The Role of Word Class in the Attrition of School-Learned French:
Are Nouns or Verbs More Likely to Be Lost?

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Introduction

One relatively new area of language research is that which investigates the fate of knowledge of a particular language when that language is not used for significant periods of time. "Language attrition" is the most common term used for any "loss of language skills" (Moorcraft & Gardner, 1987, p.327) that occurs. The most basic distinction in this field is between losses in the person's native language (L1), and losses in a second, later-learned language (L2). L1 attrition may occur, for instance, in immigrants who adopt the dominant language of their new country, while L2 attrition may occur, for example, in students who learn a second language in school but do not use it once classes have been completed (de Bot & Weltens, 1995). When the learner is not proficient in the second language, the L2 is sometimes referred to as a foreign language (FL), and the subsequent attrition is termed FL attrition. First, this paper will review theories that provide guidelines for predicting the general types of linguistic knowledge most likely to be lost, then discuss the different patterns of loss of vocabulary and grammar in L1 and L2 attrition, and finally review theories regarding which elements of the lexicon in particular may be most resistant to attrition.

One general theory in attrition research is the regression hypothesis, which suggests that "attrition is the mirror image of acquisition:" the first items lost will be the ones that were acquired last (Yoshitomi, 1992, p. 295). This general idea has also been expressed simply as "Last Learned, First Forgotten" (Yoshitomi, 1992, p. 295). In discussing L2 attrition, Yoshitomi (1992) noted that the theory seemed to have support from research focusing on broad categories of linguistic knowledge. For instance, one is able to comprehend language of a certain level before being able to produce language at that level, and productive skills tend to be more susceptible to attrition than receptive skills (Yoshitomi, 1992, Hansen & Reetz-Kurashige, 1999). Yoshitomi also noted that vocabulary

tends to be more resistant to attrition than grammar, but this is a complex issue that will be discussed in further detail below. Yoshitomi also explained that some studies have found the hypothesis to be true for the acquisition and loss of various grammatical forms, but that it was not possible to generalize from the results of these experiments, because only a few specific structures had been studied.

Anderson's (1982) "linguistic feature hypotheses" provide another way of looking at the attrition puzzle (cited in Weltens (1989) and de Bot & Weltens (1991)). Weltens (1989) explained that these hypotheses have two major areas. First, they state that the nature of the linguistic elements themselves, such as whether they are high or low frequency, and whether they are marked or unmarked (part of Universal Grammar), will be important in determining if they are lost. Second, these hypotheses propose that the relationship between corresponding structures in the dominant and attriting languages is a factor, explaining, for example, that the amount of contrast between the structures in the two languages will help determine what will be vulnerable to attrition (Weltens, 1989). de Bot & Weltens (1991), discussing L1 attrition, gave an example of this hypothesis, explaining that, "on the lexical level . . .frequency and degree of similarity between L1 and FL words would be relevant factors" (p.44). Low frequency words would be more likely to be lost than high frequency ones, and noncognate FL words, in which there is no similarity between the L1 and FL word, would be more likely to be lost than cognate words (de Bot & Weltens, 1991).

While de Bot & Weltens (1991) interpreted the linguistic feature hypothesis as related to a hypothesis that an item in the attriting language similar to the corresponding structure in the other language will be more likely to be retained than a dissimilar item, the view of forgetting as interference suggests the

opposite. The interference theory states that people forget a particular thing "A," because they learned "B" either before (retroactive interference) or after (proactive interference) they learned "A." The memory of "B" interferes with the recall of "A" (Weltens, 1989). The likelihood and degree of interference becomes greater as the two structures become more similar (Neisser, 1984). This theory would thus predict that an element in the attriting language that is most similar to the corresponding element in the dominant language is most likely to be interfered with and forgotten. This is supported by, for instance, L2 learning studies which showed that more transfer between languages occurred when the languages were closely related than when they were not, and when the particular structures in the two languages were similar (Hansen & Reetz-Kurashige, 1999). Hansen & Reetz-Kurashige (1999), however, noted that one attrition study found that when an element in the attriting language was most *different* from an element in the dominant language, it was most likely to be lost. This echoes de Bot and Welten's (1991) explanation of why noncognates would be more likely to be lost than cognates.

There is a slightly different view of the forgetting process in the "retrieval failure theory," which states that "forgotten information is not gone, but has become inaccessible," and could be obtained with the right cues (Hansen & Reetz-Kurashige, 1999, p.10). This theory is supported by studies that show that with greater processing time, subjects are able to remember more (Hansen & Reetz-Kurashige, 1999), and by the existence of the "savings" effect, where relearning forgotten items is more successful than learning similar items for the first time (de Bot & Stoessel, 2000). The inaccessible information may be what facilitates the improvement seen in relearning.

de Groot & Keijzer (2000) had another hypothesis regarding forgetting. They proposed that "what is hard to learn is easy to forget" (p.1). Applying this to

lexical learning and forgetting, they found that words that seemed easier to learn, such as cognates and concrete words, were better retained in memory. A related theory is the "best learned, last forgotten" theory (Weltens, 1989, p. 7), which predicts that items that are learned and integrated most completely are least likely to be forgotten. This concept is similar to the "inverse relation hypothesis," which states that, in L2 attrition, the higher the proficiency level of the language learner, the smaller the amount of subsequent attrition (Yoshitomi, 1992, p. 296, Hansen & Reetz-Kurashige, 1999).   As Yoshitomi (1992) noted, this hypothesis is supported by studies such as that of Bahrick (1984a).   Bahrick studied the attrition of school learned Spanish, and, comparing different groups, found that those of very low proficiency (those who had not had any Spanish beyond Level 1, and had obtained only C's on that level) demonstrated so much attrition that their performance on Spanish tasks was not very different from that of a control group who had never taken Spanish. He also found that both obtaining higher grades and completing higher levels of instruction correlated with better performance on Spanish tasks.

Bahrick (1984a) suggested that his subjects were able to access a great deal of Spanish knowledge after as many as fifty years of disuse because certain "responses" were in a state he referred to as "permastore" (p.22).   It was the information in permastore that allowed the subjects to perform well in Spanish years after taking their classes, and he proposed that those with higher levels of proficiency retain more in permastore (p.23).   Neisser (1984) responded to Bahrick's ideas by proposing a subtle modification: discarding the term "permastore," which implied that the responses go to a particular place in the mind, "a kind of mental fallout shelter" (p.33), and suggesting instead that certain "response strengths reach a critical threshold during [or after] learning", and that once responses reach this threshold, they will not be forgotten (p.33).   Although

Neisser proposed this way of viewing memory, he immediately indicated that he did not believe it was the correct explanation.   More recent research, however, continues to find Neisser's idea appealing. For instance, Hansen & Reetz-Kurashige (1999) cited the critical threshold as an explanation of studies that did not find much L2 attrition in certain areas.

Neisser (1984) himself explained a somewhat different theory that he thought better represented language learning and forgetting.   He hypothesized that memory for FL items does not simply involve the "reproduction of items acquired at some earlier time" (p.33). Drawing on general psychological research, he explained that memory for everything from oral histories to witnessing a crime has been shown to involve more "constructive recall" than "literal recall,"   and is more a process of "problem solving" than "reproduction" (p. 33).   When people remember an experience, they are not retrieving a particular stored item, but are using their "general knowledge" to construct the memory (p.33).   (Note, though, that Bahrick (1984b) responded to this by insisting that while some memory may rely on "reconstruction," much learning, and therefore memory, is dependent on strong connections between individual responses (p.37)).

Neisser (1984) hypothesized that memory for language operates in a "reconstructive" fashion. In commenting on the study by Bahrick (1984a), he proposed that the students, especially the more advanced ones, had retained a great deal of information because they had learned a "schema," or "structured system of relationships," for Spanish (p. 33). Their knowledge of this schema allowed them to continue to "generate" correct answers, even after years of non-use, just as people's general knowledge of the world allows them to reconstruct memories of experiences (Neisser, 1984, p 34).   He further explained that, "even if the word is one that we once memorized separately, our recall of it on a later

occasion is supported by a wider web of knowledge" (p.34). Looking at the process from a "forgetting as interference" point of view, Neisser also explained that interference will not occur for the language schema, because it is so unique that no other structure will resemble it.

Neisser (1984) proposed that what will be forgotten is the information that is "isolated" and less well-connected to the schema, while it will be difficult to lose information that *is* well-connected to this schema (p.34). The learner will retain "only relatively redundant and systematic knowledge" (p.34). This theory might be referred to as the "best connected, last forgotten" hypothesis. It complements the "best learned, last forgotten" hypothesis, because the more completely learned structures are likely to be better connected than the others.

Yoshitomi (1999), discussing L2 attrition, mentioned a similar concept, but came to a very different conclusion. Yoshitomi stated that she agrees with researchers who have proposed one controversial approach to viewing linguistic knowledge: that this knowledge is made up of "connections and associations of information" (p. 93). These connections and associations seem somewhat similar to Neisser's schema. Because of these connections, when one part of the system experiences a problem, the entire system suffers. Yoshitomi thus concluded that "an isolated portion of knowledge" may be more resistant to loss (p. 93). So, while Neisser (1984) proposed that being well-connected to the language system would make a structure more resistant to attrition, Yoshitomi (1999) suggested that being well connected may make a structure more vulnerable to difficulties in another part of the system.

Still, other evidence seems more consistent with Neisser's (1984) general theory. For instance, Altenberg (1991) tested the retention of predictable and unpredictable plural forms in L1 German, and found that subjects had more difficulty producing the correct plural form in words that were unpredictable. She

suggested that producing a predictable plural form is based on the knowledge of morphological rules, while producing an unpredictable plural form may be based on knowledge of information contained in that particular word's lexical representation. Altenberg concluded that "idiosyncratic lexical information may be more prone to attrition than morphological rules" (p. 203). This seems consistent with Neisser's theory, as morphological rules are more likely to be "redundant and systematic" than information which applies only to one word.

Altenberg's (1991) finding that lexical information is more likely to be lost than morphological rules is indicative of the general pattern found in studies of L1 attrition, where grammar is more resistant than vocabulary (Yoshitomi, 1992). Several studies in L2 attrition, however, have found the opposite pattern. For instance, Moorcraft & Gardner (1987), reporting on the attrition of school-learned French during summer vacation, found no evidence of vocabulary loss, but did find that subjects lost some ability to use rules of grammar in speaking and writing. Weltens (1989) studied the attrition of school learned French in Dutch students and found that, although there was not a great deal of attrition in any linguistic element, there were more losses in grammar than in vocabulary. Bahrick (1984a) found, in his abovementioned study on the attrition of school learned Spanish, that, of the various language measures he tested, the "recall for grammar declines most precipitously" (Bahrick, 1984, p. 17), although subjects performed somewhat better on tests of grammar recognition. It should be noted, though, that in de Bot & Welten's (1995) review of FL attrition, it was stated that both vocabulary *and* later learned syntactic structures may be *least* resistant to attrition.

Moorcraft & Gardner (1987) commented on this difference in the elements of language lost in L1 and L2 attrition, and noted that differences in proficiency may explain it. They hypothesized that the French students in their study

exhibited more grammatical than lexical losses because "most grammatical structures are incompletely and recently learned" (Moorcraft & Gardner, 1987, p. 338). This hypothesis was supported by the fact that students in this study had not thoroughly learned many of the grammatical structures which showed attrition after the summer vacation, and many structures that had been learned earlier and more completely did not show attrition (Moorcraft & Gardner, 1987).   Further evidence that differences in proficiency are the source of the different patterns in L1 and L2 attrition comes from Yoshitomi (1992), who explained that, when L2 attrition is considered individually, "beginning students lose more grammar than vocabulary, while advanced students lose more vocabulary than grammar" (p.296). Yoshitomi (1992) also noted that this explanation reflects the "best-learned, last forgotten" hypothesis.

Neisser's (1984) hypothesis that the "redundant and systematic" items are more likely to be connected to a "schema" and therefore remembered may provide a possible explanation for the pattern of greater grammatical than lexical losses in L1 attrition, and in proficient L2 attriters.   Grammar, with its multiplicity of rules that must be constantly applied, tends to be more "redundant and systematic" than vocabulary, where each word has a specific meaning applicable only in a very limited number of situations. This also means that frequency plays a role. Because they are used more often than individual words, grammatical rules are of higher frequency and may be less likely to be lost because of that. Thus, it may be that in the less proficient L2 attriters, the "best learned, last forgotten" hypothesis takes precedence, and these students forget more grammar than vocabulary because they have not completely learned the grammatical rules.   In more advanced L2 learners, and in L1 learners, where both the grammatical and lexical systems are likely to be at an equal level of proficiency, the grammar is less likely to be lost because of its more "redundant

and systematic" nature, its tendency to be more well-connected, and its higher frequency.

Yoshitomi (1999), however, was more cautious regarding theories that vocabulary is more likely than grammar to be subject to attrition in advanced L2 learners who had acquired the language in a natural setting.   She pointed out that it is difficult to compare the two systems, because one word and one grammatical rule do not represent equal amounts of information. In addition, adopting the retrieval failure point of view, she noted that "the process of attrition is gradual, from decreased accessibility to total loss," so it may not be apparent whether a structure is completely gone or simply less accessible" (p. 94). Yoshitomi also pointed out that it is difficult to determine the amount of grammatical attrition through samples of speech. Speakers experiencing "decreased accessibility" of certain grammatical structures may simply avoid them and use others. When speakers use only those grammatical constructions about which they are certain, their speech is correct and their grammar may then be considered intact, but difficulty with certain avoidable grammatical structures may exist. Yoshitomi was thus not certain that vocabulary is more likely to be lost than grammar, stating that grammatical attrition may simply be more difficult to detect. Still, speakers may easily avoid inaccessible lexical items as well, so lexical attrition may be as difficult to detect as grammatical attrition. Yoshitomi also suggested that, in the initial stages of loss, attrition may be more apparent in situations (e.g. conversation) that require the speaker to coordinate a variety of language skills than in situations that focus on testing one specific subskill, such as vocabulary or grammar.

While some research has focused on which of the broader elements of language, such as vocabulary or grammar, are more likely to be lost, other research has focused specifically on which elements of the lexicon are most

likely to be lost. Weltens (1989), writing about L2 attrition, and de Bot & Weltens (1991), writing about L1 attrition, suggested that certain words may be particularly resistant to attrition, including greetings, "closed-set" words (p.9), such as the months of the year, and, as suggested by Berko-Gleason (1982), words to songs and words with particularly emotional connections, such as expletives (cited in Weltens, 1989, and de Bot & Weltens, 1991). de Bot & Weltens (1991) added that these items are well retained because they are overlearned.   This pattern, however, may not always be true of L2/FL learners (Berko-Gleason, 1982, cited in de Bot & Weltens, 1991). Overlearning, and thus better retention, of this type of pragmatic information is more likely when the language is thoroughly learned in a naturalistic situation (Berman & Olshtain, 1983, cited in de Bot & Weltens, 1991, and Weltens, 1989).

While Weltens (1989) and de Bot & Weltens (1991) noted that research supported the hypothesis that these types of words may be most resistant to attrition, Tomiyama (1999) noted that she found the opposite to be true. She studied a Japanese child who had learned English in a naturalistic setting and subsequently returned to Japan, where he had much less exposure to English. She collected data from the child at various intervals following his return to Japan, and noted that, during the first five months after his return, the child was able to converse entirely in English, without any codeswitching.   Soon after, however, the child began to sometimes codeswitch to L1 Japanese, and the process was first seen in "emotion-laden utterances, interjections, and conversational-fillers" (Tomiyama, 1999, p. 77).   Although codeswitching is not always a sign that the codeswitched item has been lost, it can indicate that.   If codeswitching were indicative of attrition in this case, it would indicate loss of the very types of words that others had suggested were most resistant to loss (Tomiyama, 1999).

Tomiyama (1999) suggested a hypothesis that would reconcile these potentially conflicting findings. The child might have switched to L1 for certain words not because they were forgotten, but because as he lost some of his skill in L2, speaking it became more of a demanding performance. For the more intimate, personal words, the emotional words and interjections, it might have felt more appropriate and natural to the child to use his comfortable L1, and using these L1 words also gave the child a break from his L2 performance (Tomiyama, 1999).

Olshtain & Barzilay (1991) also studied lexical attrition, and they hypothesized that very specific nouns are more prone to attrition than general ones. Their subjects were Americans who relocated to Israel. Their L1 was English, but they had had years of reduced exposure to English. Olshtain & Barzilay asked the subjects to tell a story from pictures that required them to produce very specific nouns, such as "pond" and "gopher." The subjects were often unable to produce the correct specific noun. Instead, they either used words, such as "body of water," with more general semantic features, or words, such as "squirrel," that were in the same general semantic category as the target word, but contained incorrect specific semantic features (Olshtain & Barzilay, 1991).

Research has also suggested that cognates may be less vulnerable to loss than noncognates. A pair of cognate words exists when the L1 word and its translation have a similar form, either orthographically or phonologically (de Groot & Keijzer, 2000). In a study of L2 attrition, Weltens (1989) found that a cognate effect was "highly significant" (p.64). His subjects were able to translate more French (L2) words that were cognates than those that were non-cognates. de Bot & Stoessel (2000) also found a cognate effect with their two subjects, who were fluent in French and German, but had not regularly used the target

language, Dutch, in thirty years. They tested the subjects on Dutch words, and found that the highest recognition scores occurred for Dutch words that were cognates with both their German and English equivalents. The subjects recognized fewer words in the categories of Dutch words that were cognates only with the English or German equivalent, but not both, and they recognized the fewest words in the category of words that were noncognates for both German and English. This same study, however, also included an exercise which required subjects to name pictures in Dutch, and here there was a "clear effect of cognateness" (p.345) for only one subject.

Weltens (1989) pointed out that the finding that cognates seem to be more resistant supports one of the abovementioned "linguistic feature hypotheses" proposed by Anderson (1982): that the degree of contrast between the structure in the dominant language and the one in the attriting language will be important in determining whether the structure is lost (cited in Weltens, 1989, p.94). An L2 noncognate is a greater contrast to the word in the dominant language than an L2 cognate, and L2 cognates are less likely to be lost.

In a very short term study, de Groot & Keijzer (2000) also found evidence of a cognate effect. Their subjects learned nonsense words, and were tested on the retention of these words after one week. The subjects remembered more cognates than non-cognates. de Groot & Keijzer explained that this effect may be explained by the abovementioned theory that "what is hard to learn is easy to forget," as it may be easier to learn cognates than to learn noncognates (p. 1).

Cognates are easier to learn than noncognates for several reasons. First, because the L2 word is similar in form and meaning to the completely mastered L1 word, there is actually "less to learn" with a cognate than with a noncognate (de Groot & Keijzer, 2000, p. 33, Lotto & de Groot, 1998). In addition, the two words in the cognate pair, each from a different language, may be contained in

the same memory representation, while the two words in the noncognate pair, although they may have similar meaning in the two languages, may have two separate memory representations (Lotto & de Groot, 1998). Learning an L2 word that is a cognate may involve adding additional information to, or slightly changing, the memory representation of the corresponding word in L1 (de Groot & Keijzer, 2000, p.34). Learning a noncognate, however, may require building an entirely separate and new memory representation, and this may be more challenging than simply changing an already established representation (de Groot & Keijzer, 2000, Lotto & de Groot, 1998).

The idea that cognates share a memory representation, however, would not be accepted by all linguistic researchers. In fact, the question of how the bilingual's lexical and conceptual representations are organized is an area fraught with conflicting and complementary theories. Heredia & McLaughlin (1992) noted that a major issue has been whether the bilingual's two languages are stored separately or share a system. They explained that the "interdependence" model proposes a shared system with "a single conceptual or semantic representation subserving the two lexical representations" (p.91). In this model, words are not stored according to language, but according to their semantic features, and are only "tagged" with the proper language when output occurs (p. 91). The independence model, on the other hand, hypothesizes that the two languages are stored entirely separately, with "two distinct memories -- one memory for each language, with information in one language not readily available to the other system" (p.91). Heredia & McLaughlin pointed out that these two models are not necessarily conflicting; some researchers have suggested that parts of language may operate according to the independence model, while others operate according to the interdependence model.

Gascoigne (2001) reviewed six more specific models of bilingual memory

representations, and herself proposed a seventh.   The first model is the word association model, which seems based on the interdependence model, as it suggests that, for each translation pair, there is one conceptual representation and two lexical representations, one for the L1 word, and one for the L2 word. There is a connection between the L1 representation and the L2 representation, and another connection between the L1 representation and the conceptual representation.   There is not, however, a direct connection between the L2 representation and the conceptual representation. Thus, if the bilingual wanted to understand an L2 word, he or she would have to first translate the word into L1, using the connection between the L1 and L2 representations, and then access the meaning of the L1 word, by using the connection between the L1 word and the concept (Gascoigne, 2001).

An alternate model is the concept mediation model, which, like the word association model, assumes two lexical representations sharing one conceptual representation. It, however, proposes that there is a direct link between the representation for the L1 word and the representation for the concept, and another direct link between the representation for the L2 word and the representation for the concept (Gascoigne, 2001, p.447).   In this model, there is no direct link between the representation for the L1 word and the representation for the L2 word.   In order to translate from one language to the other, the bilingual must first access the concept; the L1 and L2 words are "mediated" by the concept (Gascoigne, 2001). Gascoigne (2001) noted that it is commonly believed that the memory of beginning second language learners is organized according to the word association model, while the memory of more proficient language learners is organized according to the concept mediation model.   This makes sense, because the concept mediation model allows the bilingual to think in the L2, while the word association model requires the cumbersome process of

translating all L2 information into L1.   Generally, beginning language students must translate everything into their L1, while more proficient bilinguals are able to think entirely in L2.

Gascoigne (2001) explained that a model related to these two is the mixed model, which, relying on the same three representations as the above two models, proposed that both the L1 and L2 words have a direct connection to the same concept, and that the two words also have a direct connection to each other. A slightly different version of this model is the asymmetrical model. The asymmetrical model posits the same connections as the mixed model, but assigns different degrees of strength to different connections.   It proposes strong connections leading from the representation of the L2 word to the representation of the L1 word, and between the representations of the L1 word and the concept, and only weak connections leading from the representation of the L1 word to the representation of the L2 word, and between the representations of the L2 word and the concept.

Gascoigne (2001) also described the coordinate model, which hypothesizes that there are separate representations for the words in the two languages *and* two separate representations for the concepts corresponding to the words. Unlike the previous four models, this one seems based on the independence model, as it posits two separate conceptual representations, one for each language, although the L1 and L2 lexical representations are linked to each other. In the coordinate model, the L1 word is directly linked to the concept it represents (C1), and the L2 word is directly linked to the concept it represents (C2).   This model allows for the slightly different meanings of corresponding L1 and L2 words. Finally, Gascoigne (2001) explained the distributed model, which hypothesizes the existence of two separate, unconnected representations for the L1 and L2 words, and also many "nodes" representing different aspects of the

meanings of the words.   Certain nodes would be connected to both the L1 and L2 representations, while some nodes would be connected to only one lexical representation or the other. Like the coordinate model, this model allows for slight variations in meaning of the two words in the translation pair, but here the words share some of the conceptual representation, by sharing some of the nodes.

Gascoigne (2001) proposed that one particular model may not fit all types of words, suggesting that there should be a different model for cognates than for noncognates. She hypothesized that the mixed model represented the bilingual memory for noncognates, but proposed a model for cognates, similar to that explained by de Groot & Keijzer (2000), in which there are "separate -- but overlapping -- lexical representations with a single path to a single conceptual node" (Gascoigne, 2001, p.451).   Thus, although cognates seem to be better remembered than non-cognates, it is not clear that this is due to their sharing a memory representation, as there is a great deal of debate over how bilingual memory is organized.

Another explanation for the cognate effect is put forth by both de Groot & Keijzer (2000) and Lotto & de Groot (1998), who pointed out that, on a test, subjects may translate more cognates than noncognates correctly because the test stimulus, with its form so similar to the target word, acts as an important cue. Still, Lotto & de Groot found that subjects in their study performed better with cognates than with non-cognates even when a picture, instead of an L1 word, was used in learning and testing. The form of the foreign language word was not similar to the picture (de Groot & Keijzer, 2000). Lotto & de Groot proposed that the cognate effect occurred here because the orthographic, or more likely the phonological, form of the word was activated upon seeing the picture.

de Groot & Keijzer (2000) also suggested that concrete words are easier

to learn than abstract words, and are thus better remembered. They found that subjects generally had better scores for recalling concrete words than for recalling abstract words.   The words that were labeled concrete in this study were actually those which had been given, in an earlier study, high ratings on an "imageability" scale.   The authors noted that because of a strong correlation between imageability and concreteness, they would refer to words with high imageability ratings as concrete, and to those with low imageability ratings as abstract. Ellis & Beaton (1993), concurred that "the greater the imageability of a word -- that is the degree to which it arouses a mental image -- the more likely it is to be recalled" (p. 565).   Ellis & Beaton also noted that others have suggested that the imageability phenomenon is really caused by other psycholinguistic features, such as concreteness, but concluded that research has shown that the imageability effect is really independent of these features. They maintained a distinction between concreteness and imageability, but also conceded that some research suggests that concreteness and imageability "have much in common" (Ellis & Beaton, 1993, p. 606).

de Groot & Keijzer (2000) discussed two theories that may explain why concrete, or highly imageable, words are better retained in memory.   The first is the context availability theory, which is concerned with differences in "how easy it is to think of a context" for different words (p. 35).   Concreteness and context availability are generally strongly correlated, with concrete words receiving higher context availability ratings. Concrete words may have more context associated with them because there is more information in their memory representations, and this additional information may help "anchor the new FL words in memory" (de Groot & Keijzer, 2000, p.38).

A second theory that may explain the concreteness effect is the "dual coding" theory.   This theory is only one of very many that describe the

organization of the bilingual memory, but it provides an interesting explanation for the concreteness effect. The dual coding theory states that there are three systems in the bilingual memory.   There is an imagery system, which processes and stores concepts that can be represented in images.   Then, there are two separate verbal systems, one for each language, that process and store words and the concepts represented by them.   The systems are independent of each other, in that one can think solely in pictures that cannot be expressed in words, but can also think in either language, without images, and of concepts that cannot be represented in images.   These systems are also interconnected, however, in that using one system can activate another (Paivio & Desrochers, 1980).

de Groot & Keijzer (2000) explained that, according to the dual-coding theory, a concrete word would be represented in both the image system and the verbal system of the language to which it belonged, but an abstract word would be represented only in the verbal system of its language (p.35). Because of this, when learning a new concrete FL word, the learner would be able to connect it to two separate, but interconnected, memory representations, while an abstract word could be connected to only one representation (p.35). The concrete word is thus more solidly embedded in the memory, and would be less likely to be forgotten than the abstract word.

de Groot & Keijzer (2000) noted that both the context availability theory and the dual-coding theory state that concrete words are better remembered than abstract ones because there is more information in their memory representations. Yet, while context availability simply states that there is more information, dual coding suggests that this additional information is an imaginal representation.

The basic thesis of de Groot & Keijzer (2000) was that words that are

forgotten most easily are those that were the most difficult to learn. They found not only that fewer noncognates than cognates are remembered, and that fewer abstract words than concrete words are remembered, but also that the categories had a cumulative effect.   Words which were both abstract and noncognate and thus "most difficult to learn . . . were most susceptible to forgetting" (p. 16).

Some researchers have also suggested that low frequency words are more likely to be forgotten than high frequency ones. Weltens (1989) noted that word frequency "has been shown to play a significant role in . . . FL attrition," (p.28) and he found, in his study of the attrition of school-learned French, that students were able to remember more high frequency words than low frequency ones.   Weltens found that low frequency noncognates made up the largest group of forgotten words.

Lotto & de Groot (1998) also discussed the role of word frequency in the learning, although not the attrition, of FL words.   They taught Italian words to speakers of L1 Dutch, and then immediately tested the words. They found that the subjects made fewer errors on translations for high frequency Dutch words than on translations for low frequency ones.   They commented that their finding was interesting because the frequency of the words did not actually differ during learning: all the words were presented for learning the same number of times, and the subjects had no prior knowledge of Italian, although some subjects knew closely related languages, such as French (p.44). Lotto & de Groot explained that the frequency effect may have come about because the subjects were more familiar with the high frequency Dutch words, or because they were more familiar with the concepts represented by the high frequency words.   There is generally a strong correlation between frequency of a word and familiarity with the concept it represents, and it seems that it is "easier to assign a new name to a familiar

form or concept than to a less familiar one" (Lotto & de Groot, 1998, p.60).   Lotto & de Groot suggested that this is so because being more familiar with a concept may enable the learner to elaborate more, and elaboration supports learning.   In elaboration, a learner's past experiences cause him or her to associate a particular word with various "associations, images, or stories" (Craik & Lockhart, 1972, p. 675) Also, there may be a somewhat greater amount of information in the memory representations of high frequency words than in low frequency words, and this larger amount of information may be helpful to elaboration, and, in turn, learning (Lotto & de Groot, 1998).

de Groot & Keijzer (2000) also investigated whether word frequency played a role in the learning and forgetting of FL words, but found that the effect of word frequency was much smaller than that of concreteness and cognate status, and that the frequency effect was not always present. Their study, however, examined the learning of nonsense words in a laboratory, and the learning and forgetting in this setting may be quite different from that which takes place in a more naturalistic setting, or even a school setting. Weltens (1989) commented on theories based on laboratory experiments with nonsense words, saying that "One may well wonder . . .whether these theories have anything to do with real-life forgetting, let alone the forgetting of such a complex phenomenon as language" (p. 20).   Also, Ellis & Beaton (1993) noted that word frequency is an important factor in naturalistic vocabulary learning, "because frequency determines exposure," but that it is less important in laboratory settings where all words are presented with the same frequency (p. 566).   So, de Groot & Keijzer may not have found much of a frequency effect because of the nature of their experiment.

Also, because de Groot & Keijzer (2000) studied the learning of nonsense words, frequency had to be based on the L1 words. While Lotto & de Groot

(1998) obtained a frequency effect using L1 frequency, Ellis & Beaton (1993) noted that, in paired associate learning, where a person learns two words as a connected pair, the "effects of stimulus frequency are more variable [than the effects of response frequency] and may even be negative" (p. 566).   Thus, de Groot & Keijzer (2000) might not have found a frequency effect because they were looking at the frequency of the L1 words, rather than the words being learned and forgotten.

Still, based on the results obtained by Lotto & de Groot (1998), and the rationales for those results, one might have expected there to have been a frequency effect in the study by de Groot & Keijzer (2000).   The subjects in de Groot & Keijzer's study would have been more familiar with the high frequency L1 words, and with the concepts represented by them.   As explained above, this might have led to easier learning, and thus better retention.   Yet de Groot & Keijzer pointed out that the frequency effect found by Lotto & de Groot might have been due to the fact that high frequency words in that study might have contained more information in their memory representations than low frequency ones.   de Groot & Keijzer noted that in their own study, high and low frequency words had the same ratings for context availability, which is related to the amount of information in the memory representation. They suggested that the frequency effect obtained by Lotto & de Groot was due to differences in "information density," and that there was no frequency effect in their own study because these differences were eliminated (p.41).

Word class is another possible variable in language attrition. Ellis & Beaton (1993) noted that "nouns are the easiest to learn . . .whereas verbs and adverbs are the most difficult to learn in FL vocabulary list-learning experiments," (p.565) and also cited research indicating that children learn nouns before other parts of speech.   According to de Groot & Keijzer's (2000) hypothesis that words

that are easier to learn are better remembered, nouns, which seem to be easier to learn than verbs, would be better remembered than verbs.   The "last learned, first forgotten" hypothesis also would suggest that verbs are more likely to be lost than nouns, in both L1 and L2 attrition.   With regard to L1, children tend to acquire nouns before verbs, although the extent of this varies from language to language. In L2, at least with a school learned L2, more nouns than verbs tend to be taught in early classes, as beginning classes often cover subjects heavily dependent on nouns (e.g. food, parts of the body, items of clothing). Since verbs tend to be learned later than nouns, they may be lost earlier.

The study here investigated whether nouns or verbs are more likely to be lost in the attrition of school learned French, hypothesizing that verbs will be more likely to be lost.

Method

Subjects

The experiment was constructed for subjects who had completed at least Level 3 of high school French (as defined by high school programs), and who had not been in a French class for at least two years. Four female college students between the ages of 19 and 21 (Mean age = 20.5) that met these criteria participated. Due to variations in school programs, the subjects had spent between two and five calendar years in French classes, but all had completed either Level 3 or Level 4 French. All subjects reported receiving A's in their high school French classes, and none of the subjects had taken any French in college. Three subjects were native English speakers, and the fourth indicated that both Cantonese and English were her native languages. Subjects had completed their last French class between twenty-eight months and four and one half years (Mean = 3.37 years) prior to the experiment. Only one subject

indicated any significant exposure to French outside of class, which was three weeks traveling in France. One subject also indicated an extensive background in Spanish, having taken 5 years of Spanish in high school and one semester in college.

Because it was possible to locate only four subjects who met these criteria, two additional subjects with somewhat different backgrounds were recruited to provide additional information. One of these subjects had completed only Level 2 in high school French, and the other had taken French only in college, and had completed her last French class only a year and five months prior to the experiment. These two subjects were female college students, native English speakers, between the ages of twenty-one and twenty-two, who reported receiving grades of A or B in their French classes. One subject had also taken classes in Italian and Latin, and the other had also taken classes in Spanish. One subject also indicated that she had visited France, but noted that the visit was not extensive enough for her to learn a great deal of French. Because it was not possible to determine as confidently that these subjects had initially learned all the words being tested, their results were not included in calculations, but were considered when looking at general patterns.

Materials

A list of eighteen French nouns and eighteen French verbs was constructed. The choice of words was made carefully, mindful of a central problem in attrition research: the distinction between "non-acquisition and loss" (Tomiyama, 1999, p. 60). To attempt to determine that students who had completed Level 3 French would have learned, or at least have been taught, the words being tested, several sources were consulted. These included the class notes from French 1 through 3 of the author and a classmate (from a class using

the texts Helstrom & Schmitt, 1985, Schmitt & Helstrom, 1985, and Schmitt & Helstrom, 1988), early textbooks from three series aimed at middle and high school French students (Jarvis, Bonin, & Birckbichler, 1983a and 1983b, Schmitt & Lutz, 1994a and 1994b, and Valette & Valette, 1994), and the New York State Regents Exams in Comprehensive French from 1992 through 2001. The Regents Exam is generally administered after completion of Level 3 French. Words that appeared in at least three of these sources were assumed to have been learned by the participants.

All words were noncognates, and had frequency and imageability ratings within the same range, according to the ratings available on the MRC Psycholinguistic Database. Imageability ratings were based on a 100 to 700 scale, with 100 being the least imageable and 700 being the most imageable. Words included in the experiment had ratings between 423 and 597, with the mean imageability for nouns at 557.06, and the mean imageability for verbs at 507.11. The frequency ratings obtained from the database were based on the work of Kucera and Francis (1967), and the frequency of a word's occurrence in their database ranged from 0 to 69,971 times. Words included in this experiment had frequency ratings between 15 and 105 occurrences. The average frequency for nouns was 47.88 occurrences, while the average frequency for verbs was 54.94 occurrences.

The frequency and imageability ratings were based on the English translations of the French words, rather than the French words themselves. This was not ideal, but it was not possible to obtain ratings for the French words, and it was assumed that the frequency and imageability ratings for the French stimulus and its English translation would be reasonably similar.

Due to the limited number of words that met all the constraints, it was not possible to control for all other variables, including word length and

pronounceability. Most words in both categories were two syllables long, although two verbs and five nouns were one syllable long, two nouns and three verbs were three syllables long, and one verb was four syllables long. The average word length for verbs was 2.17 syllables, and the average word length for nouns was 1.8 syllables. The stimuli are listed in Tables 1 and 2.

Procedure

Subjects were given a sheet that listed the thirty-six French stimuli in random order, but with the constraint that no more than three nouns or three verbs could be in a row. (One subject received a version which contained additional words, and in which the words were in a slightly different order, because this subject was also part of another experiment. Because there were more nouns than verbs in that version, the constraint there was that no more than four nouns could be in a row). Subjects were asked to provide, in writing, the English translations for the French stimuli. They were then asked to indicate whether or not they believed they had ever learned each word, rating the words on a scale from 1 to 5, with 1 being "definitely learned the word," and 5 being "definitely did *not* learn the word." Finally, subjects were asked to complete a survey regarding their language background. (See Table 3 for a copy of this survey).

Results

Subjects' responses to and ratings for each French word are displayed in Tables 1 and 2. Overall, more verbs than nouns were remembered. A summary of the results is indicated in Table 4. Of the four primary subjects, the average number of correct verbs was 10.25, while the average number of correct nouns was only 6.75. When the additional two subjects were also considered, the data

remained remarkably similar: the average number of correct verbs for all six subjects was 10, while the average number of correct nouns was only 7. Each individual primary subject also remembered more verbs than nouns. On average, the four primary subjects remembered 3.25 more verbs than nouns. Of the additional subjects, one also remembered several more verbs than nouns, while the other remembered the same number of verbs and nouns. Note, though, that it is difficult to generalize with these two subjects because it was not possible to determine as confidently that the words had been initially learned. Furthermore, there were five verbs that were remembered correctly by all six subjects (to eat, to wash, to sleep, to sing, and to walk), and a sixth verb that was remembered correctly by all four of the primary subjects (to send).   There was not a single noun that was remembered correctly by all four primary subjects. There were three verbs and five nouns that none of the primary subjects were able to translate correctly.

The primary subjects' average rating for each word is also shown in Tables 1 and 2. On a scale of 1 to 5, with "1" being "definitely learned the word" and "5" being "definitely did *not* learn the word," the average rating for the nouns was 1.79, and the average rating for the verbs was 1.68.

Discussion

The results were quite surprising, as common theories seemed to suggest that nouns would be better remembered than verbs, but verbs actually seemed significantly more resistant to attrition.   There are several possible explanations for this.   First, Ellis & Beaton (1993) noted that one reason nouns are easier to learn than verbs is that they tend to be more imageable. In this experiment, the nouns and verbs had similar imageability ratings. So, if nouns are better remembered because they are easier to learn, and they are only easier to learn

because they are more imageable, when the imageability factor is controlled, the nouns are no longer easier, and would no longer be more likely to be remembered.   Still, this does not account for why verbs were better remembered.

A possible explanation lies in considering frequency, since high frequency words may be better remembered than low frequency ones. The average frequency rating for the verbs was seven points higher than that for the nouns, but this difference is so slight that it is unlikely to account for the results. These ratings, however, are based on the English translations, so it is possible that the *French* verbs have higher frequency ratings than the *French* nouns. As noted above, some researchers have found that effects based on the frequency of response words differ from effects based on the frequency of stimulus words. It is also possible that the frequency of words as used in French class differs from the frequency of words in general usage as calculated by Kucera and Francis. Possibly, the particular verbs in this experiment were of higher frequency in French class than the particular nouns.

An additional consideration is that more nouns than verbs may have been acquired early in learning. Although some words from each class were probably taught in each of the first three levels of French, more nouns than verbs tend to be taught in early classes (e.g. parts of the body, items of clothing, food). According to the regression hypothesis, then, one would have expected nouns to be better remembered than verbs, but, again, this was not the case. Perhaps, in a less naturalistic learning environment like a classroom, where earlier learned words are not always consistently used after being taught and tested in a particular unit, the later learned words are actually better retained, because the learner was exposed to them more recently.   Still, in a classroom setting, many earlier learned words certainly continue to be used in exercises such as general

reading comprehension and writing. Furthermore, because of the small number of overall words and because some of the nouns may have been learned later and some verbs earlier, it cannot really be determined if the time of learning is relevant in this case.

Other factors make the better retention of verbs seem even more striking, because certain variables slightly favored the better retention of nouns. For instance, although it was attempted to control for imageability, the mean imageability rating for the verbs was actually 50 points lower than the mean imageability for the nouns. Since higher imageability words may be better remembered, this gives the nouns a slight advantage, but subjects still remembered more verbs. Furthermore, the verb "envoyer", meaning "to send," had an imageability rating of 423, which was the lowest rating in the entire experiment, but this verb was remembered correctly by all four of the primary subjects.   Note, though, that imageability ratings were based on English translations, rather than the French words themselves.

The word length variable also seemed to give a slight advantage to the nouns. Longer words may be more difficult to remember, as "the longer the FL word, the more to be remembered, the more scope for phonotactic and orthographic variation and thus the more room for error" (Ellis & Beaton, 1993, p.268). The average length of nouns and verbs was quite similar, but the verbs, with an average syllable length of 2.17, were slightly longer than the nouns, with an average syllable length of 1.8.   Furthermore, while the majority of words in both categories were of two syllables, there were five one-syllable nouns, and only two one syllable verbs. In addition, there were two three-syllable nouns and no four syllable nouns, while there were three three syllable verbs, and one four

syllable verb[1]. Since the nouns as a group tended to be somewhat shorter, word length, too, would seem to point in favor of a greater number of nouns being remembered.

Yet, despite these disadvantages, verbs were significantly better remembered than nouns. An explanation for this may also lie in the choice of the particular nouns and verbs. Some of the verbs that were remembered correctly by all the subjects were related to English words, although they were noncognates.   For instance, subjects may have remembered that the verb "chanter" means "to sing", because it is related to the English word "chant." Furthermore, the verb "dormir," meaning "to sleep," is related to the English word "dormitory," and the verb "se promener" meaning "to walk" is related to the English word "promenade." One subject even indicated that she remembered that "laver" meant "to wash" because the French word reminded her of Lever 2000 soap.   So, it may be that even if a word is not a cognate, if the subject can relate it to an L1 word, it will be, to borrow a term from de Groot & Keijzer (2000), better "anchored" in memory. It is possible that more verbs than nouns in this particular study could be connected to L1 words in this way.

However, this seemed to apply to only a few verbs, and some nouns could be connected to English words in similar ways, so this does not necessarily explain why subjects recalled more verbs than nouns.   For instance, the French noun "repas" meaning "meal", is related to the English word "repast," but only two of the four primary subjects remembered that word correctly.   The French noun "lune," meaning "moon," is related to English words, such as "lunar," but, while five of the subjects did recall that word correctly, one subject marked "sun" instead.

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[1]Note, though, that one of the four syllables in this verb, "se promener," is "se" which indicates that the verb is reflexive, and is not really part of the conceptual meaning.

Another possible explanation for the better retention of verbs is that some standardized exams, such as the Regents, have writing portions that require the student to use a certain number of conjugated verbs. This may focus the student's attention on verbs, and thus lead to better learning of and memory for the verbs.

The subjects' ratings of whether they had ever learned the words provided additional interesting information. The overall average ratings for nouns and verbs were quite similar, with 1.79 for nouns and 1.68 for verbs. This indicated that subjects believed they had definitely or probably learned most of the words tested.   Since the overall rating for verbs was slightly better than that for nouns, and more verbs than nouns received average ratings that were purely "1," it is possible that more verbs than nouns tested were initially learned. However, since the difference in ratings is extremely slight, and most subjects indicated that they had learned most of the words, this is probably not relevant.   In addition, one verb received an average rating of 4, and another received an average rating of 4.25, indicating that subjects believed they had probably *not* learned those two verbs. Meanwhile, the highest two average ratings for nouns were 3 and 3.5, a level that suggested only that subjects were not certain whether or not they had learned the words. Despite the fact that subjects were more certain they had *not* learned certain verbs than certain nouns, they *still* remembered more verbs than nouns.

Since the subjects themselves performed these ratings, however, an additional question comes into play. Suppose a person initially learns two words, and years later, for whatever reasons, remembers Word A and forgets Word B. At that later time, will the person be more certain that he or she originally learned Word A, even though both words were initially learned equally well? In other words, the subjects' ratings of whether or not they learned the word may not be

totally reliable, because the factors that lead them to remember the word in the first place may also make them more likely to believe, years later, that they initially learned the word.   Interestingly, though, many subjects indicated that they had definitely learned a certain word, but were unable to give a correct translation for it.   This may indicate that they *are* able to separate their memory of the meaning of the word from whether or not they initially learned it. This also seems to give support to the abovementioned retrieval failure theory of forgetting, where words are not lost from the lexicon, but are simply less accessible. Subjects knew they had learned certain words, so those words were not gone from their lexicon, but they were unable to access the meanings of the words.

The subjects' errors also provided interesting data. Three basic error patterns emerged. The first was giving a translation related to the meaning of the French stimulus, such as when one subject marked "scarf" as the translation for "manteau," which means "coat." The second pattern involved giving a translation for a French word that was phonologically or orthographically similar to the French stimulus. For instance, one subject translated the verb "nager," which means "to swim," as "to snow." "To snow" is a translation for the French verb "neiger."   Next, the third error pattern was giving an English word that was phonologically or orthographically similar to the French stimulus,. This occurred, for instance, when two subjects translated the French word "équipe", which means "team," as "to equip".   There was also one instance of a fourth error pattern, where a subject who had taken several years of Spanish gave a translation for a Spanish word that was phonologically and orthographically similar to the French stimulus. For the French word "jambon," meaning "ham," this subject wrote "soap," which was actually a translation of "jabón," the Spanish word for "soap."

In addition, it was sometimes difficult to determine which pattern was

being seen, or if two were operating at once. For instance, one subject translated the French word "cadeau," meaning "gift," as "card." This translation is related to the meaning of the French word, but also is an example of an English word phonologically and orthographically similar to the French stimulus.

The frequency of occurrence of each of the three major error processes is displayed in Table 5. Where two processes may have contributed to one particular error, both were counted. The most common process seemed to be giving a translation for a French word that was phonologically or orthographically similar to the French stimulus, while a slightly less common error was giving an English word phonologically or orthographically similar to the French stimulus, and the least common error was giving a word related to the meaning of the stimulus word. When the first two processes are considered together as errors based on phonological and orthographic features, and are opposed to errors based on meaning, the difference is striking. Clearly, the subjects made many more errors based on phonology and orthography than on meaning.

This brings to mind the various models of bilingual memory. While no evidence here is sufficient to support any model, these errors seem to be consistent with a type of asymmetrical model, where connections between the L2 word and the concept are minimal, but connections between the two lexical representations, and the phonological and orthographic information contained therein, are stronger. Furthermore, the fact that subjects offered incorrect responses on the basis of similar words in *both* their L1 and L2 seems consistent with an interdependence model. Still, an entirely separate question is how these connections fail as words are forgotten.

The subjects' errors also indicated that they were not always certain if the French stimulus was a noun or a verb. There were two instances where the subject gave the correct meaning, but the incorrect word class. First, one subject

offered a verb when the correct translation was a noun, as she wrote "born," rather than "birth."   Then, for the verb "mourir," meaning "to die," one subject marked "dead," which could be either a noun or an adjective, but is not a verb. These errors also seem to suggest that representation of lexical information, such as word class, is stored separately from the conceptual information, the meanings of the words.

Furthermore, there were many instances where the subjects gave the wrong word class as well as the wrong meaning.   Sometimes, these word class errors may have been based on the grammatical system of the language. For instance, for "ventre," a noun meaning "stomach", one subject offered the verb "to open." Here, it was logical to offer a verb, because one of the three major types of verbs in French are those which end in "re."   Other errors, however, did not follow that type of pattern. For instance, for the verb "mourir," meaning "to die,"one subject offered the adjective "sad," although verbs ending in "ir" are another major class of French verbs.   There were also several instances where subjects offered verb responses for noun stimuli. Here, they may have thought that they were looking at a conjugated verb. (During testing, one subject indicated that she was certain that there were several conjugated verbs on the list, although all verbs were in their infinitive form.)

This suggests another explanation for why subjects remembered more verbs than nouns. Perhaps, since all the verbs were presented in their infinitive form, regular endings such as "-er" gave away that the word was a verb, and provided a cue for retrieval.   This still would not provide a complete explanation, however, since some verbs were irregular, and, as noted above, some subjects offered noun responses for verb stimuli.

Finally, because of the small number of subjects and words tested, and because other variables, such as word length, were not completely controlled for,

any conclusions drawn from this study are necessarily preliminary and tentative. This is particularly true with regard to the subjects' errors, because the experiment was not designed to look at the errors, and the total number of errors was fairly small.

Conclusion

This was a preliminary investigation into the relative vulnerability of nouns and verbs in the attrition of school learned French. Although many theories seemed to lead to the prediction that nouns would be better remembered than verbs, all four primary subjects in this experiment remembered more verbs than nouns. Larger studies that manipulate other possible variables are needed to determine whether there is something about the class of verbs themselves that makes them more likely to be remembered, or if another variable was responsible for this effect. In addition, studies that investigate the nature of errors that attriters make may shed some light on the organization of the bilingual lexicon, and what happens to the connections therein in language attrition.

References

Altenberg, E.P. (1991). Assessing first language vulnerability to attrition. In H.W. Seliger & R.M. Vago (Eds.), *First Language Attrition* (pp. 189-206). Cambridge: Cambridge University Press.

Bahrick, H.P. (1984a). Semantic memory content in Permastore: Fifty years of memory for Spanish learned in school. *Journal of Experimental Psychology: General, 113*(1), 1-29.

Bahrick, H.P. (1984b). Associations and Organization in Cognitive Psychology: A

Reply to Neisser. *Journal of Experimental Psychology: General, 113*(1), p. 36-37.

Craik, F.I.M, & Lockhart, R.S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671-684.

de Bot, K. & Stoessel, S. (2000). In search of yesterday's words: Reactivating a long-forgotten language. *Applied Linguistics, 21*(3), 333-353.

de Bot, K. & Weltens, B. (1991). Recapitulation, regression, and language loss. In   H.W. Seliger & R.M. Vago (Eds.), *First Language Attrition* (pp. 31-52). Cambridge: Cambridge University Press.

de Bot, K. & Weltens, B. (1995). Foreign language attrition. *Annual Review of Applied Linguistics, 15,* 151-164.

de Groot, A. & Keijzer R. (2000). What is hard to learn is easy to forget: The roles of word concreteness, cognate status, and word frequency in foreign language learning and forgetting. *Language Learning, 50*(1), 1-56.

Ellis, N. & Beaton A. (1993). Psycholinguistic determinants of foreign language vocabulary learning. *Language Learning, 43*(4), 559-617.

Gascoigne, C. (2001). Lexical and conceptual representations in more and less-skilled bilinguals: The role of cognates. *Foreign Language Annals, 34(5),* 446 – 452.

Hansen, L. & Reetz-Kurashige, A. (1999). Investigating second language attrition:An introduction. In L. Hansen(Ed.), *Second Language Attrition in Japanese Contexts* (pp. 3-20). Oxford: Oxford University Press.

Helstrom, J., & Schmitt, C.J. (1985). *French: Rencontres.* New York: McGraw Hill Book Company.

Heredia, R., & McLaughlin, B. (1992). Bilingual memory revisited. In R.J.Harris (Ed.), *Cognitive Processing in Bilinguals* (pp.91-103). Amsterdam:

Elsevier Science Publishing Company.

Jarvis, G.A., Bonin, T.M, & Birckbichler, D.W. (1983a). *Et Vous? (1)* New York: Holt, Rinehart, & Winston.

Jarvis, G.A., Bonin, T.M, & Birckbichler, D.W. (1983b). *Nous Tous (2)* New York: Holt, Rinehart, & Winston.

Lotto, L. & de Groot, A.M.B. (1998). Effects of learning method and word type on acquiring vocabulary in an unfamiliar language. *Language Learning, 48*(1), 31-69.

Moorcraft, R. & Gardner, R. C. (1987). Linguistic factors in second language loss. *Language Learning, 37*(3), 327-340.

MRC Psycholinguistic Database. Available online at:

http://www.psy.uwa.edu.au/mrcdatabase/uwa_mrc.htm

Neisser, U. (1984). Interpreting Harry Bahrick's discovery: What confers immunity against forgetting? *Journal of Experimental Psychology: General, 113*(1), 32-35

New York State Regents Examinations. Available online at:
http://www.nysl.nysed.gov/edocs/education/exams/french.htm

Olshtain, E. & Barzilay, M. (1991). Lexical retrieval difficulties in adult language attrition. In H.W. Seliger & R.M. Vago (Eds.), *First Language Attrition* (pp. 139-150). Cambridge: Cambridge University Press.

Paivio, A. & Desrochers, A. (1980). A Dual-Coding approach to bilingual memory. *Canadian Journal of Psychology, 34,* 388-399.

Schmitt, C.J., & Helstrom, J. (1985) *French: Connaissances* New York: McGraw-Hill Book Company.

Schmitt, C.J., & Helstrom, J. (1988) *French: Illuminations.* New York:McGraw-Hill Book Company.

Schmitt, C. J. & Lutz, K.B. (1994a). *Bienvenue: Glencoe French 1.* New York:

Glencoe Macmillan/McGraw-Hill.

Schmitt, C. J. & Lutz, K.B.(1994b). *À Bord: Glencoe French 2.* New York:

Glencoe Macmillan/McGraw-Hill.

Tomiyama, M. (1999). The first stage of second language attrition: A case study

of a Japanese returnee. In L. Hansen (Ed.), *Second Language Attrition in*

Japanese Contexts (pp. 59-79). Oxford: Oxford University Press

Valette, J.P. & Valette, R.M. (1994). *Discovering French: Blanc.* Lexington: D.C.

Heath.

Weltens, B. (1989). *The attrition of French as a foreign language.* Dordrecht:

Foris Publications.

Yoshitomi, A. (1992). Towards a model of language attrition: Neurobiological

and psychological contributions. *Issues in Applied Linguistics, 3(2),* 293-

318.

Yoshitomi, A. (1999). On the loss of English as a second language by Japanese

returnee children. In L. Hansen (Ed.), *Second Language Attrition in*

Japanese Contexts (pp. 80-111). Oxford: Oxford University Press

Table 1: Subjects' Responses for and Ratings of French Nouns Learned in High School

French Word	Correct Translation	Subject A	Subject B	Subject C	Subject D	Subject E	Subject F	x Rating
billet	ticket	ticket	ticket	ticket	wallet(o)	ticket	ticket	1
neige	snow	-----	snow	-----	snow	black(f)	snow	1.25
santé	health	health	health	-----	health	-----	health	1.75
cadeau	gift	present	gift	card(e/m)	gift	gift	gift	1.25
manteau	coat	now (f)	scarf (m)	-----	-----	-----	-----	1.5
lune	moon	moon	moon	sun (m)	moon	moon	moon	1.25
assiette	plate	fork(m)	seat(f/e)	to sit(f/e)	-----	assist(f/e)	-----	2.5
jambon	ham	ham	soap(o)	ham	arm(f/m)	ham	ham	1
gorge	throat	-----	throat	-----	-----	-----	-----	1.75
équipe	team	equipment (e)	team	to equip(e)	to equip(e)	-----	equipment (e)	2
magasin	store	store	magazine	magazine	-----	magazine/book	store	1.5
jupe	skirt	dress(m)	dress/skirt	-----	-----	-----	-----	1.5
orage	storm	-----	-----	-----	orange(e)	-----	orange(e)	3.5
aile	wing	-----	to be sick(e)	-----	-----	-----	went(o)	3
ventre	stomach	-----	to open(e/f)	-----	-----	twenty(f)	open(e/f)	2.25
verre	glass	green(f)	true/to verify(e/f)	glass	-----	green(f)	glass	1.75
naissance	birth	------	birth	------	born	swim(f)	birth	2
repas	meal	to rest(f)	meal	------	meal	rest(f)	meal	1.5

Notes:
1.Subjects E and F did not meet all criteria and were not included in the calculations of x rating.
2.x Rating:1=definitely learned the word, 2 = probably learned the word, 3 = may have learned the word, 4 = probably did **not** learn the word, 5 = definitely did **not** learn the word
3. Each incorrect response is categorized by type of error: m = incorrect response was related to the correct meaning, e = incorrect response was an English word phonologically or orthographically similar to the French stimulus word, f = incorrect response was a translation for a French word orthographically or phonologically similar to the French stimulus word, o = other. Where two processes may have been involved, both are noted.
4. Subject B's response "of "dress/skirt" for "jupe" was considered correct although only "skirt" is a correct definition
5. Subject D's response of "born" for "naissance" was considered correct although "birth" is the correct definition.
6. Subjects B, C, and E's response of "magazine" for the French word "magasin" was considered correct although the target translation was "store," because "magazine" was listed as a possible definition of "magasin" in the dictionary, and a high school French teacher indicated in a personal communication that she believed French students might have learned "magazine" as a definition of "magasin," (although "store" seems to be the more common definition found in textbooks).
7. Subject B's response of "seat" and Subject C's response of "to sit" for the French word "assiette" (plate) were considered incorrect although "seat" is listed as a possible translation in the French dictionary, because a high school French teacher indicated in a personal communication that "seat" is a very old definition of "assiette" and she thought it unlikely that high school French students would have ever learned that meaning.

Table 2: Subjects' Responses For and Ratings of French Verbs Learned in High School

French Word	Correct Translation	Subject A	Subject B	Subject C	Subject D	Subject E	Subject F	x Rating
s'habiller	to dress (oneself)	to live(f)	to inhabit(f/e)	to live(f)	to live(f)	live(f)	to dress yourself	1.25
envoyer	to send	to send	to send	to send	to send	send	-----	1
louer	to rent	to rent	to rent	-----	-----	lend(m)	-----	2.5
boire	to drink	box(e/f)	to drink	to drink	-----	drink	drink	1
tuer	to kill	-----	-----	-----	-----	-----	-----	4.25
manger	to eat	to eat	to eat	to eat	eat	eat	to eat	1
laver	to wash	wash	to wash	to wash	wash	wash	to wash	1
nager	to swim	to swim	to snow(f)	to swim	to swim	swim	to swim	1
jeter	to throw	-----	to throw	to be(f)	throw	-----	-----	1
dormir	to sleep	to sleep	to sleep	to sleep	sleep	sleep	to sleep	1
rire	to laugh	to laugh	to laugh	-----	nothing(f)	-----	-----	1.75
mourir	to die	to cry(m)	to die	to die	sad(m)	dead	to die	1
chanter	to sing	to sing	to sing	to sing	sing	sing	to sing	1
gagner	to win	to win	-----	-----	win	-----	to win	1.5
se promener	to walk	to walk	to walk	to walk with	to walk	walk	walk	1.25
enseigner	to teach	-----	to teach	to sign(e)	-----	-----	sign(e)	2
souffler	to blow	-----	to blow	-----	-----	-----	-----	2.75
lutter	to fight	-----	to pollute(e)	-----	-----	-----	-----	4

1.Subjects E and F did not meet all criteria and were not included in the calculations of x rating.
2.x Rating: 1 = definitely learned the word, 2 = probably learned the word, 3 = may have learned the word, 4 = probably did **not** learn the word, 5 = definitely did **not** learn the word
3. Each incorrect response is categorized by type of error: m = incorrect response was related to the correct meaning, e = incorrect response was an English word phonologically or orthographically related to the French stimulus word, f = incorrect response was a translation for a French word orthographically or phonologically similar to the French stimulus word, o = other. Where two processes may have been involved, both are noted.
4. Subject E's response of "dead" for "mourir" was considered correct although it was of the wrong word class.

Table 3: Survey of Language Background

1. _____ Male _____ Female

2. _____ Age

3. How many years of French did you take in high school? _____

4. In what range were your grades in high school French?

_____ A _____ B _____ C _____ D _____F

5. Did you take the French Regents? _____ yes _____ no

6. If yes, what was your approximate grade on the French Regents?

_____ A _____ B _____ C _____ D _____ F

7. If you took a standardized test in French other than the Regents, please indicate the name of

the test and approximate grade received.

_____

8. How many semesters of French did you take in college, and on what level?

_____

9. Approximate grades in college French? _____ A ___ B _____ C _____ D _____ F

10. In what month and year did you finish your last French class? _____

11.Have you had any significant exposure to French outside of class? If yes, please describe the

length and type of exposure.

12. What is your native language? _____

13. If you know or have studied any other languages, please indicate the language, number of

years studied, where you learned it, and approximate level of proficiency.

Table 4: Number of Nouns and Verbs Correct

Subject	Number of Correct Nouns	Number of Correct Verbs
A	6	10
B	11	13
C	4	9
D	6	9
E	5	9
F	10	10
Average	6.75	10.25

Note:

Subjects E and F did not meet all criteria and were not included in calculation of averages.

Table 5: Three Error Processes and Frequency of their Occurrence
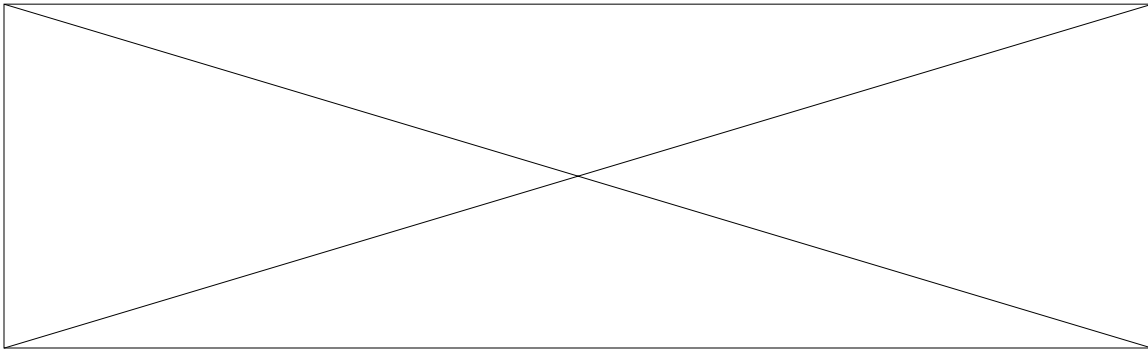
Notes:
1.Similar = phonologically or orthographically similar
2. Subjects E and F did not meet all criteria and were not included in calculations of averages.