragmatic function). *Depth* will be used to refer to the degree of proceduralization of knowledge (Anderson, 1993), as well as to knowledge of the distributional properties of a given formulaic sequence in usage (i.e., how common it is, in what co-texts and contexts it is most likely to occur, and—in case it is a variable expression—what its most common variants are).

In many ways, formulaic sequences fulfill the same functions as single words. Apart from some *lexical bundles* (Biber, Johansson, Leech, Conrad, & Finegan, 1999), such as *one of the*, whose sole hallmark is higher than chance frequency, formulaic sequences are symbolic units that serve particular expressive purposes. Many (e.g., collocations: *blow your nose*, *running water*; and complex verbs: *give up, talk it over*) have primarily a referential or ideational function and thus function as content words do. Others (e.g., exclamations: *What the heck*, *no kidding*, and idioms: *get an even break*, *jump the gun*) are particularly helpful for conveying an evaluative stance. Some ensure smooth social interaction (pragmatic formulae such as *See you later* and *I'm so sorry to hear that*), while others are more like function words serving, for example, to organize discourse (e.g., *on the other hand*, *having said that*). All together they compose a considerable and integral part of one's vocabulary, playing an important part in enabling the comprehension and expression of messages that might otherwise fail to get across.

Vocabulary size has been found to be a strong predictor of general proficiency (Iwashita, Brown, McNamara, & O'Hagan, 2008; Schmitt, Jiang, & Grabe, 2011; Staehr, 2009). It is no wonder then that L2 learners' knowledge of multiword lexis has been found to correlate significantly with proficiency ratings. Keshavarz and Salimi (2007), for example, reported a correlation of $r = .68$ between learners'

performance on a collocations test and their scores on a cloze test intended to gauge general proficiency. Hsu and Chiu (2008) found a correlation of $r = .56$ between learners' collocation test scores and the scores obtained on a narrative speaking task. Boers, Eyckmans, Kappel, Stengers, and Demecheleer (2006) and Stengers, Boers, Housen, and Eyckmans (2010, 2011) report strong associations between the number of formulaic sequences produced by English as a foreign language (EFL) learners during retell tasks and the scores for oral proficiency awarded to them by independent assessors. The correlations were particularly strong (up to $r = .65$) when assessors were asked to focus on the learners' range of expression. In a similar vein, Dai and Ding (2010) report significant correlations (up to $r = .46$) between the numbers of formulaic sequences used by L2 learners in their writing assignments and the marks given for these assignments by independent assessors.

Width of knowledge of formulaic sequences has also been shown to be beneficial for purposes of comprehension. It is well known that many figurative idioms (e.g., *follow suit*) pose comprehension problems even when they are accompanied by ample contextual cues (e.g., Boers, Eyckmans, & Stengers, 2007), and these problems extend beyond the class of expressions one finds in standard idiom dictionaries. Martinez and Murphy (2011) illustrated how lower-intermediate learners may attribute an inappropriate meaning to expressions such as *it's about time*, based on the meanings of the individual words that make them up (i.e., they may construe *about* as a topic marker). Interestingly, learners quite often show little awareness of this: a finding also reported in connection with L2 students' misinterpretations of the metaphorical language used by their university lecturers (Littlemore, Chen, Koester, & Barnden, 2011). Metaphor and phraseology are interconnected, of course, since words that are used in a conventionalized metaphorical sense tend to occur in a narrowly restricted range of word combinations (e.g., when *ride* is used metaphorically it is typically preceded by *bumpy* or *rough*). It is therefore not surprising that learning the phraseological behavior of a polysemous word coincides with learning its range of meanings or functions (e.g., Mueller, 2011 regarding the learning of prepositions, a word class renowned for its polysemy).

Let's now turn from width of knowledge to the advantages of having what may be called deep knowledge of L2 formulaic sequences. When formulaic sequences are well entrenched in memory, co-text is imbued with predictability (e.g., *She helped me through thick and* . . .; *Last but not* . . .; *That's the way the cookie* . . .). This may also work in reverse in a way that enables something partly heard to be reconstructed post facto (e.g., *Did Michael Jackson really [. . .] suicide?*). All this eases processing so that attention can be allocated to parts of the discourse that are less formulaic and therefore less predictable. In fact, one can argue that it is only when a sequence is deeply entrenched in a language user's long-term memory that it qualifies as truly formulaic for that user. Word strings that bring the aforesaid processing advantages to a native speaker may not (yet) do so for learners. Although advanced L2 learners recognize and use many standardized word strings that are formulaic for native speakers, they may not process these strings the same way as native speakers do. A discussion of models of processing of formulaic language is beyond the scope of this

article (but see Schmitt, this volume). Suffice it to say that, according to one influential model (Wray, 2002), native speakers are highly likely to have stored common word sequences holistically, that is, as single unanalyzed chunks (although compositional representations may be retained as well). These chunks can then be retrieved from memory as prefabricated units, thus bypassing the need to assemble the sequences word by word. Adult L2 learners, by contrast, are less likely to have stored conventional word strings holistically. According to this model, the most likely processing benefit that formulaic language confers on a learner is that particular sequences may be encountered often enough that the associations between the component words become so strong that, on meeting or recalling part of the string, the learner will recall the rest. Some researchers of formulaicity do not go as far as to say that formulaic sequences are by definition stored holistically in native speakers' mental lexicons, but hold instead that also in L1 formulaicity is a matter of strength of association and priming effects (Hoey, 2005). Others (e.g., Boers & Lindstromberg, 2009) suspect that learners also process some (types of) multiword units as unanalyzed units—that is, in a manner not essentially different from that characteristic of native speakers according to Wray's (2002) model. A major complication in the theorizing about the psychological status of formulaic sequences is the great diversity in kinds of sequences, some of which intuitively seem more likely to be processed as unitary lexical units (e.g., idioms such as *by and large* and *across the board*, and strong collocations such as *cut corners* and *a narrow escape*) than others (e.g., some of the lexical bundles mechanically extracted from corpus data, such as *is one of the*). Eye-tracking measures of speed of processing during silent reading indeed show evidence that not all kinds of word strings that are prima facie instances of formulaicity offer the same degree of processing ease (Columbus, 2010). Having said that, experiments with native-speaker participants have shown that formulaic word strings of various types are indeed processed significantly faster than nonformulaic controls, with shorter reaction times in lexical decision and grammaticality judgment tasks (Arnon & Snider, 2009; Durrant & Doherty, 2010; Ellis, Frey, & Jalkanen, 2009; Ellis, Simpson-Vlach, & Maynard, 2008; Jiang & Nekrasova, 2007), faster self-paced reading (Conklin & Schmitt, 2008; Millar, 2010; Tremblay, Derwing, Libben, & Westbury, 2011), faster reading aloud of the whole sequence and of the final component (Ellis et al., 2008), and faster silent reading as evidenced by eye-tracking (Columbus, 2010; Siyanova-Chanturia, Conklin, & Schmitt, 2011; Siyanova-Chanturia, Conklin, & van Heuven, 2011; Underwood, Schmitt, & Galpin, 2004). Importantly for the purpose of the present article, when groups of nonnative participants were also involved in these studies, they also processed the formulaic word strings significantly faster than the nonformulaic control strings, although—as expected—overall speed of processing was always slower than in the case of the native speakers (Columbus, 2010; Conklin & Schmitt, 2008; Jiang & Nekrasova, 2007). It is worth mentioning that the nonnative speakers in these studies were (again) advanced learners, usually ones in an immersion context. It stands to reason that, to reap the processing advantages afforded by a formulaic sequence, a learner needs to be quite familiar with it. In that regard, comparisons between the native and nonnative participants' performance in some of the experiments

are revealing of the amount of exposure to the language that is required to reach such a level of familiarity with formulaic sequences that are not very frequent in the input. Ellis et al. (2008) reported how natives' speed in processing formulaic sequences is positively influenced by the strength of the association between the component words (represented in corpus linguistics by mutual information, or MI, scores) rather than by the frequency of occurrence of the sequences per se. Ellis et al. suggested that native speakers have had plenty of opportunity to meet and use even relatively low-frequency multiword units so that the effect of frequency on learning has reached a ceiling. It is then the closeness of the bond between words and the distinctive semantic function of this bond (as in *peer pressure*, *pay tribute to*) that will give some word strings an edge over others (e.g., *the way in which*) in speed-of-processing experiments. Most nonnatives, on the other hand, will have encountered the lower-frequency but strongly bonded word combinations insufficiently often for these to be firmly established in memory as proceduralized knowledge. Instead, learners' performance in these experiments shows a processing advantage first and foremost for high-frequency strings regardless of their MI scores. The difference between natives' and nonnatives' opportunities for familiarization, through exposure, with not-so-frequent conventionalized expressions helps to explain the finding reported in an eye-tracking study by Siyanova-Chanturia, Conklin, and Schmitt (2011) that learners—in contrast to native speakers—do not seem to process idioms (e.g., *It rings a bell*) faster than nonformulaic controls (e.g., *Ring the bell*). Although these idioms were supposedly known, they were probably not yet sufficiently entrenched in the learners' lexicons to fulfill their potential as unanalyzed units.

A complementary explanation may lie in the figurative nature of the idioms. Native speakers process idioms fast (Tabossi, Fanari, & Wolf, 2009) because they map these word strings directly onto their nonliteral, idiomatic meaning: For native speakers, after all, the idiomatic meaning is the most salient meaning of these word strings in their considerable experience with the language (Giora, 1997; Laurent, Denhières, Passerieux, Iakimova, & Hardy-Baylé, 2005). That is, natives naturally bypass a full compositional, literal interpretation of the word string (but see Kuiper, Van Egmond, Kempen, & Sprenger, 2007; Sprenger, Levelt, & Kempen, 2006). A cross-modal priming study by Cieslicka (2006) found that learners, though, do not tend to bypass direct activation of the literal meaning(s) of component words, the evidence being that the idioms prime visual targets related to a literal interpretation. If, then, learners activate extraneous imagery associated with the literal meaning of the words contained in an idiom, as is likely if these individual words are directly activated, processing speed seems certain to be reduced.

So far, we have looked at evidence of a processing advantage afforded by formulaic language at the receiving end: receptive fluency. It has also been proposed that formulaicity facilitates fluency in language production (e.g., Bybee, 2002; Kuiper, 1996; Skehan, 1998). Evidence that formulaic sequences help language learners come across as fluent speakers is reported in the aforementioned studies by Boers, Eyckmans, Kappel et al. (2006) and Stengers et al. (2010, 2011), in which students' recourse to formulaic sequences in L2 narratives was

positively correlated with their proficiency ratings in general and with scores awarded for fluency in particular (up to $r = .60$) (But see Eyckmans, 2007 for a study where the association between speech fluency and the use of formulaic sequences reached only $r = .35$). A caveat worth mentioning is that these studies relied on impressionistic fluency ratings. Confirmatory evidence of the contribution of formulaic sequences to L2 oral fluency in narratives is reported in Wood (2006, 2010), though, a study that used objectively measurable phenomena to capture fluency, such as speech rate, frequency of pauses and length of runs (i.e., uninterrupted speech between pauses). Wood's identification of formulaic sequences differed in two important ways from the procedure used in the aforementioned studies, however. First, one of the guidelines stipulated for inclusion as formulaic in Wood's study was phonological coherence, that is, fluent production of the word string, which inevitably introduces some circularity in the conclusion that formulaic sequences contribute to fluency. Second, there was no necessity for the word strings to correspond to native-speaker phrasing. As a consequence, *make a dream*, for example, while not a native-like collocation, would have been counted as formulaic if it seemed to be processed as such by the learner. According to data reported by Stengers et al. (2011), inaccuracies in learners' use of formulaic sequences exert a nonnegligible negative influence on their oral proficiency scores (also see Millar, 2010 on the impact of malformed collocations).

To sum up so far, there is a growing body of evidence to suggest that L2 learners can greatly benefit from mastering formulaic language. However, the learning challenge is daunting: In order to reap the full benefits of formulaicity learners must achieve both breadth *and* depth of knowledge. In what follows, we review studies in which pedagogical interventions for helping learners meet that challenge are put to the test.

INTERVENTION STUDIES

Awareness-Raising and Attention-Directing

Classroom time is clearly too limited to explicitly teach more than a fraction of the vast number of formulaic word strings in a language. Some pedagogues, such as Lewis (1993), have therefore recommended devoting class time to activities that raise the learners' awareness of the ubiquity of formulaic language rather than spending time on the direct teaching of particular sequences. In this view, it is hoped that an enhanced awareness of formulaicity will foster independent learning because the learners will be more inclined to notice formulaic sequences in the samples of L2 they engage with outside the language classroom. In addition, it is hoped that learners will be more attentive to information about the syntagmatic behavior of words they look up in a dictionary. This is reminiscent of the recommendation in L2 vocabulary learning more generally that, after learners have acquired the highest utility words, classroom activities should shift to equipping learners with strategies that may help them learn the bulk of vocabulary independently (Nation, 2001). One classroom activity intended to

foster awareness of formulaic language is that of chunking texts (Lewis, 1997). This involves asking students to highlight or underline word strings in an authentic text that they consider to be multiword units (e.g., strong collocations). Their selections are subsequently compared to those of peers or checked against the teacher's selection. Alternatively, dictionaries or online sources (e.g., concordance tools or search engines such as Google) can be resorted to in order to verify the chunk status of selected word strings.

The effect of awareness raising through text chunking was investigated in Boers, Eyckmans, Kappel, et al. (2006). Text chunking was a regular activity in the course of a school year for one group of advanced adult EFL learners, while a comparison group engaged in other activities with the same texts. At the end of the course all the students were asked to orally retell the content of a new English text. Significantly more formulaic sequences were found in the narratives produced by the students in the chunking treatment group. However, this was because these students recycled more word strings verbatim from the new text (while the comparison group tended to incorporate just single words from the text into their retelling). Stengers et al. (2010) repeated the experiment with new cohorts of language majors (one cohort of advanced EFL learners and one of advanced learners of Spanish). To avoid the possibility of recycling language verbatim from the input text for the L2 retell task, they used an input text in the students' L1. Pretest–posttest comparisons revealed no evidence of any differential uptake of formulaic sequences between the groups which had regularly engaged in text chunking and those which had not. In an earlier study, Jones and Haywood (2004) applied a wider range of techniques to raise their English for academic purposes (EAP) students' awareness of formulaic language, including the highlighting of sequences in texts, discussing their usefulness for EAP writing, using concordance lines to investigate their usage patterns, and the recycling of the encountered sequences in students' own writing tasks. These were regular activities over a 10-week trimester. At the end of the trimester, the students who had engaged in these activities showed evidence of a greater awareness of formulaicity than a control group. For example, when asked to underline vocabulary in a new text that they would advise other students to learn, they underlined more word strings rather than single words than did their control peers. The effect of the course on the students' retention of formulaic sequences was unclear, however. Their end-of-course essays did not contain more formulaic sequences than those written by the control group, for example.

One possible explanation for the lack of attested surplus learning of formulaic language as a result of awareness raising is that taking notice of a given word sequence just once or twice is hardly enough to leave durable memory traces. Indeed, this is what has repeatedly been found in investigations concerning the uptake of single words (e.g., Laufer, 2005 [for a review]; Waring & Takaki, 2003). By the time a given sequence is re-encountered, so much time may have passed that any memory trace left by the previous encounter has faded away before it can be consolidated by the new encounter. Not only does the sporadic nature of encounters with a given formulaic sequence hamper the formation of durable memory traces, it must make it hard for learners to autonomously

recognize whether a given word sequence qualifies as a formula in the first place. Eyckmans, Boers, and Stengers (2007) asked advanced EFL learners who had practiced text chunking for a school year to underline formulaic sequences in a new text. As in Jones and Haywood's report (2004), these learners were found to underline significantly more segments of the text than did peers whose awareness of formulaicity had not been enhanced through chunking activities. This suggests that the awareness raising made the learners more appreciative of the syntagmatic dimension of language, which is an encouraging finding. However, when these learners' selections of sequences were compared with those of four native speakers, it turned out the learners had underlined many segments of the text that none of the native speakers had considered formulaic. In order to identify a word sequence as a recurring one, a learner obviously needs to have encountered (and taken notice of) this sequence a couple of times before, at least. Given that formulaic sequences tend to be relatively infrequent, with a great many occurring not more than once per million running words (e.g., Moon, 1992), this requirement for independent learner uptake is not easily met.

One potential solution to this problem is to manipulate the input so that selected formulaic sequences are typographically enhanced (e.g., underlined). However, the effect on incidental vocabulary acquisition of such textual enhancement has not been firmly established. A recent study by Petchka (2010), for instance, revealed no difference in participants' retention of words encountered in texts with or without enhancement. Regarding formulaic sequences, Bishop (2004) showed that visual enhancement at least stimulates learners to seek glosses about these sequences, which is a sign that they have taken notice of them. This was confirmed by Gürsoy (2008), in a partial replication of Bishop's study. Neither investigated participants' retention of the target sequences, however.

The effect on retention of typographic enhancement and of glossing was the object of a recent study by Peters (2012), which found that L2 students were better able to recollect glossed formulaic sequences from reading when these sequences were typologically enhanced (underlined and in bold font) in the text. The students in Peters's study had been informed that a vocabulary posttest would follow, though, which distinguishes this study from the other studies reviewed in this section (which are concerned with more incidental uptake of formulaic sequences). It is conceivable that the students made more of an effort to remember the highlighted items in the text than those which were not highlighted (even though both sets were glossed), because they assumed the former were the most likely targets for testing. We mention Peters's (2012) study here, because it also happens to corroborate the above thesis that L2 learners are not likely to autonomously recognize or attend to formulaic sequences in a text beyond the ones pointed out to them by the teacher or materials writer. As part of their preparation for the vocabulary test, participants were asked to copy words and phrases from the text that they felt merited attention. Despite being briefed about the importance of formulaic language, students tended to write down unfamiliar single words rather than the complete formulaic sequence in which these words appeared. Formulaic sequences consisting entirely of familiar words seemed to attract very little attention.

Another means that has been proposed for stimulating independent learner uptake of formulaic sequences is flooding the input, or ensuring that the same sequence recurs several times in a relatively short stretch of discourse. In a recent study of uptake from reading while listening, Webb, Newton, and Chang (in press) incorporated 18 verb-noun collocations (e.g., *meet a demand*; *run a risk*; *raise questions*) in a graded reader and created four versions, differing in the number of times each of the collocations occurred: just once, five times, 10 times, and 15 times. Intermediate level EFL learners were randomly assigned to read one of the four versions of the story while listening to a recording of it, which took about 35 minutes. The participants' retention of the target collocations was measured by unannounced immediate posttests. As expected, the more often a collocation was encountered, the better the chances of it being recalled in the posttests, with receptive knowledge tests generating better scores than productive ones. Rather disconcertingly, however, as many as 15 encounters in such a short span of time still did not guarantee full scores on any of the posttests. For example, after 15 encounters, collocations were correctly recalled only half of the time in the L1-cued productive knowledge test. After 10 encounters, the success rate on this test was about 30 percent. Learners who met the collocations just once in the text did not obtain better posttest scores than control participants (who had not read the text). Although the study certainly shows that recurring collocations can be acquired from reading (while listening), it offers little ground for optimism about the pace of collocation uptake as a by-product of reading authentic texts.

Collocations may be more likely to leave memory traces if the learner's attention is not allocated primarily to the content of a text. Durrant and Schmitt (2010) presented adult ESL (English as a second language) learners with a series of decontextualized sentences containing adjective-noun pairs (e.g., *excellent drink*), which the participants were simply asked to read aloud. In an unannounced immediate posttest the participants were presented with the adjectives again (e.g., *excellent*) and asked to supply the nouns they associated with them. The first two letters of the nouns were given as well as dashes to indicate the number of missing letters (e.g., *dr_ _ _*). The participants were exposed to the target collocations in the read-aloud stage either once or twice. Two exposures enabled participants to recall the associated noun in five out of 10 posttest items. Even one exposure was found sufficient to yield a higher than chance success rate (3 out of 10) in this experiment. This success rate must be interpreted with caution, though, given the small number of target collocations and the relatively easy test format. Webb and Kagimoto (2009) asked EFL learners to either read three example sentences containing the same verb-noun collocation (e.g., *sit exams*; presented in bold font) or copy the same collocation three times in gapped sentences. L1 translations were provided. The participants' retention of the 24 collocations they had practiced was measured in unannounced immediate posttests. No overall difference in effectiveness between the two learning conditions (reading vs. copying) was found. The mean score on the more demanding test of recollecting the full collocations (cued by their L1 translations) was 29 percent, which is less encouraging than Durrant and Schmitt's (2010) findings.

Stimulating Lookups to Foster Learner Autonomy

One much discussed aspect of learner autonomy is effective use of dictionaries, either to find or to verify the meaning of an item or to find information about its usage patterns. As to meaning, though, many formulaic sentences may seem so transparent that a learner feels no need to look them up. Even if the learner does consult a dictionary about them, retention of the target item is by no means guaranteed. According to research on single words, it typically takes several lookups of the same word for it to leave a durable memory trace, and the correlation between number of lookups and rate of vocabulary retention that one would expect is mitigated by many variables (e.g., De Ridder, 2002; Peters, Hulstijn, Sercu, & Lutjeharms, 2009). Moreover, dictionary users are not always successful at finding the desired information in the first place. Information about the collocational behavior of words may not be easy to retrieve from general purpose dictionaries, and even consultation of specialized phrase dictionaries does not always yield the appropriate information. Komuro (2009) asked EFL students to consult the *Oxford Collocations Dictionary for Students of English* (Lea, Crowther, & Dignen, 2002) in order to complete blanks in English sentences where a collocate was missing (L1 translations were provided as extra cues). On average the students produced acceptable collocates in only 60 percent of the test sentences. Komuro suggested that this was due to the choices the learner still needed to make when different collocates were listed under separate meanings and part-of-speech subheadings of the query word.

Adding the question whether lookups lead to retention, Laufer (2011) gave EFL learners the task of providing the missing collocates in sentences (e.g., *You are dreaming and not ____ attention to what I'm saying*) accompanied by an L1 translation as extra cue. After a first attempt at this task, which served as a pretest, paper copies of the relevant entries from several monolingual and bilingual dictionaries were handed out. Students were asked to do the completion task again and also to indicate on their response sheets whether they had consulted the dictionary entries and, if so, where they had found the desired information. Despite the availability of dictionary information, fewer than 40 percent of the blanks in the exercise were filled in with the correct collocation. Retention was tested 1 week later, when the students were given an unannounced posttest which required them to provide the English collocations in response to L1 equivalents. The mean score (about 25%) was only marginally better than the mean score on the pretest. To some extent the low learning gains can be explained by the fact the students did not consult the dictionary information consistently. However, of the instances where students did report finding the desired information in one or the other dictionary, many actually coincided with a wrong answer in the exercise.

The nature of the source of lexicological information is also likely to play a part. Dziemianko (2010) investigated whether lookups in paper and electronic dictionaries lead with equal likelihood to retention. Participants first took a pen-and-paper pretest to establish the extent to which they knew 18 target expressions. When the test was readministered, the participants were asked to consult the *Collins COBUILD Advanced Learner's English Dictionary* (*CCAD,* 2008);

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30 participants used the paper version and 34 used the e-version. Two weeks later, unannounced, the participants were given the test again, without recourse to the dictionary. On both the second and the (delayed) third administration of the test, the participants who had used the e-version of the dictionary answered significantly more items correctly. However, when Dziemianko (2011) replicated this experiment with paper and e-versions of a different dictionary, the *Longman Dictionary of Contemporary English* (*LDOCE,* 2009), she found no significant difference in how well the two versions enabled participants to retain knowledge. She observed that the e-version of the *LDOCE* is much more cluttered than the *CCAD* with multicolored widgets, banners, animations, and so on, and speculated that this clutter may have distracted participants from the lexicographic information.

Dictionaries are not the only source of information about collocation, of course. It has been suggested that learners benefit from seeking direct corpus evidence of the collocational behavior of words (e.g., Tribble & Jones, 1997); for instance, they can gain an impression of the conventionality of a given word string by checking whether it is used reasonably often. Such an impression can be obtained by using the search function of online corpora (e.g., the British National Corpus) and even by using a web browser (e.g., Google): (e.g., Boers & Lindstromberg, 2009: 57–59). This is an easy way of testing the hypothesis that a certain word combination is formulaic, but it is perhaps less efficient as a way of finding the strongest collocate(s) of a word. Wu, Witten, and Franken (2010) created a corpus and web-derived bank of word sequences (of up to five words) and a sophisticated search program to identify collocates of query words. As part of their validation of the design, they asked nine ESL students to use the program to try and correct malformed collocations in an essay they had recently written. The students first received two hours of instruction on how to navigate through the digital library. The actual error-correction exercise itself also took two hours. The volunteers' lookups helped them replace 67 percent of the malformed collocations with native-like ones. A posttest to measure the impact on retention of those lookups was not included in their study, however, but gauging the effect on retention was part of an earlier study by Chan and Liou (2005), who incorporated a concordancer in online EFL practice units on verb-noun collocations (e.g., *convene a meeting*). The learners were pretested and posttested on their knowledge of the target collocations by means of a 36-item completion exercise. The first letter of the missing collocate was given. The learners gained on average nine test items between the pretest and posttest. When they were tested again more than two months later, that gain shrank to five items. The overall effectiveness of the learning tool is hard to evaluate because the learners also improved their scores significantly on test items which they had not practiced in the units.

Stimulating Retention

In the intervention studies we have reviewed so far, participants were presented with opportunities for the learning of various kinds of formulaic sequences, but the learning—when it occurred—can be said to have been incidental in the sense that the participants were not explicitly told to try to commit the target phrases

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to memory. Neither were they told a test would follow (cf. Hulstijn's [2001] distinction between incidental and intentional learning conditions). This does not, of course, preclude the possibility that in many cases the participants did suspect that a test would follow, especially when a pretest alerted them to this possibility. However, in the first couple of studies we look at next the participants were explicitly prompted to try to remember particular vocabulary items.

Peters (2009) had advanced EFL learners (language majors in tertiary education) read a text (2,100 words) with 78 glosses in the margin that explained the meaning of underlined words (e.g., *notorious*) and underlined collocations (e.g., *hold a grudge*). All the students were told a test (L1–L2 translations) would follow on the vocabulary contained in the text. One of two groups was explicitly warned that the test would be on both words and collocations. Students were given 40 minutes to read the text and study its vocabulary. Both groups gained significantly between the pretest and posttest (a mean gain of 68 percent, which is substantial given the high number of lexical items the students were stimulated to attend to in a short span of study time). No difference was found between the two groups' gains. Presumably both groups paid equal attention to collocations during the study time. After all, the pretest contained test items on collocations, and collocations were presented as worthy of attention through the underlining. A partial replication is reported in Peters (2012), which has already been mentioned here in connection with the positive effect of typographical enhancement of formulaic sequences in reading materials. The students who had been instructed to attend to formulaic sequences in addition to words did not outperform the comparison group in this study either.

Webb and Kagimoto (2011) asked EFL learners to deliberately learn sets of unfamiliar adjective-noun collocations accompanied by their L1 translations. The sets consisted of 12 collocations, and the learners were given three minutes' study time per set, followed immediately by a productive recall test (cued by the L1 translations). The test scores were highest (almost at the ceiling) when the choice among collocates was limited, that is, when several collocations in the same set had the same adjective (e.g., *deep respect*, *deep sleep*, *deep voice*, and *black sheep*, *black market*, *black eye*). This is unsurprising since the participants had few words to remember. In contrast, a set of collocations all made up of different words, including semantically related adjectives (e.g., *narrow escape* and *slim chance*; *tall order* and *high spirits*) generated the poorest posttest score. This shows that the presence of semantically related words in a set of expressions to be learned adds to the learning burden, a phenomenon reported many times before in relation to single words (Erten & Tekin, 2008; Finkbeiner & Nicol, 2003; Tinkham, 1997; Waring, 1997), and which Webb and Kagimoto's (2011) data now confirm also plays a part in the learning of collocations.

One might suspect that memorizing formulaic sequences that contain new words is more demanding than memorizing the new words separately. Studies by Hsu (2010) and Kasahara (2011), however, show that collocation learning fosters recall of a new word contained in the collocation at least as well as learning the new word as a single item. In fact, once the collocation is learned, the word which was already familiar (e.g., *memory*) can serve as a cue for the recall of its newly learned syntagmatic partner (e.g., *lapse*).

In the aforementioned studies the participants were prompted to learn vocabulary as well as they could, but they were essentially left to their own devices as to how they could make the vocabulary stick in their memories. In the studies that follow, no posttest was announced in advance, but the learners in experimental groups were guided to engage in particular kinds of cognitive processing believed to aid retention. The pathway for cognitive engagement with L2 English collocations opted for by Laufer and Girsai (2008) was contrastive analysis and translation, a choice motivated by the observation that the majority of collocational errors made by learners are due to L1 interference (e.g., Nesselhauf, 2005). Three groups of EFL students read a text containing 10 single words (e.g., *relish*) and 10 collocations (e.g., *hit the headlines*), which pretesting had shown to be unknown to them. The meaning of the unfamiliar vocabulary was clarified to the students. The next stage of work differed across the three groups. One group was asked to discuss the contents of the text and to debate a moral issue it raised. The second group focused on the meaning and the form of the target vocabulary contained in the text via multiple-choice exercises and completion exercises, respectively. The third group, the contrastive analysis group, engaged with the target vocabulary through translation exercises, from L2 to L1 and vice versa. One day after the treatment, all the learners were given an unannounced posttest where they were required to explain the meaning and reproduce the form of the target words and collocations, prompted by the translation equivalents. One week later, a delayed posttest was administered. The contrastive analysis group outperformed both other groups significantly in both tests (mean passive recall of the collocations in the delayed posttest: 8.7/10; active recall: 6.1/10). As expected, the group which had not done vocabulary-focused exercises obtained the lowest scores. The authors conclude that a particular type of vocabulary-focused engagement, that is, comparing and contrasting with L1, seems particularly apt for collocation learning. It should be conceded, though, that the choice of posttest format—producing translations—may have given an edge to the group who had learned the items through a translation route.

Boers and Lindstromberg (2005) and Lindstromberg and Boers (2008a, 2008b) investigated the potential mnemonic benefits of drawing learners' attention to sound repetition commonly manifested in formulaic sequences, namely, alliteration (e.g., *play a part*), rhyme (e.g., *wear and tear*), and assonance (e.g., *turn a blind eye to*). For example, in Lindstromberg and Boers (2008a), EFL learners dictated to their partners 26 two-word collocations shown on jumbled slips of paper; 13 of these collocations were alliterative (e.g., *good guess*), and 13 showed no similarly salient pattern of sound repetition. The 25 learners (university language majors familiar with alliteration) were then asked individually to sort the collocations into one alliterative and one nonalliterative set. An immediate explicit free recall test was administered. Scores showed that the alliterative collocations were recalled significantly better than the controls. A delayed recognition test (with 26 distracters) was administered two weeks later. Again, the stimulus collocations that showed alliteration were remembered significantly better than the nonalliterative controls. Lindstromberg and Boers (2008b) reported a methodologically identical experiment in which they found that assonant collocations were significantly better recalled on both tests than matched nonassonant controls. The

whole procedure of dictating, writing, and sorting the stimuli phrases in the learning stage of these experiments involved a substantial amount of structural elaboration, that is, mental operation focusing on the form of the words (e.g., Barcroft, 2002). Moreover, the participants were explicitly asked to attend to the sound pattern of interest. The attested comparative mnemonic advantage of alliteration and assonance in these experiments may therefore have been task-induced rather than being intrinsic to the stimuli phrases as such. In part to address this issue, Boers, Lindstromberg, and Eyckmans (2012) conducted an experiment in which the participants merely orally repeated and then wrote a series of alliterative word pairs (e.g., *private property*) and matched nonalliterative controls (e.g., *private collection*), without being overtly alerted to the presence of alliteration in some of the stimuli phrases. An unannounced free recall test still showed a significant mnemonic advantage for the alliterative stimuli. It does not seem to take much to unlock the mnemonic potential of salient sound patterns, and stimulating students' engagement with those patterns in the formulaic sequences they encounter is a small but worthwhile per-item expenditure of time. Moreover, there is compelling statistical evidence that sound repetition plays a significant part in the bonding between words and the formation of formulaic sequences generally (Boers & Lindstromberg, 2009; Gries, 2011).

A mnemonic potential that has been explored more than that of sound repetition is the imageability of certain types of formulaic sequences, most notably figurative idioms. Steinel, Hulstijn, and Steinel (2007) showed that idioms that call up a mental picture relatively often (e.g., *stick to your guns*) were better retained in an L1–L2 paired associates learning experiment than idioms which evoke an image less readily (e.g., *hang fire*). This finding is in accordance with the dual coding hypothesis (Paivio, 1986; Sadoski, 2005), which holds that concrete vocabulary is easier to remember than abstract vocabulary, and with findings that concreteness is strongly associated with imageability (see, e.g., Hamilton & Rajaram, 2001). Dual coding, or the use of mental imagery, is at the heart of pedagogic approaches to idioms inspired by ideas from the school of thought known as cognitive semantics (e.g., Lakoff, 1987; Boers and Lindstromberg, 2005). What these approaches have in common is that they endeavor to increase the imageability of idioms by showing learners how groups of expressions instantiate general metaphor themes (e.g., *blowing off steam* and *adding fuel to the fire* instantiate ANGER IS HEAT) or share a domain of origin (e.g., *being on the ropes* and *throwing in the towel* have a shared origin in the domain of boxing), or simply by pointing out the literal meaning of a figuratively used word (e.g., *snap* in a *snap decision*). In addition to verbal explanations that stimulate mental imagery, intervention studies informed by cognitive semantics will often involve use of mime, drawings, or pictures. Given that a detailed review of this branch of intervention studies is available elsewhere (Boers, 2011, 2012), we will only give a brief synopsis here.

Beréndi, Csábi, and Kövecses (2008) and T. F. Li (2009) confirmed earlier findings (e.g., Boers, 2000) that grouping sets of idioms under metaphor themes helps retention. It is important to note that this kind of grouping relates to the vehicle of the metaphor (e.g., heat), not to the topic that the metaphor is used to describe (e.g., anger). A study by Zyzik (2011) suggests that grouping of idioms

by topic is not particularly conducive to retention. Grouping idioms simply by the verb they happen to have in common generated the same posttreatment recall rates in Zyzik's study. Resuscitating the literal reading of an idiom—as recommended by cognitive semanticists in line with dual coding theory—seems more beneficial for retention. Boers, Demecheleer, and Eyckmans (2004) reported on an experiment in which informing one group of learners only of the original, literal meaning of idioms helped these learners obtain significantly higher scores on a completion test than another group who had been informed of the idiomatic meanings but not the literal origins. Research in this branch has meanwhile turned to the comparison of learning outcomes under variants of the approach (e.g., Boers et al., 2007; Skoufaki, 2008) and to the influence of learner profiles (such as cognitive style and cultural background) on their effectiveness (e.g., Boers, Eyckmans, & Stengers, 2006; Hu & Fong, 2010). One of the areas of debate is whether imagery processing benefits retention of the form of the idioms (i.e., the precise lexical makeup of the expressions) as well as it does retention of their meaning (Boers, Lindstromberg, Littlemore, Stengers, & Eyckmans, 2008). On the downside, Boers, Piquer Píriz, Stengers, and Eyckmans (2009) reported data suggesting that the presence of pictures may distract learners from paying sufficient attention to the form of hitherto unfamiliar words (cf. Samuels, 1970 on such effects regarding children's picture books and Carpenter & Olson, 2012 on the pitfalls of overreliance on pictures as a mnemonic aid for learning new words in an L2). On the upside, Szczepaniak and Lew (2011) reported a highly positive role for pictures as an aid in retaining not only the meaning of idioms but also the word forms needed in idiom completion tests—as long, at least, as the form of those individual component words was already familiar to the learners.

Cognitive semantics has also inspired proposals for the teaching of prepositional and phrasal verbs through imagery. It has been argued that these verbs reflect metaphors such as GOOD IS UP (e.g., *cheer up; live up to high expectations*) and KNOWN IS OUT (e.g., *find out; figure out*), and that revealing to learners this nonarbitrary dimension in the choice of particle in phrasal and prepositional verbs will be helpful for them. The collective evidence for the effectiveness of a cognitive semantic approach to teaching phrasal and prepositional verbs—although generally positive—seems less strong, however, than that concerning figurative idioms (Boers, 2000; Condon, 2008; Kövecses & Szabó, 1996; Yasuda, 2010). Perhaps this is due to the obvious fact that a given preposition (e.g., *up*) rarely if ever instantiates just one metaphor. For example, *up* in *put up with* does not express the GOOD IS UP metaphor, and *out* in *knocked out* does not instantiate the KNOWN IS OUT metaphor. Also, the mental imagery evoked by pointing out these rather schematic orientational metaphors is perhaps less vivid—and less memorable—than the imagery evoked by a literal reading of an idiom such as *blow the whistle on someone*.

All the intervention studies we have reviewed so far are concerned with adding formulaic sequences of diverse types to learners' lexicons. In particular, they are concerned first and foremost with increasing learners' width of knowledge of formulaic sequences. Only a couple of studies have investigated ways of fostering depth of knowledge of formulaic sequences, in the sense of fostering an appreciation of the usage patterns and usage restrictions of the

items. Lindstromberg and Boers (2005) showed that a deep understanding of the literal meanings of action verbs (e.g., *hurl stones at the police*) helps learners appreciate the connotations attached to their figurative uses (e.g., *hurl accusations at someone*). Boers et al. (2007) reported that informing learners of the source domain of some idioms (e.g., *break ranks* from warfare; *lose your shirt* from games) helped them improve their intuitions about the level of (in)formality of the expressions.

Intervention studies of ways of fostering the other aspect of depth of knowledge of formulaic sequences, namely, proceduralization (for the sake of fluency), are rare as well. De Jong and Perfetti (2011) showed the usefulness of task repetition for fluency development but did not focus on the role of formulaic sequences. Wood (2009) described a case study with one ESL learner whom he coached intensively through a variety of speaking activities in which formulaic sequences were reiterated, resulting in a notable improvement of the learner's oral fluency. Wray and Fitzpatrick (2010) asked ESL learners to anticipate the formulaic sequences that would be useful in a particular conversational context with a native speaker and to learn these models by heart through rehearsal. When the actual conversations with native speakers took place, the memorized sequences proved useful, but under the exigencies of the actual encounter (such as unexpected turns in the conversation), the learners sometimes failed to produce the models accurately or even to produce them at all. Yu (2009), targeting just one formulaic sequence, *despite the fact (that)*, reported that rote memorization was more effective than syntactic analysis (informing students that *despite* is followed by a noun phrase) in engendering proceduralized knowledge of this sequence.

Finally, one may hypothesize that verbatim memorization of relatively long stretches of text will help entrenchment in memory of the formulaic sequences therein (or rather, that memorized text segments will serve as formulas for the learner). Verbatim text memorization was shown to be quite effective by Wray (2004), who described how an absolute beginner managed to memorize enough L2 monologue in just one week to enable her to present a cooking program on TV. In a larger-scale study, Dai and Ding (2010) had one group of EFL students memorize texts (e.g., through verbatim recitation) during daily independent study time in the course of a school term. Another group used their study time to work with the English texts as they saw fit. The former group's use of formulaic sequences in end-of-term writing assignments was found to be more varied and more accurate than the latter's.

DISCUSSION

In light of the ubiquity and multifaceted nature of formulaicity, the collection of intervention studies on L2 formulaic sequences that we have reviewed is small, and it is not surprising that the studies vary widely in terms of precise research questions, the profile of the participants, the kinds of formulaic sequences targeted, and chosen research methods and instruments. The unique mix of ingredients in each study makes it difficult to form legitimate comparisons

of the pedagogical significance of the interventions they describe. What follows is, necessarily, impressionistic; but we nevertheless think some trends can be discerned, and by and large, these trends parallel those found in the much larger body of research on the learning of single words.

First, learners' uptake of formulaic sequences as a by-product of message-oriented activities alone is an incremental process that typically requires multiple encounters with the same items; it is therefore strongly contingent upon the frequency of occurrence of the items in the input. Attention directing may be expected to speed up learning, but we have found little evidence in this collection of intervention studies to suggest that merely raising learners' awareness about formulaic sequences is a particularly powerful accelerator. The intentional learning of formulaic sequences, instigated either because a test has been announced or through the process of doing vocabulary-focused exercises, seems to generate more robust learning rates. These rates are influenced by many variables, however, including characteristics of the formulaic sequences targeted (e.g., highly imageable idioms are remembered more easily, as in Steinel, Hulstijn, & Steinel, 2007; as are idioms made up of familiar words, as in Zyzik, 2011), the composition of the input (e.g., the co-presentation of confusable items impedes learning, as in Webb & Kagimoto, 2011), and the kind of cognitive processing stimulated by the instruction (e.g., contrasting L2 with L1 provides one such pathway for engagement, as in Laufer & Girsai, 2008). The second trend we can discern in the collection of studies is that fostering learner autonomy by providing sources of information such as collocation dictionaries and concordance data, and equipping learners with strategies to make good use of them, produces rather mixed results. The effectiveness of this kind of intervention hinges on the quality of the tool as well as on the learner's willingness and ability to use it. Moreover, retrieving information successfully with a view to completing a task at hand by no means guarantees that the retrieved information will be stored in long-term memory.

Laufer and Hulstijn's (2001) involvement load hypothesis can help to frame these general patterns. The involvement load hypothesis, inspired by levels-of-processing theory (e.g., Cermak & Craik, 1979) holds that the chances of vocabulary retention are positively influenced by the presence of three factors—need, search, and evaluation. The positive influence of the need factor is believed to be greatest when it stems from the learners themselves. For example, the learner may want to find out what a given word means because it is crucial to comprehend a message or the learner may wish to find a word to appropriately convey a message. It is possible, though, that learners are more likely to feel this kind of motivation in connection with single words than in connection with (certain kinds of) formulaic sequences. For example, learners may fail to recognize the idiomatic nature and meaning of sequences that are made up of familiar words (Martinez & Murphy, 2011), they may rely on presumed L1–L2 equivalences (Laufer & Waldman, 2011), and they may resort to familiar single-word alternatives in contexts where native speakers would use a formula (Siyanova & Schmitt, 2007). The lack of intrinsic need experienced by learners in many of the studies may help explain the rather poor learning rates reported. Intrinsic need was substituted for in most of the studies by externally instigated need,

ranging from the teacher's instructions to identify formulaic sequences in a text to the instruction to prepare for a test—with the latter predictably resulting in the greater learning rates. The search factor in the involvement load hypothesis refers to the amount of effort the learner puts into obtaining the desired information. The collection of intervention studies we have reviewed here shows little evidence of the influence of this factor. For example, in Peters's (2009, 2012) studies, the students were provided with glosses and so did not need to invest effort in any search. Yet, recorded learning gains were substantial—at least in an immediate posttest. The third factor, evaluation, in a narrow sense, refers to the learner's assessment of the suitability of a given word for the purpose of the task at hand (e.g., whether it is the most appropriate choice among options). In most of the studies reviewed, however, this evaluation effort on the part of the learners coincided with the posttest and was thus not part of the intervention as such, and so its contribution to learning was not actually measured. The few studies that did stimulate an evaluation effort in the course of the pedagogical intervention—by including exercises where learners chose among formulaic sequences they were previously introduced to, for example—tend to show relatively encouraging learning rates (e.g., Laufer & Girsai, 2008). Recent studies on the learning of single words also suggest that it is the evaluation factor of the involvement load model that is the most influential in heightening the chances of vocabulary retention (Kim, 2011; Laufer & Roitblat-Rozovski, 2011).

The evaluation factor can also be interpreted in a broader sense, however, where it includes learners' cognitive engagement with a word or phrase that goes beyond the immediate necessities of the task at hand. Elsewhere (Boers & Lindstromberg, 2009) we have adopted the label *elaboration* for this—a label that harks back to the original levels-of-processing theory. It is an umbrella term for a wide variety of mental operations, including associating words and phrases with mental pictures (e.g., T. F. Li, 2009), appraising the phonological or graphemic shape of words and phrases (e.g., Lindstromberg & Boers, 2008a, 2008b), speculating about their etymology (e.g., Boers et al., 2004), making cross-cultural comparisons (e.g., Boers & Stengers, 2008), and more. Although the available evidence is still limited, it seems to us that interventions where stimuli for such kinds of elaboration are given tend to be particularly likely to lead learners to commit (some kinds of) formulaic sequences to memory. Given the analytical nature of the cognitive processing involved, this is quite different from the holistic way that the bulk of formulaic language is said to be acquired in a first language—and by young learners in immersion contexts (Wray, 2002). But, if it is true that postchildhood learners of an additional language find it hard to bypass analysis anyway, then perhaps it is worthwhile to channel that analytical processing along ways known to enhance retention, provided one is aware that the resulting knowledge is likely (at least initially) to be different from the implicit knowledge of formulaic sequences in L1.

As stated, however, the preceding comments are to be taken as preliminary impressions owing to the diversity of the studies reviewed here. Pedagogy-oriented researchers of L2 *word* retention at least have the advantage that they can refer to a vast body of research in the field of memory oriented experimental psychology that casts light on effects in retention testing which are associated

with (a) whether a test is explicit or implicit; (b) whether or how recall is primed or cued; (c) whether a set of stimulus words is mixed or pure in some regard; (d) whether the stimulus words are to be recalled serially or not; (e) whether these words are of low or high objective, or subjective, frequency; (f) whether they contain high or low-frequency syllables; (g) whether they have many or few phonological neighbors; (h) whether they tend to be early or late-acquired; (i) whether they have meanings that are specific or general; (j) concrete or abstract; (k) imageable or not; and so on. Those researching the retention of L2 formulaic sequences, however, are able to benefit from such research much less directly for the simple reason that experimental psychologists too seem to have been slow to turn their attention to formulaic sequences, L1 idioms excepted. Fortunately, as demonstrated by this volume, interest in the processing and acquisition of formulaic sequences is now growing fast, which also bodes well for future pedagogical intervention studies.

AVENUES

For the reasons outlined here, it would be premature to end this review with a section entitled "Conclusion." If there is a conclusion, it is that the research conducted so far has raised almost as many questions as it originally sought to answer. The following is but a handful of new questions that follow from findings that we have summarized.

Apart from frequency of encounters and perceived utility, what other factors influence the chances of a given formulaic sequence being acquired from exposure? Are semantically opaque sequences more likely to be taken notice of than sequences that appear to be transparent? Are completely fixed expressions recognized as formulaic units faster than more variable expressions? Are formulaic sequences that show phonological repetition across words comparatively memorable? Do different types of formulaic sequences follow different itineraries of acquisition through exposure? If so, do different types of formulaic sequences require different pedagogical interventions?

To what extent do native-speaker intuitions about the degree of semantic transparency of formulaic sequences help predict comprehensibility for the language learner? It is not just idioms (whose overall meaning transcends that of the individual words they are made up of) that can be expected to pose comprehension problems for learners. For instance, there are collocations with meanings that native speakers may regard as straightforward which may nevertheless be hard for learners to comprehend due to polysemy—for example, *pay* in *pay tribute* is not used in the sense of the word that the learner is likely to be most familiar with; neither is *cut* in *cut corners*.

What criteria are appropriate for the prioritization of certain formulaic sequences as targets for learning? Are these the same as for prioritizing targets for teaching? For example, learners may be likely to pick up highly frequent word sequences (i.e., sequences with a high corpus-derived *t* score or *z* score) independently from exposure, but they may benefit from teaching interventions that bring slightly less frequent sequences with high MI scores into the limelight.

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Does raising learners' awareness of formulaicity improve their autonomous uptake of formulaic sequences from the samples of L2 they are exposed to? The studies reviewed here failed to find evidence of this, but perhaps the instruments used to measure changes in participants' repertoires of formulaic sequences were too blunt, or perhaps their statistical power was too low for detection of any but quite large effects.

Does visual enhancement of formulaic sequences in texts meant for leisure reading or extensive reading improve uptake? Positive effects of typographical enhancement (combined with marginal glosses) have already been attested, but this was in contexts of intentional vocabulary learning (students were forewarned that a vocabulary test would follow).

How can we effectively promote accuracy in the use of formulaic sequences beyond the appropriate selection of content words? Several of the studies reviewed here measured learning rates by testing participants' choice of content words, such as the combinations *blow* + *nose* and *tell* + *time* (e.g., Webb & Kagimoto, 2009), regardless of intervening function words or inflectional patterns. As shown by Nesselhauf (2005), however, collocational errors are also abundant at the level of function words such as prepositions and articles.

How differently beneficial are formula-oriented L2 pedagogical methods across types of language? For instance, would adult learners of a language like Russian, with its highly elaborate inflectional morphology, benefit differently, particularly in real-time speech production, compared to learners of a rather analytic, or isolating, language like English, from instruction with an increased emphasis on the well-entrenched learning of formulaic sequences? And does teaching a L2 that is highly inflectional perhaps require a formula-oriented pedagogy with a greater focus on form, as suggested by Stengers et al. (2011), who found abundant errors at the level of inflection in advanced L2 Spanish students' use of formulaic sequences, errors that negatively affected the proficiency ratings of the students?

If the ultimate aim is for learners to be able to process formulaic sequences as holistic chunks, then what are we to make of exercises in textbooks which present users with separated parts of collocations to be matched (cf. Gatbonten & Segalowitz's [2005] criticism of audio-lingual substitution drills)? Cortes (2006) described a classroom intervention the aim of which was to help native-speaker students make better use of formulaic sequences in their discipline-specific writing. The treatment had little effect, and the author suggests that the lack of success may have been due to the nature of the exercises—mostly matching and completion exercises—that were used as part of the intervention, the effectiveness of which, she points out, lacks empirical validation. To begin addressing this lack of validation, Boers, Demecheleer, Coxhead, & Webb (in press) have recently evaluated the effectiveness of common textbook exercises intended for the learning of L2 verb-noun collocations. Their preliminary findings raise serious concerns that there is a high risk of interference in long-term memory due to erroneous verb-noun associations formed during matching exercises (in which learners are asked to decide, for example, whether *a dream* is typically preceded by *make* or by *have* or whether *a photo* is typically preceded by *make* or by *take*).

How effective is verbatim text memorization for learning formulaic sequences, particularly to the extent that they foster fluency? Ding (2007) interviewed winners of English-speaking competitions and debating tournaments and found that these highly successful learners attributed their success to the repeated recitation. A comparison of the usefulness of verbatim memories of texts from diverse genres, such as songs, speeches, and theatrical scripts, seems to be a pedagogically relevant research topic.

How does knowledge of L2 formulaic sequences contribute to learners' self-confidence and willingness to communicate? Conversely, how do particular personality traits and cultural habits influence the pace and fashion of formulaic sequence learning (Wray & Fitzpatrick, 2010; Wood, 2010)?

NOTES

1 Formulaicity can also be displayed within "words," or rather within phrase-like sequences that are orthographically presented as single units. This is especially pertinent when it comes to analyzing formulaicity in agglutinating languages, such as Turkish (Durrant, in press). Wray's (2008) introduction of *morpheme equivalent unit* as an alternative for *formulaic sequence* also underscores this point. If in this article we only treat interword formulaicity, it is because this happens to be what all the intervention studies we review in this article have focused on.

2 Although we were asked to focus on research conducted within the past five years or so, we felt justified in going back as far as 2004 because that would enable us to include the experimental work reported in Schmitt's (2004) edited volume, which has sparked so much of the subsequent SLA work on formulaic sequences.

ANNOTATED BIBLIOGRAPHY

Boers, F. (2011). Cognitive semantic ways of teaching figurative phrases: An assessment. *Review of Cognitive Linguistics*, *9*, 227–261.

This is a critical review of a collection of intervention studies informed by cognitive semantics and conceptual metaphor theory. Most of the studies focus on figurative idioms or on phrasal/prepositional verbs. (For a shorter review, see Boers [in press]).

Ellis, N. C., Simpson-Vlach, R., & Maynard, C. (2008). Formulaic language in native and second language speakers: Psycholinguistics, corpus linguistics, and TESOL. *TESOL Quarterly*, *42*, 375–396.

It is experimentally demonstrated in this article that formulaicity facilitates processing in both native and nonnative participants, but word strings that fulfill this facilitative role for natives do not necessarily do so for learners.

Laufer, B., & Girsai, N. (2008). Form-focused instruction in second language vocabulary learning: A case for contrastive analysis and translation. *Applied Linguistics*, *29*, 694–716.

This article reports a classroom experiment comparing retention of L2 words and collocations under three conditions. Two conditions in which the students did vocabulary-focused exercises resulted in better retention than a condition which

relied on incidental uptake. A condition where students focused on vocabulary via translation practice was found particularly conducive to learning.

Lindstromberg, S., & Boers, F. (2008b). Phonemic repetition and the learning of lexical chunks: The mnemonic power of assonance. *System*, *36*, 423–436.

This article presents further support for the thesis that formulaic sequences displaying sound patterns such as alliteration (e.g., *slippery slope*) and assonance (e.g., *high time*) have a mnemonic potential that is relatively easy to unlock, and that is applicable to a non-negligible number of word partnerships.

Martinez, R., & Murphy, V. A. (2011). Effect of frequency and idiomaticity on second language reading comprehension. *TESOL Quarterly*, *45*, 267–290.

The authors illustrate how adequate text comprehension hinges not only on knowledge of individual words but also on knowledge of scores of idiomatic expressions, many of which are made up of words that learners are likely to be familiar with as single items (e.g., *He's over the hill*) but whose combined idiomatic meaning they may fail to recognize.

Millar, N. (2010). The processing of malformed formulaic language. *Applied Linguistics*, *32*, 129–148.

This article reports a self-paced reading experiment the results of which indicate that significantly more processing effort is required of native speakers when they are confronted with so- called malformed collocations (e.g., *cheap cost* instead of *low cost*). This finding suggests that inaccurate use of formulaic language by learners can put a strain on communication with native-speaker interlocutors.

Webb, S., Newton, J., & Chang, A. C. S. (in press). Incidental learning of collocation. *Language Learning*.

This article demonstrates that incremental learning of L2 collocations from reading is possible, provided the same collocation is encountered sufficiently often in a relatively short time span. It is suggested that graded readers could be adapted to provide better opportunities also for learning collocations, in addition to single words.

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