

**WHEN DOES ASSONANCE MAKE L2 LEXICAL PHRASES
MEMORABLE?***Frank Boers, Victoria University of Wellington, New Zealand**Seth Lindstromberg, Hilderstone College, UK**June Eyckmans, Ghent University, Belgium***1. INTRODUCTION**

Among the challenges that second language learners face is that of acquiring a large number of lexical phrases such as collocations and idiomatic expressions (e.g. Pawley & Syder, 1983; Willis, 1990; Nattinger & DeCarrico, 1992; Lewis, 1993). There is evidence that post-childhood learners master this dimension of L2 vocabulary very slowly (e.g. Li & Schmitt, 2010; Laufer & Waldman, 2011). In recent years, researchers have tested diverse proposals about how learners can be helped to acquire L2 phrases (see Boers & Lindstromberg, 2012). These proposals have included adapting input texts so that they are flooded with instances of selected lexical phrases (e.g. Webb, Newton & Chang, 2013), highlighting and/or glossing strong collocations in written texts (e.g. Peters, 2012), engaging learners in contrastive analysis of collocations (e.g. Laufer & Girsai, 2008); presenting learners with worksheets of discrete-item exercises on collocations (e.g. Boers, Demecheleer, Coxhead & Webb, 2014) and integrating formulaic word strings into fluency practice (e.g. Wood, 2010). With regard to figurative idioms and some phrasal verbs, some researchers have proposed ways of stimulating cognitive engagement by pointing out the imagery behind these expressions (Boers, 2013). Also, with regard to collocations, it is sometimes feasible to point to plausible semantic reasons why particular words seek each other's company. For example, *commit* collocates systematically and probably analogically with nouns and noun phrases denoting criminal action such as *a crime*, *an offence*, *murder* and so on (Boers & Lindstromberg, 2009; Liu, 2010). In this article, we explore an additional channel for stimulating learners' engagement with certain lexical phrases – drawing learners' attention to plausible *phonological* reasons why words seek each other's company.

The number of lexical phrases available in a language is vast, and since time for deliberate language study is far too limited to tackle more than a small fraction of them, one has to be hopeful that many will be picked up by learners without the benefit of pedagogic intervention. One of the questions this raises is whether some phrases stand a better chance of being picked up than others. Clearly, many factors are likely to influence the chances of incidental acquisition. One is frequency of encounters (e.g. Siyanova-Chanturia, Conklin & van Heuven, 2011; Webb, Newton & Chang, 2013). Another is degree of semantic transparency, a variable particularly pertinent in the case of idioms (e.g. Steinel, Hulstijn & Steinel, 2007). Yet another factor is the availability of equivalent word strings in the learner's L1 (e.g. Wolter & Gyllstad, 2011). The factor we explore in the present article,

however, is a phonological feature that may make word combinations relatively noticeable and easy to acquire, namely, assonance.

We define assonance as the occurrence of the same simple or complex vowel in prominent syllables of two or more content words in a phrase, for example, *a good look* and *it's high time*. Assonance occurs as a component of prototypical rhyme (*deep sleep*), clipped rhyme (*go with the flow*) and near (or slant) rhyme (*back in action, hot spots*). None of the ten assonant stimulus expressions used in the experiments reported further below show rhyme or near rhyme and only one (*fair share*) may be regarded as a case of clipped rhyme. One motive for focusing on “mere” assonance is that it is much more common in the English phrasal repertoire than forms of rhyme. For example, according to Boers and Stengers (2008), only about 2 percent of English idioms rhyme, whereas, as will be seen, the percentage is much greater for assonance. Another motive for not focusing on prototypical rhyme is that the mnemonic advantage of rhyme has already been documented in the literature of psycholinguistics research, while there is little or no comparable evidence from that discipline for a mnemonic advantage of assonance (see section 3 below).

Our reason for hypothesizing that the presence of assonance may facilitate acquisition of L2 lexical phrases from exposure is as follows. Learning vocabulary from exposure appears to be an incremental process, whereby each encounter with an item strengthens any representation in memory left from previous encounters. In the case of a lexical phrase, such strengthening may include strengthening inter-word bonds (or, technically, syntagmatic intra-lexical associations). The cumulative consolidation process is unlikely to take hold if the memory trace, or traces, left by earlier encounters with the item have faded away by the time it is re-encountered. In other words, the pace of incremental learning of an item of vocabulary is likely to be influenced by the relative durability of previously formed memories of the item. It is in that regard that we investigate further below whether phrases that manifest assonance have a comparative advantage (all else being equal) over other phrases that manifest no inter-word phonological similarity. Why we deem assonance worthy of investigation in this light is explained in the following two sections.

2. THE INCIDENCE OF ASSONANCE IN ENGLISH PHRASEOLOGY

Instances of assonance abound in certain classes of lexical phrases. For instance, even after discounting instances of rhyme, about 25 percent of English proverbs assonate (e.g. *time flies, variety is the spice of life*) (Lindstromberg, 2012). To estimate how abundant assonance is among English idioms in a broader sense of that term, we examined the *Oxford Idioms Dictionary for Learners of English* (2006), tallying all defined idioms that include, in addition to any verbs, at least two non-verb, non-pro-form content words. (Framing our search in this way enabled us largely to avoid having to decide whether variants such as *get the boot* and *give somebody the boot* represent one idiom or two.) Of 2906 expressions deemed to satisfy our count criteria, 392 (13.5%) show assonance (e.g. *a dead end, have the patience of a saint, the length and breadth of, high and mighty*).

A subset of the idioms defined in this same dictionary, so-called “binomials” (e.g. *win or lose; cut and run*) was chosen for inferential statistics. Among the 197 currently used binomials found in the dictionary, 25 (12.7%) show a form of assonance. To determine

whether this incidence is likely to be the result of chance, we split each binomial after the conjunction (e.g. *cut and // run, win or // lose*) and created a randomized list of the lopped off, final parts (e.g. ... *run, ... lose*). This jumbled list of final parts was placed against the list of first parts, which was still in its original order. Reading crosswise yielded 197 random combinations (e.g. *cut and lose*). This procedure was then repeated to yield a total of 394 manufactured binomials randomly composed with halves of the original real binomials. Among these manufactured binomials, the incidence of assonance was only 2.8 percent (11 out of 394), which indicates that the incidence of assonance in real binomials is significantly greater than chance. Pearson's *chi* square = 22.5, $p < .0001$, $phi = .20 \approx d = .41$. This suggests that within the English repertoire of idioms there is a surplus of assonance – namely, the amount of assonance that there actually is minus the amount that there would be by chance – and this points to the possibility that the surplus exists because assonance privileges the conventionalization of phrases that manifest it.

It might be objected that idioms are seldom suitable as priority targets for language learning because (and this we do not dispute) the frequency of any given idiom is likely to be low (Moon, 1998). We leave it to others to argue that idioms might nevertheless be worth targeting (e.g. Simpson & Mendis, 2003). Rather, we will show that assonance also occurs above chance in much higher frequency bands than the lowly ones in which most idioms dwell. From a ranked list of the 5000 most frequent lemmas in the Corpus of Contemporary American English (COCA, Davis 2008-2013) we selected the 100 most frequent monosyllabic adjectives (excluding *just* and *still* on account of homonymy). Using the online COCA search facility, we identified the ten most frequent noun collocates (lemmas) of each adjective. Of the 1000 adjective + noun collocations thus collected, 97 (9.7%) were found to show assonance (e.g. *safe place, safe haven*). We determined that this too is a greater than chance incidence by creating a randomized list of the 1000 nouns, which we then allotted to the 100 adjectives ten at a time starting from the top of both lists. Among the resulting 1000 manufactured adjective + noun combinations we found only 42 instances of assonance (4.2%). A statistical comparison of the ratios 97:1000 and 42:1000 indicates that it would be very unlikely for there to be as many as 97 assonating collocations among the 1000 actual collocations if assonance occurred in them only by chance. Pearson's *chi* square = 23.39; $p < .0001$, $phi = .11 \approx d = .22$. (For evidence that alliteration too – for example, *a slippery slope* – occurs at greater than chance rates in English phraseology, see Lindstromberg and Boers [2009: 114] and Gries [2011].)

A discussion of the reasons for the surplus of assonance in English phraseology is beyond the scope of this article, but one speculation that springs to mind is that assonant word sequences have a comparative advantage in the competition for entrenchment in a community's phrasal repertoire owing to their relative memorability.

3. INDICATIONS THAT ASSONANCE MAY HELP TO MAKE LEXICAL PHRASES MEMORABLE

Evidence that assonance may make lexical phrases comparatively memorable in the context of TESOL has been reported by Lindstromberg and Boers (2008a). Participants ($N = 35$) were formed into pairs, and one member of each pair was given a pre-shuffled pack of

24 slips of paper. Each slip bore a different assonant collocation (e.g. *loud sound*) or a non-sound-repeating control (e.g. *soft touch*). In each pair, the person with the packet of slips dictated all the collocations to their partner, who then wrote them down. Then, working individually, each with a packet of slips, participants followed the instruction to sort the slips into one assonant and one non-asonant set. (The concept of assonance had been explained to them.) When the sorting task had been completed and the slips collected by the instructor, participants were asked to write down as many of the phrases as they could remember. One week after this free recall test, the participants were given a recognition test in which they were each given a jumbled list of 48 two-word collocations – the original 24 plus 24 similar foils, half of which are assonant. The participants’ task in this delayed test ($N = 25$) was to tick the collocations they had worked with the previous week. The assonant phrases showed superior memorability in both tests (respectively, $p = .0009$ and $p = .0002$, Wilcoxon Signed Ranks Test, 1-tailed), and a large positive effect was observed in each test: $d = .87$ and 1.03 , respectively. (Because Lindstromberg and Boers [2008a] did not state effect sizes, these were calculated retrospectively via new paired t -tests.)

Note, however, that in the experiment just summarized the sorting task that followed the dictation is likely to have raised the learners’ awareness of, and directed their attention to, the sound pattern at issue. Consequently, no light is shed on the question of whether assonance is *intrinsically* mnemonic, that is, whether it makes phrases extra retrievable even when learners’ attention is not explicitly directed to its presence. As it happens, there are reasons for scepticism about this latter possibility. It is well known, for example, that word onsets and word endings are good retrieval cues, but elements between the onset and the ending generally are not (Aitchison, 2003: 138–40, 210–11). For example, many psycholinguistic studies of the effects of phonological similarity on the retrieval of L1 words have revealed an advantage for rhyme in certain recall tasks but none that we know of has found an advantage for simple assonance. Macnamara, Moore and Conway (2011), for instance, carried out three experiments in which participants were exposed to sets of rhyming words (e.g. *shawl, hall, doll*), phonologically dissimilar words (e.g. *deck, frown, sea*) and words showing assonance (*cat, man, cap*). It was only in the case of rhyming words that they found (very strong) evidence that phonological similarity can facilitate short term item recall. In their third experiment, the one involving assonant words (some of which also alliterate, though), the observed effect of phonological similarity on recall was medium $\eta_p^2 = .08$ but significance was not achieved: $F(1,39) = 3.23$, $p = .08$ (2-tailed). The authors speculate that rhyme serves as a “list retrieval cue”, whereby a participant’s knowledge that all the words in a recently encountered set belong to the same category (e.g. words with the same VC ending’) facilitates those words’ retrieval.

Unfortunately, multiword items do not appear to have figured in such studies. But application of the list retrieval hypothesis to the case of retrieval of lexical phrases in L2 may run as follows. After having noticed the rhyme in, say, the binomial expression *moan and groan*, a learner may subsequently be able to use this knowledge so that recall of one of the key words in the rhyming expression (e.g. *moan*) can serve as a retrieval cue for the other rhyming word (e.g. *groan*). If, however, the sound repetition attracts little notice in the first place, then no phonological retrieval cue will be available. The assonant phrase *hit and*

miss may be such a case, for the reasons that the repeated vowel is short and lax and the sound repetition does not include the word-end consonants.

An additional reason for suspecting that assonance may not be a decisive factor in making phrases memorable, unless the learners' attention is explicitly directed to it, comes from findings concerning the effect of another kind of inter-word phonological repetition, namely, alliteration (e.g. *cut corners*). In a study bearing a strong resemblance to their aforementioned study on assonance, Lindstromberg and Boers (2008b, experiment 1) gave EFL students jumbled paper slips containing phrases that either alliterate (e.g. *sea salt*) or show no sound repetition (e.g. *bath soap*) and were asked to dictate them to each other. They were then given the task of sorting the phrases into an alliterative set and a non-alliterative set. In an unannounced, immediate free recall test and a delayed recognition test, the alliterative phrases were found to have been remembered significantly better, and large positive effects were observed – immediate test: Cohen's $d = .88$; recognition test: $d = .93$ (again the effect sizes reported here were calculated retrospectively). In a more recent article, however, Boers, Lindstromberg and Eyckmans (2012) acknowledge that the superior recall rates of the alliterative phrases may have been an artefact of the sorting task that was part of the treatment, as this task may have directed the participants' attention more to the alliterative phrases than to the others. Boers, Lindstromberg and Eyckmans (2012) therefore carried out a new experiment in which the treatment was confined to a dictation task involving no explicit awareness-raising regarding alliteration. An immediate recall test showed better recall of the alliterative phrases (e.g. *private property*) than of the non-alliterative controls (e.g. *private collection*). But the difference was now just narrowly significant ($p = .05$, 1-tailed) and the observed effect ($d = .48$, also calculated retrospectively), while still respectable, was much smaller than that seen in the previous study. There was no delayed test. In a follow-up (Boers, Lindstromberg & Eyckmans, 2013, experiment 1), an advantage for alliteration was again found in the immediate recall test ($p = .02$, $d = .34$) but this disappeared in the one-week delayed recall test ($p = .45$, $d = .02$). The combined findings suggest that, although alliteration appears to have at least a modest intrinsic mnemonic advantage, learners are likely to reap its full mnemonic benefit only when their attention is directed to it. The question we address in the two experiments now to be described is whether the same applies to assonance.

Experiment One is analogous to Boers, Lindstromberg and Eyckmans (2012), but with the focus on assonance instead of alliteration. In this experiment, EFL students' recall of assonant and non-assonant phrases was compared after a dictation activity that included no steps to raise the participants' awareness of the sound pattern at issue. As will be seen, this experiment has furnished only weak evidence of a mnemonic advantage for assonance. Because of this, we conducted a second experiment with an awareness-raising component added to the procedure in order to evaluate the impact of this intervention.

3. EXPERIMENT ONE

3.1. PARTICIPANTS, MATERIALS AND PROCEDURE

Participants were 55 undergraduate students at a university in New Zealand enrolled in their third year of a TESOL programme. Their mother tongue was Malay or Chinese. They

all had a vocabulary of 7000+ word families as gauged by Nation's *Vocabulary Size Test* (Nation & Beglar, 2007, available from <http://www.victoria.ac.nz/lals/about/staff/paul-nation>).

A set of 20 two-word adjective+noun and noun+noun phrases, 10 assonant and 10 non-asonant ones, was compiled for use in a dictation task (see Table 1). Efforts were made to balance matched assonant and non-asonant targets with respect to potential confounding variables. As a first step in creating matched sets, we compiled a long list of assonant and control phrases in pairs such that each phrase in a pair shares a word, has the same syntactic structure and is of similar length (e.g. *high price / high rate*). To control for novelty effects, we chose only words of relatively high frequency (all belonging to the most frequent 3000 word families according to Nation's base words list calculated from *British National Corpus* data). Choosing stimulus phrases consisting only of familiar words in an experiment on learning L2 multiword items is justified by the observation that many lexical phrases comprise high-frequency words (e.g. Martinez & Murphy, 2011), which means that a large part of learning formulaic language consists not in learning new words but in strengthening the bond between familiar words. The selection of stimulus phrases took into account their individual whole phrase frequencies as verbatim forms (not lemmas) as given by COCA. Table 1, columns 3 and 7, shows that the mean frequency of the chosen assonant expressions was higher than that of their non-asonant controls. Not shown in a table, the mean frequencies of the leftward and rightward collocates of the assonant phrases are also greater than those of the controls (by, respectively, 21% and 3%). At first glance, this unbalance in mean frequencies may seem problematic for the design of the study. However, there is ample evidence that item frequency tends to correlate *negatively* with lexical recall in tests such as those described below (e.g. Merrit, DeLosh & McDaniel, 2006). In other words, if we were to find better recall of the assonant phrases in our experiment, this would be *despite* their higher frequency. As will be seen further below, the expectation that greater frequency would *not* advantage recall of the assonant phrases was borne out.

A factor that *is* known to positively influence recall is concreteness of meaning. To control for this well-known effect, we asked eight native speakers to rate candidate stimulus items for concreteness of meaning on a five-point scale (1 - 1.5 - 2 - 2.5 - 3). The variance of the eight per-rater mean ratings, across the 20 collocations, is .03 and the mean of the variances ($N = 20$) of the eight ratings is .18. Correlations were calculated between the mean per collocation ratings of four randomly selected raters and the mean ratings of the remaining four raters. This was done ten times: $Mn r = .89$ (calculated via r to z transformations); range, $r = .80 - .94$. The mean correlation between the ratings of each rater and the other seven is $r = .80$, still a very strong correlation. The averaged per collocation ratings were used to guide selection of target expressions with a view to controlling for concreteness. As can be seen in Table 1 (columns 2 and 6), the sets of assonant and non-asonant phrases appear well-matched for concreteness of meaning. It should be noted that for this experiment, as well as for Experiment Two (reported further below) a different set of stimulus expressions was used than those used in Lindstromberg and Boers (2008a) because the selection of those expressions was not guided by informant ratings of concreteness.

The stimulus expressions were dictated to the participants in the following order, with ones in the assonant and control sets alternating, with a control expression coming last: *town square, deep sea, soft ground, gift list, quick stop, small talk, nice place, high price, fair deal, main gate, town house, deep hole, soft cloth, check list, quick trip, plain talk, safe place, high rate, fair share, main road*. To counter primacy and recency effects, the dictation started and ended with additional phrases not included in subsequent analysis (*tool box* and *firm hold*). The teacher recited each collocation or compound twice and asked the students to repeat it out loud after him (ostensibly to make sure they had heard him well) before they wrote it down on paper. The students were not informed a test would follow; they had only been told the activity served the purpose of simulating a classroom procedure, the point of which would be explained to them later. After all the items had been written down, the dictation sheets were collected. Subsequently, the students were asked to write down on a new sheet of paper as many of the dictated items they could remember, in any order. These sheets were collected. The students were asked if they had noticed sound repetition in some of the dictated expressions. While some said they had noticed the recurrence of words, there was no indication that any of the students had been aware of the presence of assonance.

3.2. RESULTS AND DISCUSSION

The dictation sheets that were collected from the students before the recall test showed that all the students had heard and written down the dictated phrases correctly. The fact that no spelling errors were found (either in the dictation or the recall test) suggests that the dictated words were indeed familiar to the students, as expected.

In the unannounced post-test, participants recalled more assonant items than controls (see Table 1 for *per item* recalls). However, statistical significance was not achieved ($MD = 1.80$; $t(54) = 1.51$; $p = 0.07$, paired t -test, 1-tailed). The estimated effect ($d = .19$) is much smaller than that reported in Lindstromberg and Boers (2008a), where the students had been explicitly instructed to attend to instances of assonance in the set of stimulus expressions.

As a check, we calculated the Spearman's rank correlation (r_s) between the recall scores and concreteness ratings of all the dictated items. This yields $r_s(18) = .46$ ($p = .04$, 2-tailed), which underscores the importance of having controlled for concreteness (Table 1). As expected, a negative correlation, $r_s(18) = -.40$ ($p = .09$, 2-tailed), was found between recalls and phrase frequency. This rules out the possibility that the assonant phrases were better recalled not because of the presence of assonance but because of frequency differences. After all, their mean frequency is higher than that of the controls (Table 1). The same holds for the correlations between recalls and left and right collocate frequency (respectively, $r_s = .01$ and $-.34$).

If the mnemonic effect of assonance is weak in the absence of teacher-led attention direction, then it may be asked whether the effect is stronger when assonant phrases are made objects of explicit attention direction. As already mentioned, Lindstromberg and Boers (2008a) have reported evidence that this is a strong possibility. Experiment Two was

set up to test this possibility further by using the same stimulus items as in Experiment One, thus allowing a direct comparison between the two data sets.

Table 1. Experiment One: Stimulus phrases, mean concreteness ratings, phrase frequencies in COCA, and number of free recalls. The maximum possible score per phrase was 55.

Assonant Phrases	Concr. Ratings	Freq'cies ^a	Recalls	Matched Controls	Concr. Ratings	Freq'cies ^a	Recalls
<i>town house</i>	2.75	556	25	<i>town square</i>	2.87	616	21
<i>deep sea</i>	2.75	232	36	<i>deep hole</i>	2.75	160	34
<i>soft cloth</i>	2.75	57	28	<i>soft ground</i>	2.50	52	25
<i>gift list</i>	2.50	74	22	<i>check list</i>	2.87	65	22
<i>quick trip</i>	1.63	164	10	<i>quick stop</i>	1.63	107	9
<i>small talk</i>	1.37	841	23	<i>plain talk</i>	1.00	36	25
<i>safe place</i>	1.63	894	7	<i>nice place</i>	1.50	390	9
<i>high price</i>	1.75	847	18	<i>high rate</i>	1.50	684	12
<i>fair share</i>	1.00	1086	15	<i>fair deal</i>	1.00	105	10
<i>main gate</i>	2.50	233	22	<i>main road</i>	2.87	753	21
TOTAL			206				188
MEAN	2.06	498	20.6		2.05	297	18.8
SD			8.1				8.9
^a These frequency data were collected on 18 February 2013							

4. EXPERIMENT TWO

4.1. PARTICIPANTS, MATERIALS AND PROCEDURE

The participants were 44 language majors at a university college in Belgium enrolled in their first year of a bachelor's programme. Their mother tongue was Dutch, and English was one of two foreign languages in their programme. Exposure to English is very common in their part of the world (e.g. from TV and the media in general), and they had already had English courses for six years at secondary school. Their proficiency in English was estimated by their regular teachers of English to be at least level B2 according to the descriptors of the Common European Framework of Reference (but no general proficiency test was administered to ascertain this). It was therefore deemed highly unlikely that any of the words used in the dictation would be unfamiliar, as these are all high-frequency words.

Since the experiment was to be a partial replication of Experiment One, with the aim of investigating the impact of treatment, the same 20 stimulus phrases were used. To counter primacy and recency effects, the dictation began and ended with the additional phrases *tool box* and *firm hold*, as in Experiment One. The treatment differed from that of Experiment

One specifically in that the students were asked to identify instances of assonance among the stimulus phrases, which were dictated in a randomized order. Beforehand, *assonance* was defined for the participants as the recurrence of the same vowel in two words, with *black cat* and *red fox* serving as illustrations of assonance and no assonance, respectively. The phrases were each called out by the teacher and the students repeated them after her. After each stimulus expression had been repeated in this way, the participants wrote it down and indicated by means of a plus or minus sign whether they thought it included vowel repetition. The full set of expressions was read out again, in a different randomized order, and the students again repeated each after the teacher, and checked their judgement about the presence or absence of vowel repetition. At this point, the dictation sheets were collected. The students were not informed a test would follow. It is relevant here that in Lindstromberg and Boers (2008a) the students manually sorted assonant and control phrases that were given to them on separate slips of paper. It was decided not to adopt this procedure in the present study because of classroom logistics. The procedure just described, whereby the students categorized the stimulus phrases on their dictation sheet, also made it easier for us to verify the accuracy of that categorization.

The students were subsequently asked to write down as many of the dictated phrases they could remember on a new sheet. These sheets were then collected. At the end of the class (about one hour after the first recall test), a second free recall test followed. One day later a cued recall test was administered. The teacher read out each of the ten shared first words of the twenty phrases and asked the students to write down, in full form, those they remembered from the dictation activity. A cued format was deemed more suitable for this delayed test than the more challenging free recall format, considering likely attrition in the course of 24 hours. The cues were given aurally rather than in printed form for the sake of congruency with the input format that was used in the treatment phase (i.e. a dictation).

4.2. RESULTS AND DISCUSSION

The data from the dictation + assonance identification task show that all students heard and spelt the dictated items correctly and the set of assonant phrases were correctly identified by nearly all participants.

The results of the first free recall test show that participants were highly likely to recall more assonant phrases than non-asonant controls (see Table 2 for *per item* recalls). A paired *t*-test showed this difference to be significant ($MD = .89$; $t(43) = 3.03$; $p = .002$, 1-tailed), and a medium effect was observed ($d = .45$). These results are consistent with the thesis that an explicit attempt to raise learners' awareness of the presence of sound repetition leads to the formation of comparatively strong memory traces. It is perhaps worth noting that the correlation between *per item* recalls in the immediate recall tests of Experiments One and Two is strong ($r_s = .62$; $p = .003$, 1-tailed), which suggests that some of the factors which influenced item recall played a part in both conditions.

Table 2. Experiment Two: Free and cued recall data. The maximum possible score per phrase was 44.

Assonant Phrases	Scores on the Post-tests of Recall			Matched Controls	Scores on the Post-tests of Recall		
	Free		Cued		Free		Cued
	Quasi immediate	1 hr delay	1-day delay		Quasi immediate	1 hr. delay	1-day delay
<i>town house</i>	25	26	25	<i>town square</i>	22	18	16
<i>deep sea</i>	27	19	28	<i>deep hole</i>	15	11	10
<i>soft cloth</i>	14	8	14	<i>soft ground</i>	7	6	3
<i>gift list</i>	12	7	14	<i>check list</i>	21	17	26
<i>quick trip</i>	12	9	14	<i>quick stop</i>	7	3	5
<i>small talk</i>	10	9	17	<i>plain talk</i>	12	11	3
<i>safe place</i>	2	3	11	<i>nice place</i>	4	4	6
<i>high price</i>	13	10	11	<i>high rate</i>	4	5	3
<i>fair share</i>	24	18	18	<i>fair deal</i>	9	6	5
<i>main gate</i>	12	11	10	<i>main road</i>	11	9	9
TOTAL	151	120	162		112	90	86
MEAN	15.1	12	16.2		11.2	9	8.6
SD	7.4	6.5	5.7		6.1	5.0	7.0

The results of the second recall test that was given after a delay of one hour also show superior recall of the assonant phrases (again $MD = .89$; $t(43) = 3.03$, $p = .002$, and $d = .45$). In the third post-test, the delayed cued recall test, participants once again recalled the assonant phrases more often than their controls ($MD = 2.17$; $t(34) = 5.6$; $p < .0001$), with the observed effect being particularly strong ($d = 1.15$).

The correlations ($df = 18$) between phrase frequencies and each of the three sets of recall scores are, in time order, $r_s = -.03$ ($p = .89$, 2-tailed), $.09$ ($p = .70$) and $.27$ ($p = .20$). For each test, the average of correlations between recalls, on the one hand, and combined frequencies of leftward and rightward collocates, on the other, is negative: $-.18$, $-.03$ and $-.04$, respectively. Overall, it seems safe to say that greater frequency did not favour recall, and is thus no alternative explanation for the better recall of the assonant phrases. In contrast, the consistently robust correlations for concreteness of meaning – $r_s = .48$ ($p = .03$), $.40$ ($p = .08$) and $.40$ ($p = .07$) – once again underscore the importance of having controlled more rigorously for this variable when compiling sets of stimulus phrases.

5. CONCLUSIONS AND LIMITATIONS

The aim of the present study was to explore a factor that may contribute to the entrenchment of L2 word sequences in memory. If encounters with assonant sequences leave relatively durable memory traces, then (all else being equal) these sequences could enjoy a marked comparative advantage over others in becoming entrenched. Given that assonance is not rare in (English) phraseology, positive evidence of a mnemonic effect would be encouraging news concerning incidental acquisition of lexical phrases. However, the results of Experiment One suggest that assonance may not be a strong positive factor in this regard. Still, the observed positive effect on immediate recall, $d = .19$, and the marginal p value (.07) indicate that there is as yet no foreclosure on the possibility that assonance may to a small degree facilitate short term recall even without steps to raise learners' awareness of its presence. Larger studies than ours, which used only 20 stimulus expressions, might well find a significant effect after the same treatment. If assonance did facilitate naturalistic phrase learning, how might that proceed? One possibility is that when an assonant lexical phrase is re-encountered after a short lapse of time – in an on-going conversation, for instance – memory traces of the most recent previous encounter(s) are especially likely to be activated in the case of a phrase showing assonance (or rhyme or alliteration) than would be the case for a phrase showing no sound repetition, all else being equal.

The findings of Experiment Two, particularly the robust positive effect sizes observed after a delay of an hour or more – $d = .45$ in free recall and 1.15 in cued recall – suggest that assonant L2 lexical phrases can be rendered significantly easier to recall if the assonance becomes the object of conscious attention, as a result of pedagogic intervention, for example. Exploiting the presence of assonance in lexical phrases as a way of helping learners remember these phrases is easy and straightforward. Instead of a dictation based activity – which we opted to use for the purpose of the experiment – teachers can simply direct their students' attention to the presence of assonance (and rhyme and alliteration) in the lexical phrases they happen to encounter in their course materials, as the opportunity presents itself. This must be a welcome addition to the teacher's tool box for helping students come to grips with formulaic language, not only because it is a very brief intervention, but also because it can be applied to a non-negligible fraction of (English) phraseology. While assonance is manifested in many phrases such as idioms where pathways for semantic engagement are available as well to foster retention (Boers, 2013), its manifestation in phrases such as compounds and collocations whose lexical composition is not easily accounted for with reference to semantics may be particularly exploitable. Pointing out the phonological repetition in those lexical phrases is actually one of the few tricks that we know of that can stimulate learners' engagement specifically with the *form* of targeted phrases.

Naturally, the effectiveness of classroom activities that focus on patterns of sound repetition is bound to vary across types of activity and from learner to learner. However, clarification of the extent to which particular pedagogical means of directing attention to assonance do or do not increase learners' engagement with targeted phrases must await further classroom-based research, as must clarification of variation in the extent to which learners vary in how much they profit from such interventions.

Certain limitations of the study must be acknowledged. First, we recognize that corpus frequency is but an indirect way of estimating the likely extent to which the participants were familiar with the stimulus phrases. While we can feel confident that none of the phrases was novel to the participants, we did not administer a pre-test to more directly establish equivalence between the assonant stimuli and their controls as regards our participants' degree of familiarity with them. Secondly, the "nuisance" variables we attempted to control for (e.g. concreteness of meaning) may not be the only important ones. Most notably, we made no systematic effort to match the assonant and control sets for potential L1 cognate effects; that was because the set of stimuli was compiled for use with different student groups exhibiting diverse L1 profiles. However, the availability of equivalent L1 collocations has been shown to considerably affect L2 collocation processing (Wolter & Gyllstad, 2011), and this factor should definitely be taken account of in any follow-up studies. Thirdly, it is conceivable that Experiment One failed to yield evidence of a mnemonic advantage of assonance because each assonant expression shared its leftward collocate with a control expression. It is likely that recall of one (e.g. *town house*) tended to prompt recall of the other (*town square*). To the extent that this occurred, the chance of finding a differential recall rate will have been reduced. Boers, Lindstromberg and Eyckmans (2012) matched sound repeating expressions (specifically, alliterative ones) and controls in the same way and in that experiment a significant medium effect of alliteration was detected nevertheless. However, alliterative phrases may be more memorable than assonant ones, all else being equal. An additional important limitation lies with the test formats used. These were recall tests, and perhaps they were not sensitive enough to measure differences in the degree of the items' accessibility in the lexicon. It is perhaps revealing in this regard that some of the students managed to recall a dictated item in the second post-test which they had failed to recall in the first. Failure to reproduce an item in a free recall test is thus not hard evidence that the memory trace left by that item has faded completely. Recognition tests with a reaction time component might reveal differential uptake of assonant and non-asonant stimuli where our recall tests failed. Ours were experiments conducted in (and constrained by) a classroom environment. Laboratory-type experiments using paradigms such as timed lexical decision tasks, self-paced reading and eye-tracking (e.g. Conklin & Schmitt, 2008; Ellis, Simpson-Vlach & Maynard, 2008; Durrant & Doherty, 2010; Siyanova-Chanturia, Conklin & Schmitt, 2011; Wolter & Gyllstad, 2011) would be very welcome to complement and fine-tune the preliminary findings we have presented here.

Finally, it must be noted again that our experiments were not about the learning of new words or new lexical phrases. It is to be hoped that future studies will address the effect of participants' engagement with novel assonant and control phrases, that is, ones which either contain unfamiliar words or which are novel combinations of words already acquired.

REFERENCES

- Aitchison, J. 2003. *Words in the Mind* (3rd ed.). Oxford: Blackwell.
- Boers, F. 2013. Cognitive Linguistic Approaches to Second Language Vocabulary: Assessment and Integration. *Language Teaching: Surveys and Studies*, 46(2), 208–224.

- Boers, F., M. Demecheleer, A. Coxhead & S. Webb. 2014. Gauging the Effects of Exercises on Verb-Noun Collocations. *Language Teaching Research*, 18(1), 57–74.
- Boers, F. & S. Lindstromberg. 2009. *Optimizing a Lexical Approach to Instructed Second Language Acquisition*. Basingstoke: Palgrave Macmillan.
- Boers, F. & S. Lindstromberg. 2012. Experimental and Intervention Studies Formulaic Sequences in a Second Language. *Annual Review of Applied Linguistics*, 32, 83–110.
- Boers, F., S. Lindstromberg & J. Eyckmans. 2012. Are Alliterative Word Combinations Comparatively Easy to Remember for Adult Learners? *RELC Journal*, 43(1), 127–135.
- Boers, F., S. Lindstromberg & J. Eyckmans. 2013. Is Alliteration Mnemonic without Awareness-raising? *Language Awareness*. DOI:10.1080/09658416.2013.774008.
- Boers, F. & H. Stengers. 2008. A Quantitative Comparison of the English and Spanish Repertoires of Figurative Idioms. In F. Boers and S. Lindstromberg (Eds.), *Cognitive Linguistic Approaches to Teaching Vocabulary and Phraseology* (pp.355–374). Berlin: Mouton Degruyter.
- Conklin, K. & N. Schmitt. 2008. Formulaic Sequences: Are They Processed More Quickly than Nonformulaic Language by Native and Nonnative Speakers? *Applied Linguistics*, 29, 72–89.
- Davies, M. 2008 to present. The Corpus of Contemporary American English. <http://www.americancorpus.org>. (Period of access: October 2011 to December 2012).
- Durrant, P. & A. Doherty. 2010. Are High-Frequency Collocations Psycholinguistically Real? Investigating the Thesis of Collocational Priming. *Corpus Linguistics and Linguistic Theory*, 6, 125–155.
- Ellis, N. C., R. Simpson-Vlach & C. Maynard. 2008. Formulaic Language in Native and Second Language Speakers: Psycholinguistics, Corpus linguistics, and TESOL. *TESOL Quarterly*, 42, 375–396.
- Gries, S. T. 2011. Phonological Similarity in Multiword Units. *Cognitive Linguistics*, 22, 491–510.
- Laufer, B. & N. Girsai. 2008. Form-focused Instruction in Second Language Vocabulary Learning: A Case for Contrastive Analysis and Translation. *Applied Linguistics*, 29, 694–716.
- Laufer, B. & T. Waldman. 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.
- Lindstromberg, S. 2012. Consonance in English Proverbs and Collocations. *Humanising Language Teaching*, 14(4). <http://www.hltmag.co.uk/aug12/mart03.htm>. (Date of access: 6 September 2013).
- Lindstromberg, S. & F. Boers. 2008a. Phonemic Repetition and the Learning of Lexical Chunks: The Mnemonic Power of Assonance. *System*, 36, 423–436.
- Lindstromberg, S. & F. Boers. 2008b. The Mnemonic Effect of Noticing Alliteration in Lexical Chunks. *Applied Linguistics*, 29(2), 200–222.
- Li, J. & N. Schmitt. 2009. The Acquisition of Lexical Phrases in Academic Writing: A Longitudinal Case Study. *Journal of Second Language Writing*, 18(2), 85–102.

- Liu, D. 2010. Going beyond Patterns: Involving Cognitive Analysis in the Learning of Collocations. *TESOL Quarterly*, 44(1), 4–30.
- Macnamara, B., A. Moore & A. Conway. 2011. Phonological Similarity Effects in Simple and Complex Span Tasks. *Memory and Cognition*, 39(7), 1174–1186.
- Martinez, R. & V. A. Murphy. 2011. Effect of Frequency and Idiomaticity on Second Language Reading Comprehension. *TESOL Quarterly*, 45, 267–290.
- Merritt, P., E. DeLosh & M. 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.
- Moon, R. 1998. *Fixed Expressions and Idioms in English*. Oxford: Clarendon Press.
- Nation, I. S. P. No date. *Vocabulary Size Test*. <http://www.victoria.ac.nz/lals/about/staff/paul-nation>. (Date of access: 6 September 2013).
- Nation, I. S. P. & D. Beglar. 2007. A Vocabulary Size Test. *The Language Teacher*, 31, 9–13.
- Nattinger, J. & J. DeCarrico. 1992. *Lexical Phrases and Language Teaching*. Oxford: Oxford University Press.
- Pawley, A. & F. H. Syder. 1983. Two Puzzles for Linguistic Theory: Nativelike Selection and Nativelike Fluency. In J. C. Richards and R. W. Schmidt (Eds.), *Language and Communication* (pp.191–225). London: Longman.
- Peters, E. 2012. Learning German Formulaic Sequences: The Effect of Two Attention-Drawing Techniques. *Language Learning Journal*, 40(1), 65–79.
- Simpson, R. & D. Mendis. 2003. *TESOL Quarterly*, 37(3), 419–441.
- Siyanova-Chanturia, A., K. Conklin & N. Schmitt. 2011. Adding More Fuel to the Fire: An Eye-tracking Study of Idiom Processing by Native and Non-native Speakers. *Second Language Research*, 27, 251–272.
- Siyanova-Chanturia, A., K. Conklin & W. van Heuven. 2011. Seeing a Phrase “Time and Again” Matters: The Role of Phrasal Frequency in the Processing of Multiword Sequences. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 37, 776–784.
- Steinel, M. P., J. H. Hulstijn & W. Steinel. 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.
- Webb, S., J. Newton & A. Chang. 2013 Incidental Learning of Collocation. *Language Learning*, 63(1), 91–120.
- Willis, D. 1990. *The Lexical Syllabus*. London: Harper Collins.
- Wolter, B. & H. Gyllstad. 2011. Collocational Links in the L2 Mental Lexicon and the Influence of L1 Intralexical Knowledge. *Applied Linguistics*, 32(4), 430–449.
- Wood, D. 2010. *Formulaic Language and Second Language Speech Fluency: Background, Evidence and Classroom Applications*. New York, NY: Continuum.

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