The Impact of Attrition on Vocabulary Knowledge among Saudi Teachers

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Abstract

This two-year longitudinal study tracks the extent of vocabulary attrition among Arabic-speaking English graduate teachers. Data were collected through pre-post tests of receptive and productive vocabulary knowledge. The results showed drastic attrition in vocabulary knowledge soon after the end of formal instruction followed by slight gain, although the gain was not quite back to the level of baseline achievement. Verbs and adjectives were more prone to attrition than nouns. The rate of attrition was greater for productive than receptive lexical knowledge. Interestingly, knowledge at peak attainment emerged as a predictor of attrition over time.

Keywords: vocabulary attrition, EFL, KAU, retention, initial knowledge, baseline

1. The State of Foreign Language Attrition Research

There has been a great deal of research on various aspects of language acquisition including vocabulary in the last three decades, and as a result we have witnessed new insights being gained, hypotheses generated and evidence and counterevidence cited (Bogaards & Laufer, 2004; Coady & Huckin, 1997; Meara, 1980; Milton, 2009; Nation, 1990, 2001; Nation & Webb, 2011; Peters, 2013; Schmitt, 2008, 2010; Tian & Macaro, 2012). However, there has been comparatively little research into lexical attrition specifically in the foreign language (FL) arena, describing key processes and how quickly or slowly lexical knowledge is forgotten. Yet, more recently attrition and retention of lexical knowledge by adults has received increased attention in the research literature (see Alharthi, 2012; Bahrick, 1984; de Bot & Weltens, 1995; Weltens, 1989). Previous empirical studies that have contributed significantly to the literature on FL attrition at the lexical level have been focused on situations where learners of English rarely use words they know after the conclusion of formal instruction (e.g. Abbasian & Khajavi, 2010; Bierling, 1990; Marefat & Rouhshad, 2007). However, equally interesting is attrition in situations where some possibly limited use is made of the FL after formal instruction has ceased.

To take a concrete example, the type of exposure to English for King Abdulaziz University (KAU) graduate students in Saudi Arabia is very often mainly – and in some cases even entirely – confined to the classroom. As a result, this limited exposure is likely to lead to lexical attrition over time. This would create a challenge for EFL majors who are supposed to build up a much larger lexical repertoire which then can help them with their teaching of English. By extension, it is possible that they may find it hard to retain the bulk of their vocabulary knowledge upon leaving KAU and therefore will start to lose their vocabulary. Thus, it appears that once students finish their formal study of English, they are less likely to use the target language.

The aim of this research then is to measure the extent of attrition and retention of vocabulary knowledge over time among EFL graduate students. The study focuses on one of the four settings of attrition outlined by de Bot and Weltens (1995): foreign language learners who upon leaving school, start losing their acquired foreign language skills. According to Weltens and Cohen (1989), further research into language attrition in various situations can throw a remarkable light on patterns and variables that researchers need to consider and which may have implications for the FL teaching profession.

2. Key Issues: A Dearth of Evidence in Studies of FL Vocabulary Attrition

Few studies have been focused on some of the independent variables that might influence FL lexical attrition. These include initial proficiency in or achievement of lexical knowledge, rate of attrition in vocabulary knowledge, type of vocabulary knowledge, such as receptive versus productive, and parts of speech (POS), such as noun, verb and adjective. These are briefly discussed below.

2.1 Attrition and Proficiency Level

One learner-internal variable that has been frequently reported to be important on subsequent attrition in the literature of FL attrition is the attained proficiency level (Bahrick, 1984). By initial proficiency is meant the learners' ability to recognize and produce the target vocabulary. However, to date there have been few studies which have addressed this issue directly. For example, research by Bahrick (1984) and Weltens (1989) failed to determine the effect of initial proficiency on the attrition of vocabulary. Such results have been due to imprecise measurements (e.g. of level of training and grades received) that have not accurately documented the relationship between proficiency and attrition. Similarly, Alharthi's (2012) findings revealed that the amount of attrition was the same for his participants regardless of their level of attainment. It would be extremely useful to employ more precise and appropriate lexical measurements that would help show the correlation between proficiency and attrition. Hence, this study examined the amount of prior lexical knowledge and the impact of this knowledge on the attrition process as measured by lexical achievement.

2.2 Rate of Attrition

Perhaps one of the most essential, yet at the same time most complicated key issues in language attrition research, is the rate of forgetting. There are two possible predictions made concerning attrition. The first is that attrition occurs soon after the learning process stops and then the rate of forgetting slows down over time. The second is that there is a level of language proficiency beyond which language skills become relatively immune to loss and the level of language proficiency is maintained. There is some evidence that a rapid decline of FL target vocabulary occurred soon after formal instruction had ended (Abbasian & Khajavi, 2010; Alharthi, 2012; Bahrick, 1984; Bierling, 1990; Weltens, 1989). Apart from Alharthi's (2012) study, there seems to be a lack of longitudinal research concerning the rate vocabulary attrition. The present study is designed to compensate for the scarcity of quantitative studies where the rate of vocabulary attrition is measured longitudinally at least two points in time.

2.3 Receptive Versus Productive Vocabulary Knowledge

Not only does lexical knowledge seem to be more prone to attrition than other aspects of language, such as grammar or phonology, but it is also the case that various types of word knowledge are affected to different degrees of attrition. This also holds true for receptive and productive types of lexical knowledge, as shown by Alharthi (2012), Bahrick (1984), Bierling (1990) and Marefat and Rouhshad (2007) who reported that productive lexical knowledge is more vulnerable to attrition than receptive lexical knowledge. Given the differences found in the attrition and maintenance of receptive and productive word knowledge, it might be predicted that this is due to the difficulty with which some lexical aspects are learned. That is, acquiring productive word knowledge took the greatest effort and the greatest amount of time and will therefore be the most susceptible to the force of attrition (Cohen, 1986). The present study aims to gain further understanding of the effect of attrition on receptive and productive word knowledge, relying on paper-pencil vocabulary measurements.

2.4 Parts of Speech

Another view is that POS affects the level of difficulty of learning words and therefore words belonging to some categories are more easily forgotten. Several factors have been identified to impact the learnability of FL vocabulary including words' grammatical properties, such as POS (Ellis & Beaton, 1993; Nation, 2001; Schmitt, 2010). It has been reported by, among others, Laufer (1997) and Milton (2009), that nouns are easier to learn than verbs, which in turn are easier to learn than adjectives. Studies of the grammatical class of words have examined them from the perspective of acquiring new words. However, the question of how much this knowledge influences attrition has scarcely been asked. Research by Cohen (1989) suggested a greater loss of the knowledge of nouns compared with other POS. Interestingly, Alharthi (2012) reported unexpected results in his study in which nouns were more immune to attrition than verbs and adjectives. Given that the number of studies is quite small, replications are needed in order to verify reported outcomes and to improve our understanding of the issue of attrition; hence the present study will look at the effect of POS on the attrition of vocabulary.

3. Why a Longitudinal Research Design Is Needed

In their recent proposal for a general model in FL attrition research, Bardovi-Harlig and Stringer (2010) suggest that attrition is likely to be considered in terms of a basic time line. The first period corresponds to the end of formal instruction. The second period refers to the interval of reduced or no exposure to the target language. In any attrition study, it is of paramount importance to implement longitudinal tracking to assess attrition. Baseline information is essentially collected through formal measurements that focus on a specific language aspect. The

same measurements are then used for follow-up periods to identify language variations through tracking the same individuals' patterns of attrition or retention in different linguistic features including vocabulary knowledge.

It could be assumed that the individuals taking part in a longitudinal study would constitute a more reliable and meaningful sample as they are repeatedly measured at various intervals, which is desirable for any research project in the area of language attrition. Consequently, a longitudinal design is employed using the same group of EFL graduate teachers for research on vocabulary after the completion of their course.

4. The Study

4.1 Research Questions

The study was primarily based on a quantitative approach with an aim to examine evidence of vocabulary attrition or retention after the end of FL instruction. Drawing on existing research results, however, the study was guided by four principal research questions:

1) Is there a relationship between the initial achievement of lexical knowledge and the degree of attrition?

2) Is there any significant difference in the degree of attrition in terms of receptive or productive word knowledge?

3) Is there a significant rate or pattern of attrition in word knowledge after the end of formal instruction?

4) Which POS is most susceptible to attrition?

5. Method

5.1 Participants

The initial sample comprised 67 graduate teachers and attempted to establish a baseline (Time 1) for their knowledge of vocabulary prior to the end of formal training at KAU, Jeddah, Saudi Arabia, but 24 were eliminated due to absence of or incomplete data. In the two subsequent data collection intervals (Time 2) and (Time 3), with a one-year time span between them, 43 participants were identified as available and took part in the longitudinal study. All participants were Arabic-speaking learners of English as Foreign Language (EFL) and had studied English for a minimum of 10 years. We can report with some confidence that EFL instruction was alike for all participants.

5.2 Instruments, Procedure and Data Analysis

Two instruments were used to measure the EFL graduate teachers' vocabulary attrition of receptive and productive knowledge of word meaning. In order to construct the target tests, we first had to consult textbook materials from which the samples of words to be measured would be taken. Target words were mainly academic that appeared in the participants' textbook *College Vocabulary 3* by Folse and Farina (2006), comprising words which were introduced in their earlier English classes. The tested items were selected from the exercises in which new words were presented in bold. These instruments or tests were specifically created in the same formats as VLT (Schmitt et al., 2001) and PVLT (Laufer & Nation, 1999). Each test presented participants with a set of 60 word items. The items were constructed with an eye to what the word originally meant in the textbook, for example, the word *theme* in the textbook has the meaning of *reoccurring subject*. Other alternatives such as *a principal melodic subject in a musical composition* or *short informal essay* were excluded. Thus, the tested word items used the same definition and synonyms as were presented in the textbook.

A sample cluster from the receptive vocabulary test is illustrated below:

1) Analysis

2) Compensation … a supposed belief

3) Discrimination … careful study

4) Integration … unifying all the parts together

5) Presumption

6) Resolution

A sample cluster from the productive vocabulary test where the target word is *discrimination* is illustrated below:

Dis… against people with foreign accents is still an unfortunate and widespread reality.

In order to identify the participants' baseline vocabulary knowledge, they were administered receptive and productive vocabulary tasks prior to graduating. Participants were not informed that they would be subsequently assessed on the target items. Two posttests were handed out one and two years later to track their vocabulary attrition and retention in relation to their receptive and productive word knowledge. The content of the tests was kept the same over the intervals.

All three test sessions were administered by the researcher who made sure that the participants received the same amount of time and identical instructions in Arabic.

The matching task was scored as follows: a point was allotted for a given correct answer and zero for incorrect answer. For the cued recall task, a correct answer received a point and an incorrect answer received zero. Words with minor spelling mistakes that are still recognizable as the target words were marked as correct. This can be illustrated in the following examples:

1) Wrong letters for example *flexbelity* for the target word *flexibility*

2) Additional letters like *intervale* for the tested item *interval*

3) An omitted letter such as *chanel* for the target item *channel*.

Methods used for processing the data were repeated measures ANOVA, *t*-tests and Pearson correlation coefficients. The alpha level for all analyses was set at $p<.05$.

6. Results and Discussion

1) Is there a relationship between the initial achievement of lexical knowledge and the degree of attrition?

In order to test whether the attained level of vocabulary knowledge is an important factor in the attrition or maintenance for the same constructions at Time 2 and Time 3, correlational analyses were performed. Table 1 displays the correlations between the initial achievement tests and the amount of vocabulary attrition of receptive and productive vocabulary knowledge (Time 3 – Time 1).

Table 1. Pearson correlations between initial achievement and amount of attrition of receptive and productive word knowledge

Variables: word knowledge type	Correlation/Sig	
	R (T3-T1)	P (T3-T1)
Receptive	r = -624 $p<.001$	
Productive		r = -601 $p<.001$

*Correlation is significant at the 0.05 level (2-tailed)

To be more specific, there were significant correlations between the participants' initial knowledge of receptive and productive scores and their scores on the delayed posttests. The tests also provided evidence of strong inverse correlations ($r = -624$, $p<.001$) and ($r = -601$, $p<.001$) between Time 1 and Time 3 on reception and production respectively. These negative values imply that the learners' levels of receptive and productive vocabulary knowledge under question at Time 1 are strong indicators of what they will forget over time. In other words, the more the participants knew the items initially, the less able they were to maintain their knowledge in the long term. While 'the more one knows, the more one forgets' makes intuitive sense and has been alluded to occasionally in the classical psychological literature, the research presented here suggests that such concept is an empirically supportable notion which is worthy of further attention. It should be mentioned that the current findings do not lend support to research by Bahrick (1984), Weltens (1989) and Alharthi (2012). We assume that the different findings might have been due to the different ways in which we measured the participants' initial vocabulary knowledge. That is, the original attainment level of the participants in those studies was determined according to the number of years of study in a certain language or by scores obtained using inaccurate measurement tools.

2) Is there any significant difference in the degree of attrition in terms of receptive or productive word knowledge?

To examine apparent within-group attrition or retention, we first carried out a series of tests to ensure that parametric statistics can be applied. This was identified through histograms for both vocabulary pretest and posttest which had normal distribution curves. These were supported by Kolmogornov–Smirnov tests of normality (R-K-S = .828; p = .311 and P-K-S = .698; p = .743). The descriptive statistics of Time 1, Time 2 and Time 3 tests scores are reported in Table 2. Time 1 scores were considered as scores of vocabulary learning, whereas those of Time 2 and Time 3 tests taken one and two years after the formal instruction ended were considered as attrition and retention scores.

Table 2. Descriptive statistics of Time 1, Time 2 and Time 3 scores for receptive and productive word knowledge

Word knowledge type	Time 1		Time 2		Time3	
	M	SD	M	SD	M	SD
Receptive	67.24	7.45	64.11	7.56	65.77	7.44
Productive	44.12	3.33	37.69	5.51	37.74	5.43

An important fact exposed in Table 2 is that participants' capacity to recognize and produce the meaning of target words declined from Time 1 and Time 2, while it appears to have been retained somewhat at Time 3, and that at any point in time receptive vocabulary is greater in size than productive vocabulary. The results of repeated measures ANOVA for vocabulary scores (see Table 3) show that the amount of vocabulary forgotten varied as a function of type of word knowledge (F = 125.92) and as a function of time of vocabulary administration, one year after the course completion (F = 57.31). The main effects were qualified by significant interaction of Time 1 and Time 2 and the degree of attrition between receptive and productive word knowledge (F = 1.29, p<.001). These findings thus appear to confirm and replicate the findings of previous investigations (Alharthi, 2012; Bahrick, 1984; Bierling, 1990; Marefat & Rouhshad, 2007).

Table 3. ANOVA for attrition scores measured over time as a function of type of word knowledge

Source	F	P
Receptive & Productive	125.92	<.001
Time of administration	57.31	<.001
Time X R & P	1.29	<.001

Even though it appears that there was significant measurable attrition between Time 1 and Time 2, the participants' mean scores for each type of word knowledge appear to show some slight degree of retention (between Time 2 and Time 3) which did not reach a level of significance. While improvement in learners' vocabulary knowledge was not at all anticipated, particularly in our context where little contact with English was expected after formal FL instruction, one can find similar behaviours in a study by Alharthi (2012) who reported that the level of maintenance was higher for receptive than productive vocabulary in the interval of 15 months. The current findings also point to a tendency among our participants to exhibit little communication not only inside but also outside the classroom. Moreover, this variation might be due to the different test formats. As one would expect, the production task that asked the test-takers to complete a word in a sentence is one of the most difficult test formats and consequently leads to low scores, whereas the multiple choice format that requires the test-takers to match words with their relevant definitions presumably produces high scores. A widespread belief is that one might recognize the meaning of a word in a given text but is not able to retrieve it when it is needed in production. This can be referred to a well-known phenomenon called tip of the tongue (TOT) which is a common experience in one's L1. Seemingly, the presence of partial information is enough to recognize a word; however, the productive stage needs more complete information so an item can be successfully retrieved.

The trends emerging at Time 3 likewise reflect the perception among researchers (Weltens, 1989) that factors such as general cognitive maturation, further academic training and continued learning of other FLs might explain the participants' increase in their test performance over time.

3) Is there a significant rate or pattern of attrition in word knowledge after the end of formal instruction?

We have partially answered this research question in the discussion of the second research question. Returning briefly to the descriptive statistics presented in Table 2, these provide a trend which confirms our prediction that once the subjects leave KAU, their competence in vocabulary decreases. The participants demonstrate sharp attrition on the receptive and productive vocabulary posttests. The pattern of decline can be seen most clearly in the productive vocabulary test between Time 1 ($M = 44.12$) and Time 2 ($M = 37.69$). A paired sample t-test shows that the difference on this type of knowledge is significant ($df = 42$, $t = 2.32$, $p = <.001$). Table 2, however, indicates a small decline from Time 1 to Time 2 in mean scores of the receptive vocabulary ($M = 67.24$), ($M = 64.11$). Interestingly with such a slight drop, a paired sample t-test reveals a significant difference ($df = 42$, $t = 1.88$, $p = <.001$). The rate of forgetting found here is in line with the work of Bahrick (1984), Weltens (1989), Bierling (1990), Abbasian and Khajavi (2010) and Alharthi (2012) and mirrors memory research that attrition occurs relatively soon after the end of a learning session (Baddeley, 1990). On the other hand, the participants' mean scores on receptive and productive word knowledge increase a little at Time 3 ($M = 65.77$), ($M = 37.74$) though the gains are not statistically significant. One plausible explanation for this finding can be given from the psychological perspective of the critical threshold. The participants in the present study seem to have reached some sort of critical threshold for vocabulary knowledge prior to Time 1 which enables them to improve at Time 3, though to a lesser degree. Clearly, the participants' performance displayed improvement in accuracy after a certain period of time, lending further support to the explanation offered by Cohen (1975) that following a period of lack or reduced FL input, some sort of residual learning may be held.

4) Which POS is most susceptible to attrition?

The last research question aims to provide evidence as to whether a particular POS influences the attrition of vocabulary. Table 4 shows the mean scores for nouns, verbs and adjectives for each type of word knowledge at the three administrations of the test.

Table 4. Mean scores of vocabulary by POS for the three administrations of the test

POS	Time 1		Time 2		Time 3	
	R	P	R	P	R	P
Noun	66.91	53.56	63.08	49.88	62.20	48.37
Verb	65.01	48.28	57.50	41.48	51.74	36.17
Adjective	55.29	46.63	47.06	38.89	41.59	32.30

The results show that POS declined over time; however, the drop is more pronounced for verbs and adjectives in both receptive and productive word knowledge. The results of repeated measures ANOVA indicated that the mean attrition scores for different POS varied as a function of time ($F = 2.25$, $p<.001$), ($F = 3.54$, $p< .001$) in receptive and productive word knowledge respectively. The difference between POS reached levels of significance only for verbs and adjectives ($t = 5.48$, $p< .001$) and ($t = 4.55$, $p< .001$). These findings to some extent confirm Alharthi's (2012) results that nouns were less vulnerable to attrition than other POS. In practice, empirical evidence seems to support the 'depth of processing theory' articulated by Craik and Lockhart (1972). This suggests that learning new words such as nouns, which involves extra effort, is likely to promote retention of this type of word. This might be one reason why verbs and adjectives were more likely to be subject to attrition than nouns. One could argue, for instance, that in almost any natural text, including KAU textbooks, verbs and adjectives occur less commonly than nouns, hence instances of these word classes are more likely to be forgotten than nouns. It is worth mentioning that the present findings are totally contrary to that reported for previous research by Cohen (1989). The most likely explanation for this difference is that it is likely due to the effect of task type. For example, in storytelling tasks, subjects were required to describe images with a great focus on verbs and therefore, such tasks reduced the possibility of using nouns.

7. Conclusion

The findings for the four research questions investigated in the current study are summarized as follows:

The results of investigating research question one suggest that there is a negative correlation between the initial knowledge of vocabulary and the degree of subsequent attrition over time. What such a trend shows is that the higher the knowledge at peak attainment, the higher the attrition the participants will experience in receptive and productive word knowledge.

The results of investigating research questions two and three indicate that there was significant loss in the participants' receptive and productive vocabulary knowledge from Time 1 to Time 2 with a slight increase at Time 3. The results also show that reception scores are higher than production scores at all points in time. The long-term vocabulary attrition and retention is portrayed in the rate of forgetting over time. That is, the participants' scores dropped right after formal instruction had ended and then increased slightly by the end of a two- year period.

The results of investigating research question four showed the potential effect of POS on the rate of attrition. The study revealed that verbs and adjectives received lower scores than nouns and therefore were more prone to attrition than nouns. This observation bears a close relationship to the depth of processing principle (Craik & Lockhart, 1972) that superficially learned words, e.g. verbs and adjectives, are more vulnerable to loss than are deeply learned words, such as nouns. It remains to be investigated whether other word characteristics such as orthography, frequency, imageability and abstractness may positively or negatively affect the process of attrition. It would be interesting to explore these concepts in future research in FL vocabulary attrition and or retention.

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