Some explanations for the slow acquisition of L2 collocations

Frank Boers
Victoria University of Wellington, New Zealand
frank.boers@vuw.ac.nz

Seth Lindstromberg
Hilderstone College, UK
lindstromberg@gmail.com

June Eyckmans
Universiteit Ghent and Vrije Universiteit Brussels, Belgium
june.eyckmans@Ugent.be

Abstract

Collocations have attracted a fair amount of attention from SLA researchers in recent years. Even though many collocations are made up of words that must be familiar to intermediate learners (e.g., *make a mistake*), there is a growing body of evidence that even advanced learners often fail to combine words the way native speakers do (e.g., **do a mistake*). We first review a collection of explanations for this, mostly concerned with learners' attention (or lack thereof) to (parts of) collocations. We then turn to a factor that – to our knowledge – has been under-researched in the context of L2 collocation learning, namely phonological properties. We report a small-scale study the results of which suggest that certain common kinds of phonological repetition across the constituent words of collocations can hamper their recall. Given the long list of hindrances to incidental L2 collocation acquisition, it must be concluded that the calls for explicit attention to collocation learning in contemporary language pedagogy are probably justified.

Keywords: Collocations, second language acquisition, memory, attention, phonology

Resumen

En los últimos años los investigadores en la adquisición de segundas lenguas han dedicado bastante atención a las combinaciones de palabras. Aunque muchas

combinaciones constan de palabras que son conocidas por los estudiantes de nivel intermedio (p.ej. *make a mistake*), existe una evidencia creciente de que incluso los estudiantes en niveles avanzados a menudo no son capaces de combinar palabras del mismo modo que lo hacen los hablantes nativos (p.ej *do a mistake*). En primer lugar revisamos un número de explicaciones de este hecho, sobre todo relacionadas con la atención de los estudiantes (o la falta de atención) a (partes de) las combinaciones. A continuación prestamos atención a un factor que –por lo que sabemos- no ha sido lo suficientemente investigado en el contexto del aprendizaje de las combinaciones de palabras: las propiedades fonológicas. Hemos llevado a cabo un estudio a pequeña escala, cuyos resultados sugieren que ciertos tipos habituales de repetición fonológica en las palabras constituyentes de las combinaciones impiden que se recuerden. Dada la larga lista de impedimentos a la adquisición incidental de combinaciones en L2, hay que concluir que resulta necesaria una atención más explícita al aprendizaje de las combinaciones en la pedagogía actual.

Palabras clave: Combinaciones de palabras, adquisición de segundas lenguas, memoria, atención, fonología

1. The immediate background to the current study

From time to time it happens that researchers conduct an experiment which fails to yield the expected statistically significant evidence of, for instance, a difference or a correlation. It also happens, although presumably less often, that an experiment yields a significant result exactly *opposite* to what was expected. This article has, in part, arisen from reflections in the wake of an experiment which yielded results of the latter kind. The experiment in question was one of a series investigating whether certain kinds of intra-phrase, inter-word sound repetition—such as alliteration (i.e., word-initial consonant repetition as in <u>b</u>reak the <u>b</u>ank; <u>d</u>one and <u>d</u>usted; <u>c</u>ool as a <u>c</u>ucumber)— have pedagogically significant potential to make short formulaic sequences relatively memorable for post-childhood learners of English. At the time the experiment was being planned, there was already some published evidence that alliterative collocations (e.g., *green grass*) and noun-noun compounds (e.g., *sea salt*) were easier for learners of English to recall, at least in the short term, than similar expressions (e.g., *grey hair*; *bath soap*) that show no such pattern of sound repetition (Lindstromberg & Boers, 2008a; Boers et al., 2012). Given that evidence, it seemed reasonable to try to establish whether retention can also be fostered by consonant repetition which falls short of being alliteration. The term we have adopted for such 'sub-alliterative' sound repetition is 'consonance'; our working definition is, 'the repetition of a consonant in two or more content words within a single phrase (e.g., *ti<u>m</u>e fra<u>m</u>e)'.

Since alliteration seems to have mnemonic potential (see also Boers, Lindstromberg, & Eyckmans, 2013), we hypothesized that those forms of consonance that most closely resemble alliteration are the ones most likely to aid retention. We thought, for example, that *front row, popular appeal,* and *important point* might have a mnemonic advantage over, respectively, *front page, popular demand* and *important thing*—all else being equal. We set up an experiment, which we report further below, with the following research question:

> "Do adult EFL learners recall dictated consonating collocations better than matched controls showing little or no phonological repetition"

As it happened, the recall test scores from the experiment do not indicate that consonance is likely to have a mnemonic effect. Rather, they indicate that consonance might in some circumstances be *anti*-mnemonic. This unanticipated finding has obliged us to fundamentally re-examine the premises of our hypothesis. Before we come to that re-examination, let us first survey the reasons why we are interested in factors that influence the memorability of second language collocations in the first place.

2. Collocations in foreign language learning

Collocations (e.g., *make a mistake; tell the truth; take a photo; running water; narrow escape; sore throat; wide awake; deeply religious; at school; on purpose*), along with other kinds of multiword expressions sometimes subsumed under the umbrella term formulaic language (Wray, 2002), have been attracting an increasing amount of attention in SLA circles in recent years. Many authors working in the domain of TESOL, in particular, have emphasised the need to regard collocation learning as an essential part of second language education (e.g., Lewis, 1993; Nattinger & Decarrico, 1992; Willis, 1990). Books with guidelines for collocation teaching have begun to appear (e.g., Davis & Kryszewska, 2012; Lindstromberg & Boers, 2009; Lewis, 2000) as have books for independent study of collocations (e.g., McCarthy & O'Dell, 2005; 2008). Many EFL textbook writers, too, have begun to include sections and exercises on collocations (e.g., Richards & Bohlke, 2011). The acquisition of formulaic language, including collocations is, of course, equally important for learning languages other than English (e.g., Forsberg, 2010, on French; Stengers, Boers, Housen, & Eyckmans, 2011, on Spanish).

Several studies suggest that learners are in general quite slow at acquiring productive knowledge of L2 collocations (e.g., Durrant & Schmitt, 2009; Laufer & Waldman, 2010; Li & Schmitt, 2010; Nekrasova, 2009; Yamashita & Jiang, 2010). Even at advanced levels, L2 learners are known to produce word combinations that

sound odd to native speakers (e.g., *do a mistake*; *say the truth*; *make a dream*). It is especially interesting that many of these malformed collocations are made up of words that are so common that they are likely to be familiar to the learners who err in producing the collocations. The poor rate of uptake of collocations – and formulaic expressions in general – is puzzling. Alison Wray, one of the leading researchers of formulaic language, finds it puzzling, too: "I still perceive a missing link regarding why learners do not feel more empowered to harvest L2 input in larger chunks" (2012: 236). One purpose of the present article is to evaluate the chances of collocation learning occurring as a result of engagement with the content of L2 text. A second purpose is to evaluate whether certain formal features can make some collocations that exhibit these features easier (or harder) to acquire. As mentioned, the formal features we will be examining concern phonological (and/or orthographic) similarities between the constituent words of a collocation – between content words, in particular.

For reasons of space, we confine our discussion to the scenario in which a learner regards an encountered collocation as semantically transparent. What, then, is the likelihood of the learner adding a given L2 word combination to her or his repertoire if that word combination, as such, puts no strain on semantic processing capacity? The transparency of a word string is often associated with 'compositionality'. By definition, compositional expressions have a meaning that follows fairly directly from summing the meanings of the constituent words. Non-compositional expressions, by contrast, are those whose overall meaning transcends that of the constituent words when similarly summed. Non-compositionality is associated first and foremost with idioms (e.g., *by and large; break the ice; follow suit*) including phrasal / prepositional verbs (e.g., *give in to someone; put up with something; break off negotiations*). The distinction between compositionality and idiomaticity is not, however, black and white. In fact, most multiword expressions, including collocations, are to some extent non-compositional (e.g., Taylor, 2006). For example, *run* in *running water* does not denote the kind of rapid bipedal, self-propelled motion that most people would think of when presented with the word *run* in isolation. The same applies to the use of this verb in *run a business, run the risk,* and *run a bath*. In order to see the non-compositional nature of an expression, it may be necessary to adopt the perspective of a language learner. Thus, a native speaker of English may regard *catch a cold* as totally compositional and so perfectly transparent, but not a learner of English who tries to make sense of the expression through reading *catch* as an intentional act (as in hunting, for example). So, when we say that we confine our discussion to the scenario in which learners interpret an encountered collocation as being transparent, we do not mean that their interpretation is necessarily accurate since, as just indicated, the collocation may be *deceptively* transparenHowever, when a learner takes a collocation encountered in a text to be semantically transparent, one might be hopeful that the attention which

the learner would otherwise allocate to working out the meaning of the phrase can be allocated instead to the precise wording of the phrase (Barcroft, 2002). Whether this is too much to hope for is the question we turn to in the next section.

3. A lack of attention

There is now considerable agreement in SLA circles that attention is a crucial first step for elements or features in the input to be retained in memory (Schmidt, 2001). There are many factors that determine the chances of an element or a feature receiving a learner's attention. On the one hand, the learner's attention may of course be directed to the element by someone else (e.g., a teacher or the writer of the text book). Or, the learner's attention may be attracted to it in the absence of intervention by any external party. It is the latter type of case that we look at here as we wish to evaluate the likelihood of *incidental* uptake, that is, uptake that is not the result of intentional study. Let us then consider some of the factors that may determine whether or not a learner will devote attention to a collocation which the learner regards as semantically transparent.

According to Wray (2002), post-childhood learners of a second language who have become literate (in an alphabetic writing system) are much less inclined than (pre-literate) children to process text in multiword chunks. Being used to seeing written words separated by white spaces, adult learners tend to consider words – rather than multiword units – to be the building blocks of discourse. It is therefore likely that single words receive greater attention from adult readers than their particular recurring combinations do. This general predisposition of post-childhood learners toward attending to words rather than to collocations is one piece of an explanation of the puzzle of why collocations are acquired so slowly.

A second piece is salience. For example, the perceived novelty of an element in the input can render that element relatively salient for the learner. It is known from eye-tracking experiments, for instance, that words that are new to the learner tend to be looked at for longer in a text than familiar words (Godfroid, Boers, & Housen, 2013). In the case of collocation learning, however, the learner is less likely to be struck by any novelty because the content words that make up a given collocation may be quite common (e.g. *make + mistake*; *tall + tree*), and any function words are likely to be even more frequent. Thus, even if a learner has not seen a given combination of words before, or not seen it very often, her inclination to regard words rather than chunks as the building blocks of text may prevent her from noticing the novelty at the phraseological level. In short, it seems that when it comes to incidental collocation learning, the high frequency – and thus the high-familiarity – of many

constituent words can reduce the chances of the collocation, as such, being attended to – unless, perhaps, it is encountered so often in a short span of time that the learner no longer overlooks its importance (see section 4 below). On the other hand, if even one constituent word of a collocation is new to the learner, as might be the case with *havoc* in the collocation *cause havoc*, then one might hope that the attention given to the novel word would extend to its potential collocates. To our knowledge, though, no empirical data are as yet available to show that this is what happens. It is probably when the learner is not yet familiar with *both* constituent words of a collocation—as may be the case when a learner encounters the collocation *wreak havoc*—that the so-called novelty effect (Tulving and Kroll, 1995) is most likely to lend salience to the word string as a whole. If it is true that a collocation is unlikely to be attended to by learners who are already familiar with its constituent words, and if many collocations are made up of words that are so common that they are familiar to learners from intermediate level up, then a pedagogical implication may be that collocation learning, even below intermediate level, must be encouraged by presenting words which are likely still to be novel to the learners not as single items but, right from the start, as constituents of multiword units. (For a recent study of incidental acquisition of novel collocations, see Webb, Newton, and Chang (2013)).

A third explanation for the lack of attention to collocations, or at least to certain parts of collocations, is as follows. It is not uncommon for one of the constituents of a collocation to make less of a contribution to the collocation's meaning than the other constituent(s). This is perhaps most notably the case in verb-noun collocations where the verb is a high-frequency, multi-purpose item (e.g., *have; make; do*), and it is the noun rather than the verb that carries most of the meaning (e.g., *have a nightmare; make a mistake; do business*). As the verb contributes so little to the interpretation process, it is probably relatively non-salient for the learner and is thus unlikely to attract much attention. It is therefore not surprising that it is mostly with regard to the verb that learners, even advanced learners, are known to err in their production of L2 verb-noun collocations (Nesselhauf, 2005). The semantically more informative noun constituent can be said to overshadow the verb component in the input (Ellis, 2006).

Besides the lack of *semantic* salience, parts of collocations can also be lacking in *perceptual* salience. Frequent formulaic sequences tend to be phonetically reduced in the stream of discourse (Bybee, 2002). This seldom causes communication failure among native speakers sharing the same repertoire of formulaic expressions, but it does mean that the reduced elements in the sequence are, for a learner, less audible and less clearly articulated and thus harder to perceive. These kinds of reduction are most typically seen in those elements that contribute least to the meaning of the expression as a whole and which may be the most predictable from context, with function words such as articles, prepositions, auxiliaries being particularly affected. If, on top of that,

such elements happen to have a phonological neighbour (i.e., a word that shares every phoneme except for one) which seems semantically plausible in a given context, then it becomes easy to understand why learners might say *make a photo* instead of *take a photo* and *in purpose* instead of *on purpose*.

The lack of semantic and perceptual salience of (parts of) collocations also reduces the likelihood that learners will notice the differences in word choice between the target language and the first language when near-equivalent collocations are available in the latter. Indeed, transfer from L1 is a well-attested phenomenon in L2 collocation use (e.g., Laufer, 2011; Laufer & Girsai, 2008; Nesselhauf, 2005; Wolter & Gyllstad, 2011; Yamashita & Jiang, 2010).

4. Not enough encounters in a short span of time

Although attention is believed to be crucial for learning to happen, it does not mean that for learning to happen learners need to *consciously* notice a given target feature or element every time they encounter it. According to Ellis's (2007) 'weak interface' model, implicit acquisition mechanisms can take over once the novel feature or element has already been noticed at least once. These implicit mechanisms are of a 'statistical' nature (e.g., Ellis, 2006; 2012). For example, the learner will unconsciously tally word combinations as well as the function they appear to fulfil in the discourse. For this process of accumulative learning to be effective, though, sufficient numbers of encounters with the target element or feature are required. This raises another problem when it comes to L2 collocation learning: While collocations as a class abound in language (the *Oxford Collocations Dictionary for Advanced Learners of English* (2002) boasts 150,000, which is far from an exhaustive inventory), the same form will tend to occur and then reoccur relatively infrequently. It stands to reason that, to be able to independently recognise a word string as a collocation, a learner not only needs to have noticed that same word string before but needs also to *remember* seeing or hearing it before. This raises the matter of the *spacing* of occurrences.

Even relatively common collocations are unlikely to be encountered several times in a short time span. Boers and Lindstromberg (2009: 42-43), for example, counted all strong verb-noun collocations (e.g., *tell the truth; make no difference; take a picture; do your best*) used in a popular crime novel and found that almost all occurred only once in a stretch of over 100 pages. They conclude from this that it would be wishful thinking to expect a learner to realise in the course of extensive reading that a given word combination is a strong collocation if encounters with this combination are so few and far between that any memory trace left by an earlier encounter has probably faded by the time the collocation is met again. The scarcity of repeated encounters with phrasal

expressions, even those that one would imagine to be very common, is not confined to fiction (i.e., to 'creative' writing). For example, Byrd and Coxhead (2010) report that *on the basis of* occurs only twice per 15,600+ words in a corpus of written academic texts. Learner-autonomous recognition of formulaic expressions is therefore a bit of a Catch 22 matter because what enables expressions to be recognized as formulaic in the first place is their recurrence. Eyckmans, Boers, and Stengers (2007) report an experiment where advanced EFL students failed to accurately identify formulaic word sequences in a new text despite having followed a year-long programme that prioritized formulaic language.

We should also bear in mind that the constituents of a collocation are not always found in each other's immediate vicinity. Unlike the examples we have given so far in which constituent words were adjacent to one another, constituents of a collocation will sometimes be separated by intervening discourse (e.g., […] *an offence which some of his acquaintances suspect Dave Singleton may have committed when he was […]*), which may also reduce the likelihood of the learner taking notice of their association. (See Cheng, Greaves, Sinclair, & Warren, 2009, on the need to cast the net sufficiently wide in corpus-based collocations research.)

The effectiveness of the statistical learning mechanism can be further reduced by the range of variability that is manifested in a word's collocational behaviour. For example, a learner may find the noun *research* accompanied by *conduct* in one encounter, by *carry out* in another, and by *do* in yet another encounter. It may therefore take many more encounters with *research* for it to become strongly associated with one of these verbs in the learner's mind than would be necessary, say, for *suicide* to become associated with *commit*. Put differently, the pace of uptake of a collocation is likely to be influenced by the degree of substitutability of its constituents. In corpus linguistics, this is often expressed as the mutual-information (MI) score, that is, the statistical probability of the constituents co-occurring in a corpus (Church & Hanks, 1991). (See Chung and Lee (2001) for a discussion of other measures of statistical association between collocates besides MI.)

Appreciation of the scope of variability of a phrasal expression is also pertinent when it comes to the precise form of idiomatic expressions. *I'm having second thoughts* is fine, but *I'm having a second thought* sounds odd. *Let's play it by ear* is conventional, but *Let's play it by the ear* is not. The question is how the learner can induce what forms are *not* sanctioned when the sample of exemplars available for inductive inference is very small.

The learner's task is complicated also when two or more collocations are deceptively similar in form. Compare, for example, *run a business* and *do business with someone*. It is not hard to appreciate that cue competition may lead a learner to produce **run*

business with someone or **do a business with someone*. A further impediment to learning the correct form of collocations, especially verb-noun collocations, is that the verb (e.g., *do*) may well have a rather vague, abstract meaning; and it is well documented that abstractness of meaning renders words harder to remember (e.g., Walker & Hulme, 1999). The degree of concreteness of meaning has been found a moderating factor in the recall of collocations as well (Boers, Lindstromberg, & Eyckmans, 2012, 2013). It is, as might be expected, strongly correlated with imageability (Hamilton & Rajaram, 2001), a factor that has also been found to positively influence the learnability of idioms (Steinel, Hulstijn, & Steinel, 2007). Indeed, researchers commonly treat concreteness and imageability as a composite variable, a practice we have followed as well, as will be seen further below (Hamilton & Rajaram, 2001).

5. From attention to retention?

Attention gives elements a (temporary) place in working memory, but for elements to cross the threshold into long-term memory, 'work' needs to be done with them. Minimally, this is said to require vocal or sub-vocal repetition (or 'rehearsal') in working memory or, more precisely, in the component of working memory called the Phonological Loop (Baddeley, 1997), also known as 'phonological short term memory' (e.g., Kormos & Safar, 2008).[6] Learners' phonological short term memory capacity— usually measured by asking participants to repeat relatively long sequences of words (or pseudo-words)—has been found to be a strong predictor of vocabulary learning success (e.g., Speciale, Ellis, & Bywater, 2004) and of language learning success more generally (e.g., O'Brien, Segalowitz, Collentine, & Freed, 2006). (See Martin and Ellis, 2012, for a recent review.)

Learners differ in their ability to hold sequences of words in working memory, but the properties of the words can play a part too. For example, if a learner is familiar with the phonological (and orthographic) features of the target language, then words that are phonologically (and orthographically) regular in that language will be easier to rehearse vocally or sub-vocally than words that are atypical (Ellis & Beaton, 1993: 560-569, for a brief review). Word length is another factor: "The longer the [foreign language] word, the more [there is] to be remembered, the more scope [there is] for phonotactic and orthographic variation and thus the more room for error" (Ellis & Beaton, 1993: 568). When a collocation consists of words that the learner already knows well, then we may expect that the degree of their familiarity with the phonology (or orthography) of those words will not be as important a variable as when *new* words need to be learned. The factor of length, however, does possibly make collocations

---

6 Memories of written forms involve another component of working memory, called the Visuo-Spatial Sketchpad in Baddeley's (1997) model.

difficult to retain in phonological short term memory compared to single words. After all, collocations are generally longer than single words.

On the upside, certain formal features may facilitate storage in memory. For example, Boers, Lindstromberg and Eyckmans (2012) report an experiment in which dictated alliterative expressions (e.g., <u>p</u>rivate <u>p</u>roperty; <u>a</u> <u>q</u>uestion <u>c</u>oncerning) were better recalled by adult language learners in an unannounced post-test than matched non-alliterative expressions (e.g., *private collection; a question regarding*). Rhyming collocations seem likely to have a comparative advantage of this kind as well. Experiments on serial recall of words in L1, at least, show that series of rhyming words (e.g., *hat, cat, mat, rat*, etc.) are comparatively easy to recall (Macnamara, Moore, & Conway, 2011, for a review). If it is true that post-childhood learners of a second language tend to assemble collocations from words instead of learning them as wholes from the start (*cf.*, Wray, 2002), then recall of an L2 collocation may be considered somewhat similar to a serial word recall task, with one constituent word cueing another, possibly helped by the learner's knowledge that the constituent words happen to rhyme (e.g., *steer → clear*; *take ← a break*).

According to Boers & Lindstromberg (2009: 114), roughly 13% of the multiword items listed in the *Macmillan English Dictionary for Advanced Learners* (2007, 2nd edition) alliterate and roughly 2% rhyme. They estimate that an additional 7% show other salient vowel repetition or 'assonance' (e.g., *small talk; grow old*). The incidence of alliteration in the English stock of phrasal expressions is much higher than would be predicted by chance (Boers and Lindstromberg, 2009; Gries, 2011), a finding which lends support to the thesis that alliterative expressions are comparatively memorable and thus stand a relatively good chance of becoming stock phrases. Evidence for its memorability in contexts of incidental learning is sparse, however. The strongest evidence comes from experiments where second language learners' attention was explicitly directed to the presence of alliteration (Lindstromberg and Boers, 2008a). Very similar experiments have revealed that assonant collocations, too, can be made memorable through teacher-led intervention (Lindstromberg and Boers, 2008b), but that does not warrant the conclusion that assonance facilitates retention of collocations also under incidental learning conditions (Lindstromberg, Boers, & Eyckmans, under review).

In any case, it is clear that the presence of alliteration, rhyme and assonance can be expected to alleviate the L2 collocation learning burden only with regard to a fraction—albeit a considerable one (about one fifth, according to aforementioned estimates)—of the vast stock of phrasal expressions available in English.[7]

---

7 The incidence of particular types of phonological repetition varies between languages (Boers & Stengers, 2008).

The question may be asked whether other, less salient phonological repetition across the constituents of collocations also influence the ease with which they are iterated in phonological short-term memory. According to our counts in McCarthy & O'Dell's (2005) *English collocations in use*, a well-known book for independent study of English collocations, roughly 39% of English collocations manifest some kind of consonant repetition across their constituent words that falls short of alliteration (e.g., *casual acquaintance; absolute beginner; body odour; break a record; attract criticism; whiff of perfume*). This abundance of phonological repetition is not surprising. It is probably a consequence mostly of there being a finite number of phonemes available in the language so that the same phonemes are bound to occur in many words, and so inevitably also in words that happen to collocate.[8]

As far as we know, the influence of non-alliterative consonant repetition on learners' recall of collocations has not yet been investigated. In the following section we report an experiment, already touched on in the introduction, which was designed to fill that gap.

6. Consonance and recall of L2 collocations: An experiment

6.1. *Participants*

Participants were 36 undergraduate language majors (25 females and 11 males aged 19 to 23), studying English as one of two foreign languages. Eighteen were Dutch native speakers; 11 were bilinguals with Dutch as one of their languages and seven spoke other languages as L1. In terms of proficiency in English, all were at least at level B2 of the Common European Framework of Reference, which corresponds to an IELTS score of at least 5. This level was a requirement for enrolling in the course in which the experiment was conducted and it ensured that the participants would be familiar with the stimulus words, all of which are at least moderately frequent (see below).

6.2. *Materials*

A set of 22 collocations was compiled for dictation to the students (see Table 1). Of these, six show consonance, i.e., across-word consonant repetition falling short of alliteration. Each of these six 'consonating' collocations was notionally paired with a control collocation judged to be formally similar to it (apart from consonance).

---

8 It is to be expected that within and across-word repetition of phonemes must be particularly ubiquitous in languages that have relatively few vowels and/or consonants.

Paired collocations share the same leftward collocate, for example, *important point* was paired with *important thing*. For the purposes of the investigation of consonance, the remaining ten collocations were fillers serving to reduce the chance of a ceiling effect on post-test recalls.

As is indicated in Table 1, a balance between the consonating collocations and their controls was sought with regard to the variables concreteness of meaning / imageability and frequency—variables which are known to have effects on recall. (For additional information, Table 1 also gives mutual information, or MI, scores as indices of the degree to which the words in each collocation are statistically associated with each other, although we are aware of no studies indicating that it has any practically significant effect on recall.)

As a first step towards controlling for concreteness and imageability (CI), eleven experienced British teachers of EFL were asked to give each of the rightward collocates a 'concreteness and imageability' score ranging from 1-10. The instrument was a questionnaire, part of which is shown in the Appendix. The informants were also orally given examples. *Table* served as an example of a word with a concrete meaning, since it refers to something tangible, while *idea* was said to have a less concrete meaning since an idea is not tangible. *Tiger* was the example of a word whose meaning is quite imageable and *as* was the example of one difficult to form an image of.[9] The informants all said they understood what to do, and their completed questionnaires furnished no evidence that this was not the case. The informants' CI ratings were averaged to yield a mean score for each collocation. As can be seen in Table 1, the mean CI score of the consonating collocations is slightly (6.5%) higher than that of the control collocations. The variable of frequency we measured in terms of raw whole collocate frequency (*WhCF*) and raw rightward collocate frequency (*RCF*) in the *Corpus of Contemporary American English* (COCA; Davies, 1998 to present). When single words are used as stimulus expressions in experiments in which participants study a list of words of varying frequencies and are later asked to recall them, it is generally the low frequency words that are recalled best (e.g., Merrit, deLosh, & McDaniel, 2006). As Table 1 shows, the control collocations and also their rightmost words are, on average, slightly more frequent than the consonating collocations and their rightmost words.

---

9 A third variable, 'specificity of meaning' (e.g., *organism* vs. *crocodile*) is sometimes included in this composite on account of its strong positive covariance with concreteness, imageability, and recall (Hamilton & Rajaram, 2001). However, we did not mention it when soliciting CI ratings from our informants as we thought doing so might have confronted them with too many variables to consider at one time.

Table 1. *The stimulus collocations used and their measures*

Consonating collocations					Control collocations				
	CI	MI	WhCF	RCF		CI	MI	WhCF	RCF
free ride	5.36	8.19	398	27,195	*free lunch*	8.55	6.24	397	23,584
important point	6.82	6.74	1149	167,393	*important thing*	3.73	6.01	4565	199,448
popular appeal	2.55	6.86	102	18,152	*popular demand*	3.91	5.49	127	26,931
current trend	4.00	9.13	137	14,285	*current level*	5.81	4.47	326	90,353
Time frame	9.37	7.51	1294	19,585	*time span*	5.73	4.86	209	4562
front row	6.82	8.04	1017	16,560	*front page*	9.44	7.8	2196	42,318
Means	5.82	6.33	683	43,862	Means	6.20	5.80	1303	64,533

Note: CI = concreteness and imageability score. MI = mutual information score. WhCF = whole collocation frequency. RCF = Rightward collocate frequencies (i.e., frequencies of tokens of orthographic forms). MI scores and raw item frequencies are from COCA (Davies, 2008 to present; accessed 22.4.2012).

6.3. Procedure

To begin the experiment, the instructor dictated every collocation, saying each one twice, and the students wrote them on a worksheet. Half of the consonating collocations were dictated before their matched control and half were dictated after it. A dictation activity requires participants to temporarily hold the dictated word strings in phonological short-term memory in order to be able to reproduce them in writing. Immediately after the dictation, the participants were given a worksheet showing a blank table of two columns labelled 'column A' and 'column B'. The instructor explained that she was going to read out single words and that each of these words was the first word of *two* of the collocations that had been dictated earlier. The students were instructed to write the words that had followed it in the dictation before. They were asked to write in column A the first one of these words to come to mind. If they also remembered the other word, they were asked to write that one in column B. The purpose of this was to enable us to form an impression of which of the two collocates (the consonating one or the control) was recalled most readily in cases when participants remembered both. The instructor read out the cues in a different,

random order from that followed in the dictation. One week later, a delayed test was administered. This was identical to the immediate test with the difference that the cue words were read out in yet another random order. Two of the 36 students did not take the delayed test.

6.4. Results

The recall scores for the two tests are summarized in Table 2, from which it can be seen that the controls were recalled more often than the consonating collocates in both the immediate test and delayed tests (immediate test: $t = -3.67$; $p = .0008$, 2-tailed; $d = -.58$, 95% confidence interval [-1.06, -.12,]; delayed test: $t = -2.01$; $p = .052$; $d = -.48$, $CI_{95\%}$ [-96, .004]).[10] The two confidence intervals for d show a wide spread—from strongly negative to small (in the case of the immediate test) and from strongly negative to at, or near, zero (in the case of the delayed test). However, in each case the true effect is about six times more likely to be at the point estimate than at either limit of the confidence interval (Cumming, 2012).

As for the column A scores (Table 2), these also indicate that it was the control collocates that came to mind most readily in both tests ($d = -.53$ and $-.51$, respectively). All four of these d values are consistent with an effect of medium magnitude (Cohen, 1988).

Table 2. *Recalls of the rightward collocates in each category*

Number of students		Recalls of the CCs	Recalls of the controls
36	Immediate test, Column A only	43	63 $MD = -.56$
	Immediate test, Columns A & B	67	94 $MD = -.75$
34	Delayed test, Column A only	26	44 $MD = -.53$
	Delayed test, Columns A & B	40	58 $MD = -.53$
Note: MD = mean difference.			

---

10 These *d* values are indices of effect size. Each one is produced by dividing the difference between the two mean scores (i.e., of the two contrasted sets of collocations) by the average of the (inferential) standard deviations of the scores in each set. Thus, it can be said that a *d* value of point .5 indicates that the two means differ by one half a standard deviation. To calculate confidence intervals for *d* we used Cumming's *ESCI Software* (2011).

6.5.*Discussion*

The results of our small-scale experiment do not merely fail to support the hypothesis that consonance might be mnemonic: they suggest that consonance might actually be *anti*-mnemonic. Recall that the set of consonating collocations was slightly advantaged by virtue of their slightly higher CI scores and their slightly lower corpus frequencies.[11] And yet, this set was much less successfully recalled. If the adverse effect of consonance on the short and near term recall of collocations is really as large as ca. $d = .5$, let alone larger, it could be of practical significance in the learning of L2 English collocations, and perhaps multiword units generally.

If this finding were to be confirmed in replication studies, it would signify that a substantial fraction of the stock of English collocations is relatively tricky for learners to retain in memory due to formal properties. Findings in experimental studies of the serial recall of single (L1) words from short-term memory suggests that this is a plausible possibility, it being a classic finding from such studies that serial item recall can be hampered by phonological similarity (Baddeley, 1966; Nelson, Fosselman, & Peebles, 1971, Gupta, Lipinksi, & Actunc, 2005; Lewandowsky & Farrell, 2008) and by orthographic similarity as well (Logie, Della Sala, Wynn, & Baddeley, 2000). Such experiments report facilitative effects of phonological repetition *only* if the repetition concerns the end of words (as in rhyme) and to a somewhat lesser extent the beginning of words (as in alliteration). Very often they report negative effects if the repetition is elsewhere (as in consonance). An example from a different research discipline is a study by Lambert, Lin, Chang, and Gandhi (1999), who found that drug brand names sharing consonants are very likely to be confused. Given the psycholinguistics literature on formal similarity effects, it is at least conceivable that phonological similarities outside word onsets and endings may actually impair learners' ability to

---

11 To estimate whether CI and WhCF had been adequately controlled for, we carried out a multiple regression of CI and WhCF on immediate test recall scores. To increase statistical power and in order to obtain results somewhat more generalizable to collocations outside our dataset, the 12 filler collocations were included; thus, $N = 22$. The unstandardized regression coefficients for CI and WhCF are, respectively, 1.5 and -.0021, which indicates (if other variables are in each case held constant) that a one unit rise in the mean CI score of a collocation corresponds to a 1.5 unit *increase* in its recall score whereas a one unit (i.e., one occurrence) increase in WhCF corresponds to a *drop* in recall score of .0021. The respective coefficients for the delayed test data are 1.5 and -.0011. Owing to the small size of our sample these results are not conclusive. However, they are broadly consistent with the literature in indicating that the effect of CI on recall is likely to be of much greater practical significance than the effect of frequency, and they rather clearly indicate that the lesser mean frequency of the control collocations is unlikely to have played a role in their being recalled the most often. In the case of CI, it was the collocating collocations that that had the advantage. Even so, they were recalled the least often. Multiple regressions analyses of CI and RCF on recalls were also were carried out; the results were similar to those just given.

form distinctive mental representations of the constituent words hosting the points of repetition.

7. Conclusion

Many variables conjointly explain why semantically transparent collocations are not swiftly added to learners' active repertoires when they encountered in input. We have seen that, for learners, there are numerous impediments—firstly, impediments to noticing word strings and, secondly, to identifying them as useful collocations. Even when learners do notice collocations, they still face the task of retaining them in memory. An initial step for this to happen is rehearsal in phonological short term memory through activation of the so-called Phonological Loop. Owing to their generally greater length, multiword items may be more difficult to rehearse in this way than words. Moreover, it appears that certain phonological (and/or orthographic) properties of a collocation influence the ease with which it can be recalled. Alliteration and rhyme appear to be types of phonological similarity between constituent words that can facilitate their joint recall. On the downside, however, it now appears that other similarities—more common ones, unfortunately—exert a negative influence.

Given the many obstacles to incidental uptake of collocations, the calls for more explicit approaches to collocation learning are probably justified. However, it does not seem likely that any and every kind of intervention to focus learners' attention on collocations will be found to be effective. Much more research needs to be directed toward testing and comparing the effectiveness of the techniques for collocation teaching that have now been proposed (for a review of effect-of-instruction studies, see Boers & Lindstromberg, 2012; for a review of common pedagogic approaches, see Meunier, 2012).

An important question here is: how should new collocations be introduced to learners? It has been found, for example, that exercises (e.g., matching exercises) that require learners to guess which words collocate with each other readily engenders confusion, and the ensuing erroneous inter-word associations are difficult to eradicate (Boers, Demecheleer, Coxhead, & Webb, in press). It is probably safer to draw learners' attention to *intact* collocations occurring in suitable reading and listening texts. However, mere direction of attention may not suffice for learners to be able effectively to add collocations to their *productive* repertoires (Stengers, Boers, Housen, & Eyckmans, 2010): output activities are most probably required.

Establishing empirically what pedagogic interventions are comparatively effective in fostering collocation knowledge (Laufer & Girsai, 2008, and Peters, 2012, for examples

of such studies) is an ambitious project, most of which is waiting to be accomplished. What we hope to have shown in the present article is that it is work worth doing because it is clear that leaving collocation learning entirely to the vagaries of incidental uptake is fraught with problems. The experiment on consonance that we have reported here suggests there may yet be additions to be made to the list of those problems.

8. References

Baddeley, A. D. 1966. "Short-term memory for word sequences as a function of acoustic, semantic and formal similarity." *Quarterly Journal of Experimental Psychology* 18: 362-365.

_____.1997. *Human memory: Theory and practice.* Hove: Psychology Press Ltd.

Barcroft, J. 2002. "Semantic and structural elaboration in L2 lexical acquisition". *Language Learning* 52: 323-363.

Boers, F., Demecheleer, M., Coxhead, A., Webb, S. in press. "Gauging the effects of exercises on verb-noun collocations". *Language Teaching Research.*

Boers, F., & Lindstromberg, S. 2009. *Optimizing a lexical approach to instructed second language acquisition.* Basingstoke: Palgrave Macmillan.

_____ .2012. "Experimental and intervention studies on formulaic sequences in a second language". *Annual Review of Applied Linguistics* 32: 83-110.

Boers, F., Lindstromberg, S., & Eyckmans, J. 2012. "Are alliterative word combinations comparatively easy to remember for adult learners?" *RELC Journal* 43: 127–135.

_____ .2013. "Is alliteration mnemonic without awareness-raising?" *Language Awareness.* DOI: 10.1080/09658416.2013.774008.

Boers, F., & Stengers, H. 2008. "Adding sound to the picture: An exercise in motivating the lexical composition of metaphorical idioms in English, Spanish and Dutch". In L. Cameron, L, M. Zanotto and M. Cavalcanti (eds), *Confronting metaphor in use: An applied linguistic approach*, 63–78. Amsterdam: John Benjamins.

Bybee, J. 2002. "Phonological evidence of exemplar storage of multiword sequences". *Studies in Second Language Acquisition* 2: 215–221.

Byrd, P., & Coxhead, A. 2010. "On the other hand: Lexical bundles in academic writing and in the teaching of EAP". *University of Sydney Papers in TESOL* 5: 31–64.

Cheng, W., Greaves, C., Sinclair, J. M., & Warren, M. 2009. "Uncovering the extent of the phraseological tendency: Towards a systematic analysis of concgrams". *Applied Linguistics* 30: 236-252.

Chung, Y. M., & Lee, J. Y. 2001. "A corpus-based approach to comparative evaluation of statistical term association measures". *Journal of the American Society for Information Science and Technology* 52:283–296.

Church, K. W., & Hanks, P. 1991. "Word association norms, mutual information and lexicography". *Computational Linguistics* 16: 22-29.

Cohen, 1988. *Statistical power analysis for the behavioral sciences,* 2nd edn. Hillsdale, NJ:

Cumming, G. 2011. "ESCI meta-analysis". *Exploratory software for confidence intervals.* Retrieved from http://www.latrobe.edu.au/psy/documents/ESCI-readme.pdf

Cumming, G. 2012. *Understanding the new statistics: Effect sizes, confidence intervals, and meta-Analysis.* London: Routledge.

Davies, M. 2008 to present. *The corpus of contemporary American English (COCA).* http://www.americancorpus.org (accessed 1 January – 1 August 2012).

Davis, P., & Kryszewska, H. 2012. *The company words keep: Lexical chunks in language teaching.* Peaslake: Delta Publishing.

Durrant, P., & Schmitt, N. 2009. "To what extent do native and non-native writers make use of collocations?" *International Review of Applied Linguistics* 47: 157–177.

Ellis, N. 1996. "Sequencing in SLA: Phonological memory, chunking, and points of order". *Studies in Second Language Acquisition* 18: 91-126.

_____ .2007. "The weak interface, consciousness, and form-focussed instruction: Mind the doors". In S. Fotos & H. Nassaji (eds), *Form focused instruction and teacher education: Studies in honour of Rod Ellis*, 17-33. Oxford: Oxford University Press.

_____.2012. "Formulaic language and second language acquisition: ZIPF and the phrasal teddy bear". *Annual Review of Applied Linguistics* 32: 17-44.

Ellis, N. C., & Beaton, A. 1993. "Psycholinguistic determinants of foreign language vocabulary learning". *Language Learning* 43: 559-617.

Eyckmans, J., Boers, F., & Stengers, H. 2007. "Identifying chunks: Who can see the wood for the trees?" *Language Forum* 33: 85–100.

Forsberg, F. 2010. "Using conventional sequences in L2 French". *International Review of Applied Linguistics* 48: 25–51.

Godfroid, A., Boers, F., & Housen, A.

in press. "An eye for words: Gauging the role of attention in L2 vocabulary acquisition by means of eye-tracking". *Studies in Second Language Acquisition*.

Gries, S. 2011. "Phonological similarity in multi-word symbolic units". *Cognitive Linguistics* 22: 491–510.

Gupta, P., Lipinski, J., & Aktunc, E. 2005. "Re-examining the phonological similarity effect in serial recall: The roles of type of similarity, category cueing, and item recall". *Memory and Cognition* 33: 1001-1016.

Hamilton, M., & Rajaram, S. 2001. "The concreteness effect in implicit and explicit memory tests". *Journal of Memory and Language* 44: 96–117.

Kormos, J., & Safar, A. 2008. "Phonological short-term memory, working memory and foreign language performance in intensive language learning". *Bilingualism: Language and Cognition* 11: 261-271.

Lambert, B. L., Lin, S.-W., Chang, K.-Y., & Gandhi, S. K. 1999. "Similarity as a risk factor in drug-name confusion errors: The look-alike (orthographic) and sound-alike (phonetic) model". *Medical Care* 37: 1214–1225.

Laufer, B. 2011. "The contribution of dictionary use to the production and retention of collocations in a second language". *International Journal of Lexicography* 24: 29–49.

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.

Laufer, B., & Waldman, T. (2011). "Verb-noun collocations in second language writing: A corpus analysis of learners' English". *Language Learning* 61: 647–672.

Lewis, M., 1993. *The Lexical Approach*. Hove: LTP / Boston: Thomson Heinle.

_____ (ed.). 2000. *Teaching collocation: Further developments in the Lexical Approach*. Hove: LTP / Boston: Thomson Heinle.

Li, J., & Schmitt, N. 2010. "The development of collocation use in academic texts by advanced L2 learners: A multiple case study approach". In D. Wood (ed), *Perspectives on formulaic language: Acquisition and communication*, 22–46. New York: Continuum.

Lindstromberg, S., & Boers, F. 2008a. "The mnemonic effect of noticing alliteration in lexical chunks". *Applied Linguistics* 29: 200–222.

_____. 2008b. "Phonemic repetition and the learning of lexical chunks: The mnemonic power of assonance". *System* 36: 423–436.

Lewandowsky, S., & Farrell, S. 2008. "Phonological similarity in serial recall: constraints on theories of memory". *Journal of Memory and Language* 58: 429-448.

Logie, R. H., Della Sala, S., Wynn, V., & Baddeley, A. D. 2000. "Visual similarity effects in immediate verbal serial recall". *The Quarterly Journal of Experimental Psychology* 53A: 626-646

Macmillan English dictionary for advanced learners. 2007 (2ⁿᵈ ed). Oxford: Macmillan Publishers Ltd.

Macnamara, B., Moore, A., & Conway, A. 2011. "Phonological similarity effects in simple and complex span tasks". *Memory and Cognition* 39: 1174–1186.

McCarthy, M., & O'Dell, F. 2005. *English collocations in use*. Cambridge: Cambridge University Press.

____. 2008. *English collocations in use. Advanced*. Cambridge, UK: Cambridge University Press.

Martin, K. I., & Ellis, N. C. 2012. "The roles of phonological STM and working memory in L2 grammar and vocabulary learning". *Studies in Second Language Acquisition* 34: 379-413.

Merritt, Paul S., Edward L. DeLosh & Mark A. McDaniel. 2006. "Effects of word frequency on individual-item and serial order retention: Tests of the order-encoding view." *Memory and Cognition* 34(8). 1615-1627.

Nattinger, J., & DeCarrico, J. 1992. *Lexical phrases and language teaching*. Oxford, UK: Oxford University Press.

Nekrasova, T. 2009. "English L_1 and L_2 speakers' knowledge of lexical bundles". *Language Learning* 59: 647–686.

Nelson, D. L., Fosselman, J. R., & Peebles, J. W. 1971. "Words as phonological sequences". *Journal of Experimental Psychology* 87: 361–366.

Nesselhauf, N. 2005. *Collocations in a learner corpus*. Amsterdam: John Benjamins.

O'Brien, I., Segalowitz, N., Collentine, J., & Freed, B. 2006. "Phonological memory and lexical, narrative and grammatical skills in second language oral production by adult learners". *Applied Psycholinguistics* 27: 377-402.

Oxford collocations dictionary for advanced learners of English. 2002. Oxford: Oxford University Press.

Peters, E. 2012. "Learning German formulaic sequences: The effect of two attention-drawing techniques". *Language Learning Journal* 40: 65–79.

Richards, J.C., & Bohlke, D. 2011. *Four corners*. Cambridge: Cambridge University Press.

Schmidt, R.W. 2001. "Attention". In P. Robinson (ed), *Cognition and Second Language* Instruction, 3–32. Cambridge: Cambridge University Press.

Speciale, G., Ellis, N. C., & Bywater, T. 2004. "Phonological sequence learning and short-term store capacity determine second language vocabulary acquisition". *Applied Psycholinguistics* 25: 293-321.

Steinel, M.P., Hulstijn, J.H., & Steinel, W. 2007. "Second language idiom learning in a paired-associate paradigm: Effects of direction of learning, direction of testing, idiom imageability, and idiom transparency". *Studies in Second Language Acquisition* 29: 449–484.

Stengers, H., Boers, F., Housen, A., & Eyckmans, J. 2010. "Does 'chunking' foster chunk-uptake?" In S. De Knop, F. Boers & A. De Rycker (eds), *Fostering language teaching efficiency through Cognitive* Linguistics, 99–117. Berlin: Mouton de Gruyter.

____. 2011. "Formulaic sequences and L2 oral proficiency: Does the type of target language influence the association?" *International Review of Applied Linguistics* 49: 321–343.

Taylor, J. 2006. "Polysemy and the lexicon". In G. Kristiansen, M. Achard, R. Dirven and J. Ruiz de Mendoza Ibanez (eds), *Cognitive Linguistics: Current applications and future perspectives*, 51—80. Berlin: Mouton de Gruyter.

Tulving, E., & Kroll, N. 1995. "Novelty assessment in the brain and long-term memory encoding". *Psychonomic Bulletin and Review* 2: 387-390.

Walker, I., & Hulme, C. 1999. "Concrete words are easier to recall than abstract words: evidence for a semantic contribution to short-term serial recall". *Journal of Experimental Psychology: Learning, Memory, and Cognition* 25: 1256–1271.

Webb, S., Newton, J., & Chang, A. 2013. "Incidental learning of collocation". *Language Learning* 63: 91—120.

Willis, D. 1990. *The Lexical Syllabus*. London: Harper Collins.

Wray, A. 2002. *Formulaic language and the lexicon.* Cambridge, UK: Cambridge University Press.

____. 2012. "What do we (think we) know about formulaic language? An evaluation of the current state of play". *Annual Review of Applied Linguistics* 32: 231-254.

Wolter, B., & Gyllstad, H. 2011. "Collocational links in the L2 mental lexicon and the influence of L1 intralexical knowledge". *Applied Linguistics* 32: 430–449.

Yamashita, J., & Jiang, N. 2010. "L1 influence on the acquisition of L2 collocations: Japanese ESL users and EFL learners acquiring English collocations". *TESOL Quarterly* 44: 647–668.

Appendix

The questionnaire used for collecting concreteness-imageability ratings of the stimulus collocations. (On account of space constraints, not all the collocations are shown.)

How concrete / imageable is each word in the 2st column when it follows the word in the 1st column? Could you give each word in the 2nd column a concreteness/imageability rating of from 10 (the most) to 1 (least)?		
Leftward collocate	Rightward collocate	Concreteness-Imageability Score (1-10)
Cloth	COAT	
a question	CONCERNING	
Private	PROPERTY	
…	…	…
Cloth	BAG	
a question	REGARDING	
Private	COLLECTION	
…	…	…