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Second Language Retention: Language Use
as a Contributing Factor

by
Daphne A. Ducharme

A thesis submitted to the School of Graduate Studies and
Research in partial fulfillment of the requirement for the degree
of Master of Arts in Education

Ottawa, Canada, 1995



Daphne A. Ducharme, Ottawa, Canada, 1995



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Abstract

Using data collected by Wesche (1992), this study examines the effect of the use of French as a second language on the performance of subjects in receptive skills (listening and reading comprehension) and productive skills (speaking and writing). Language use is presented as one of three major factors (together with the initial level of proficiency, and the role of motivation) reported from earlier research (Harley, 1994) as relevant to the maintenance of language skills. Results of earlier investigations (Bahrick, 1984; Clark & Jorden, 1984) have already shown that the level of proficiency may influence long-term retention of knowledge. Similarly, the role of motivation has been studied extensively by a number of researchers (Gardner, 1982; Gardner, Lalonde and MacPherson, 1985; Gardner, Lalonde, Moorcroft and Evers, 1985; Gardner, Moorcroft and Metford, 1989; Gardner and Lysynchuk, 1990) and it is now generally accepted that attitudes affect motivation which in turn influences the long-term retention of learned material (Moorcroft and Gardner, 1987). Just as motivation is seen as a crucial component in language learning, it stands to reason that to maintain a level of performance, it is important to benefit from a supportive external environment (Edwards, 1977). The more practice is available to subjects who wish to maintain their skills, it seems, the more likely they are to be successful in doing so.

This research attempts to establish a relationship between the use of the language after learning has occurred and the difference between pre and post test measures using the data collected by Wesche (1992). A number of specific independent variables will be examined, specifically the number of university courses taken in French, the number of books read in French, the number of movies seen in French, the number of hours of television watched in French, and the number of other activities in French.

Acknowledgements

This project has been realized with the support and guidance of a number of people. I wish to thank my Research Advisor, Dr. Johanne S. Bourdages as well as the members of my thesis committee, Dr. Renée Forgette-Giroux and Dr. Cécile Champagne-Muzar. Special thanks are also due to Dr. Raymond Leblanc for his help in correcting the final thesis paper. Finally, I wish to express my deepest gratitude to Dr. Marjorie Wesche who very generously provided the data which served as a baseline for my research and contributed to making the project a reality.

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Chapter I

Introduction

For decades, an impressive number of empirical and theoretical studies have attempted to explain the processes involved in second language acquisition (SLA) of children, adolescents, and adults. A major focus of research in SLA is the learning strategies used by students of a second language. Harley (1994) describes learning strategies "(...) as steps taken by learners to enhance their own learning" (p. 5). The learning strategies can be classified as " 'direct' (memory strategies, cognitive strategies, and compensation strategies) and 'indirect' (metacognitive, affective, and social strategies)" (Harley, 1994). Research on learning strategies has many implications for language teaching and learning since it is widely believed that students provided with guidance in learning how to learn benefit substantially by assuming greater responsibility for their own language learning, rather than sitting back passively and taking it as it comes from their teacher (Harley, 1994; Hart & Lapkin, 1990). While Harley (1994) reports that research on learning strategies has been prominent in the second language field, she also observes that the issue of retention strategies¹ to prevent attrition of language skills has received little attention. Logically, it would seem reasonable that if training in

¹ Harley (1994) does not explicitly define the term "retention strategies".

learning strategies is of prime importance, then guidance on retention strategies should be equally beneficial to learners in promoting maintenance beyond the classroom setting (Harley, 1994, p. 5).

The study of retention strategies necessarily implies an understanding of memory theory in general. Over the past century, a number of theoretical concepts have been discussed by psychologists. Bartlett (1932) was a pioneer when in 1932 he proposed that recall of knowledge was a reconstructive process. This view was in direct contrast with Ebbinghaus' (1967) earlier conception of memory as an exercise in repetition to solidify a content that can be remembered at a later time, as a result of what we now refer to as rote learning (Lleury, 1992). Bartlett's ideas did not find much favor with researchers for decades. From the 1920's to the 1960's, the science of psychology was heavily influenced by the behaviorist approach which examined extraneous factors to learning. Behaviorists rejected the term 'memory', because of its internal component (Lleury, 1992). This approach inspired a view of memory research conducted in laboratory settings in which the key to remembering learned material was thought to lie in controlling the conditions present at the time of learning new material, and reproducing those same conditions at a later time. Subjects would associate the learning conditions with the material to be remembered and thus promote recall (Lleury, 1992). In 1967, Neisser criticized memory research as being overly concerned with what he

termed a “reappearance hypothesis”. During the last two decades, we have seen a revitalization of Bartlett’s idea of memory as a reconstructive process, this as a result of the general shift of memory research away from the behaviorist view to the constructivist view of language learning (Denhière, 1992).

Most memory research over the years has been based on a laboratory or formal experimental approach and has yielded results that have little application in everyday life (Bairick & Phelps, 1988). More recently, however, researchers have begun to focus on naturalistic (or ecological) and longitudinal research, which studies the use and maintenance of language over longer periods of time. One such study was done by Bairick (1984) and led to a significant empirical discovery. Bairick (1984) claims that the process of forgetting does not continue indefinitely. His interest is in determining what external factors or conditions are important to promote retention. On the other hand, Neisser and Winograd (1988) have focused on the internal process of recalling knowledge. Inevitably, this dual focus leads to conflicting views of what may be important to emphasize in the classroom as far as retention strategies. If the process of recalling is one of ‘reappearance’ then the classroom emphasis might be better placed on rote memory work or repetition tasks. However, if we espouse a view that remembering is more like problem-solving (Neisser, 1984) and thus is a ‘reconstructive’ process,

the classroom emphasis should be placed on developing a system of relationships between ideas. As of now, no one theory has yet satisfactorily explained why second language attrition occurs and how best to promote retention. In this research, the issue of reappearance or reconstruction will be dealt with strictly in an exploratory manner. The main research question to be resolved is whether language use contributes to long-term retention. The results will then be interpreted in light of the conceptual framework presented and of the review of the literature. Finally, the subject of reappearance and reconstruction will be broached and future research options will be suggested.

1.1 Definitions

Three core concepts will have to be taken into account in this study: attrition, retention and maintenance. A number of general definitions of these concepts have been suggested by language researchers (Raffaldini, 1988; Gardner, 1982; Clark, 1982). These have been mostly concerned with the external conditions involved in remembering. For the term “attrition” a definition has been proposed by Olshtain (1989). She suggested the need to define attrition on a continuum that “stretches from a point of complete language loss (when the individual claims no memory of the language) to a point where the individual feels perfectly competent yet his or her use of the language has become somewhat restricted over an

extended period of time" (p. 153). She suggests that "in order to define attrition at any point along this continuum, one needs to examine the unique interlanguage that develops as the result of a reduction in language use and interaction with another dominant language" (p.153). Her contention is that variation in competence and performance is central to language attrition since "from what we know about language acquisition in general, we can expect people suffering from language attrition to exhibit quantitatively more and qualitatively different variations in competence and performance² as compared with native speakers" (p. 153). This difference in variation would be of major concern to attrition researchers. Although this definition describes, in terms of competence and performance, how one might recognize attrition, it does not deal adequately with the internal processes of remembering.

The terms retention and maintenance are defined by psycholinguists in terms of competence and performance. A 'cognitive' definition of "retention" is given in the Penguin Dictionary of Psychology: "Generally, the process of holding onto or retaining a thing (Reber, 1985). Most commonly used with respect to issues surrounding the retention of information, where the basic presumption is that some "mental content" persists from the time of initial exposure to the material or initial learning

² Ellis (1986, p.294) has discussed the distinction between competence and performance: "When learners acquire a L2, they internalize rules which are then organized into a system. This constitutes their 'competence'. The actual use of this system to comprehend and produce utterances is referred to as 'performance'. Researchers (and linguists) disagree about the exact nature of 'competence'. Some (e.g. Chomsky) view competence as entirely linguistic, while others (e.g. Hymes) view it as communicative.

of a response until some later request for recall or re-performance” (p.645). “Retention” is defined in behavioral terms in the Dictionary of Behavioral Science (Wolman, 1989) as “the fact that a learned behavior will persist after a period of time has passed in which the behavior has not been performed” (p.294).

Finally, the term “maintenance”, used in the field as a synonym for “retention” has not been defined by psycholinguists, but only in behavioral terms. The Dictionary of Behavioral Science (Wolman, 1989) for example, defines this term as “the unvarying ability to perform an act due to overlearning or repeated practice” (p. 200). Hughes (1985) defines maintenance as the “generalization of a trained language structure or response measured over time (...) The durability of trained responses is a crucial aspect of generalization and may be a function of the usefulness of the target or of the degree of support for it in the nontraining environment” (p. 10).³ For true maintenance to be claimed, it is assumed that direct treatment of the behavior must have ceased. The periods across which generalization of a desired behavior (maintenance) can be measured may be short (for example, several days) or long (one year or more, for example). “More often maintenance implies a rather lengthy period of time between the achievement of a language behavior in treatment and follow-up measures of that behavior one, three, six, even 12

³ Generalization refers to “the occurrence of relevant behavior under different, non-training conditions, i.e. across subjects, settings, people, behaviors, and/or time, without the scheduling of the same events in those conditions as had been scheduled in the training conditions” (Hughes, 1985, p. 4).

months later. A general rule might be at least two weeks after treatment” (Hughes, 1985, p. 128).

Although this research focuses on “retention” strategies, it would not be possible to ignore the terms “attrition” and “maintenance” which are commonly used in the field. The former usually refers to the phenomenon opposite to “retention” and the latter is considered a synonym for “retention”. As is evident by the various formal definitions given above, “maintenance” can be considered to have occurred in terms either of competence being preserved or of performance which persists over time. In both cases, a time interval must pass after a learning experience before retention can be measured.

1.2 Operational Definition

For the current investigation, the occurrence of “retention” will be defined along the lines of the definition of maintenance. We are mainly interested in measuring whether the performance level recorded prior to a time interval, has remained constant or improved. As per the definition given above, treatment (in this case formal intensive language learning) will have ceased prior to the time interval. We will be measuring the durability of the behavior (second language performance) as a result of second language use, during an interval of three years (from pre-test to post-test). Maintenance or improvement of performance will be measured

by the battery of tests used by Wesche (1992). If no change in performance is observed from pre- to post-test, retention will be said to have occurred.

1.3 Research Questions

Using data collected by Wesche (1992), this study will examine the global performance of subjects on receptive skills (listening and reading comprehension) and productive skills (speaking and writing) related to the use of the language, one of three major factors (together with the level of proficiency, and the role of motivation) reported from earlier research (Harley, 1994) as relevant to the maintenance of skills. Results of earlier investigations (Bahrick, 1984; Clark & Jorden, 1984) have already shown that the initial level of proficiency may influence long-term retention of knowledge. Similarly, the role of motivation has been studied extensively by a number of researchers (Gardner, 1982; Gardner, Lalonde and MacPherson, 1985; Gardner, Lalonde, Moorcroft and Evers, 1985; Gardner, Moorcroft and Metford, 1989; Gardner and Lysynchuk, 1990) and it is now generally accepted that attitudes affect motivation which in turn influences the long-term retention of learned material (Moorcroft and Gardner, 1987). Just as motivation is seen as a crucial component in language learning, it stands to reason that to maintain a level of performance, it is important to benefit from a supportive external

environment (Edwards, 1977). The more practice is available to subjects who wish to maintain their skills, it seems, the more likely they are to be successful in doing so.

This research will examine the possible links between the use of the language after learning has occurred and the difference between pre- and post-test measures using the data collected by Wesche (1992). A number of specific independent variables will be examined, specifically the number of university courses taken in French, the number of books read in French, the number of movies seen in French, the number of hours of television watched in French, and the number of other activities in French.

The results obtained (retention, attrition or improvement) will then be examined in terms of the research questions presented in the next paragraph and in terms of the review of the literature in Chapter 3. Finally, we will examine the process of remembering as a function of language use. A discussion of the possible role of language use in promoting both reappearance and reconstruction will be presented. It will be postulated that both these hypotheses might help understand how retention might be enhanced in terms of internal processes. This investigation should hopefully stimulate more classroom research on retention strategies and eventually lead to a definition of retention.

The following research questions are proposed:

- 1- On the basis of varying usage of the second language, can one observe a change in the performance in French as a second language of graduates of bilingual high schools studying in university, from the time they graduated from high school (1988) to third year university (1991)?
 - a) Did subjects who took courses in French during any of their three years of university study reveal better retention than those who did not take courses in French?
 - b) Did those subjects who reported reading at least one book a month in French during their years of university study reveal better retention than those who did not?
 - c) Did those subjects who reported watching at least one hour a week of television in French, seeing at least one movie a month in French and doing other activities in French for at least one hour per week during their years of university study reveal better retention than those who did not?

1.4 Scope of the Study

There are a number of considerations and constraints which determine the scope of this investigation and will therefore limit the interpretation which we will make of the results. Overall, the choice of objectives for the present study was somewhat inhibited by the use of data already collected by Wesche (1992) for other purposes. One first such consideration was that the sub-sample for measures of oral productive

skills was very small⁴ and may mitigate the results obtained regarding the independent variables identified above. Although the original number of subjects was quite high (154 took the pre-test), only 78 took the post-test and an even smaller sub-sample were given the oral test. In view of the limited size of this sub-sample, some quantitative analyses could not be performed, particularly in terms of the relationship between the initial level of proficiency and the use of the language. For example, it was not possible to examine the overall combined effect of any two of the variables on the performance of subjects on various tests. It might have been interesting to examine the combined effect of the initial level of attainment with language use variables, such as books read or courses taken in French. The limited numbers of subjects prevented analyses such as these. Practice variables (activities during the pre- and post-test interval) were examined individually in terms of their effect on the difference between pre- and post-test measures.

⁴ Of the 154 subjects who had originally been tested in 1988, only 78 were tested in 1991; of this number a subsample of 12 were tested on both occasions for speaking skills.

Table 1

List of Language Use Variables Controlled

<u>Pre-Test</u>	<u>3-year Interval</u>	<u>Post-Test</u>
1988	Courses Taken in French	1991
	Books Read in French	
	Movies Seen in French	
	Hours of Television Watched in French	
	Hours Spent on Other Activities in French	

Another problem that was encountered was in not knowing whether any French language courses had been taken by subjects in university. Control of this voluntary language learning variable during the interval between pre- and post-test measures was not possible since the data available does not provide sufficient information on French language courses taken in university. Most subjects for whom some pre- and post-test measures were available reported taking at least one French language course of some type (French literature, French as a second language, or French for francophones) during the three year interval. The data do not specify the number of courses, nor the year in which they were taken. It may have been interesting to select only those subjects who had taken

French literature courses (not language learning per se), and measure the influence of practice variables on their test results. The limited size of the sample prevented such analyses. We were able, however, to perform analyses of variance with repeated measures, grouping all three types of French courses into one independent variable. Those subjects who reported taking French courses were compared to those who did not with regards to their performance on both pre- and post-tests. None of the results were significant which allowed us to surmise that taking French courses did not influence maintenance in this study. It is nevertheless important to keep in mind, in the interpretation of results that the combined influence of taking French courses and other language use variables or the initial level of attainment may have contributed to the recorded outcomes.

With respect to the courses taken, an important distinction was made between French courses and courses taken in French. The French courses taken by subjects concerned a variety of language courses (French literature, French for francophones and French as a second language) that were reportedly taken by subjects at some time during their three years of university study. These courses were not considered as language learning per se (such as the language learning taken previously in high school) since an analysis of variance procedure showed no significant difference between pre- and post-test measures when comparing those subjects who

reported taking these types of courses and those who did not. Courses taken in French, however, were counted as language use. It was determined that these courses were taken on a voluntary basis and differed in intensity from the language learning exposure previously experienced by subjects in high school. Therefore, courses taken in French were considered language use and not language learning. The language use variable thus included courses taken in French, books read in French, television watched in French, movies seen in French, and other activities practised in French.

Even though the results obtained in the current investigation may be difficult to generalize, it will be shown that they conform with the findings of earlier studies (Snow, Padilla & Campbell, 1988; Godsall-Myers, 1981), which suggested that attrition of receptive skills was generally indicative of similar or worse attrition of productive skills. Since the number of subjects for some measures, namely oral production, was quite low, the results on these measures will certainly be difficult to generalize. However, the earlier findings by other researchers, might allow for some suggestions to be made from the results of receptive measures, for which the sample is somewhat larger.

In addition to measuring proficiency through tests, this study will also take into account, as already mentioned, language use. Questionnaires are often used in studies on language retention as a way of controlling the

language use variable which affects performance (Gardner, 1982; Gardner, Lalonde, Moorcroft and Evers, 1985; Gardner, Moorcroft, and Metford, 1989; Gardner and Lysynchuk, 1990). Even though measures were also available for attitudes, the current study has chosen to set aside this variable, since the earlier investigation by Wesche (1992) had found no significant variation in the attitudes of subjects.

This design will allow the examination of the influence on long-term retention of a number of practice variables (see Table 1), which were not controlled in the initial study by Wesche (1992). The number of courses taken in French, the number of books read in French, the number of movies seen in French, the number of hours of television watched in French, and the number of other activities conducted in French may influence the difference between pre- and post-test measures.

Chapter II

Conceptual Framework

The study of long-term retention of a second language necessarily implies an understanding of a number of theories of the mind and more specifically of the retention processes. Several fields of investigation converge to provide a general theoretical picture of the manner in which an individual organizes material in his or her mind, when first learning a second language and when attempting to use it at a later time. In this chapter, we will examine the current trends in cognitive research and we will take stock of memory research over the past century. In addition to examining past trends in cognitive and memory research, we will also discuss the latest breakthroughs in psycholinguistics on the learning of language. Finally, the issue of reappearance and reconstruction will be presented with regards to the process of remembering. This overview of the theoretical issues at play in the study of second language retention will provide a framework from which to examine empirical studies in the field and then analyse and extend the results found in the current investigation.

2.1 Current Trends in Cognitive Research

In his book *Lecture, compréhension de texte et science cognitive*, Denhière (1992), offers a contemporary perspective of cognitive research.

According to Denhière, cognitive science is based on the same precepts as all sciences, in that it deals with observation of facts. However, contrary to the dominant approach of American psychology for over fifty years (1920's to the 1970's), this school of thought considers that behavior is caused by processes that involve internal structures. Cognition is defined by Neisser (1982) as "all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used" (p.xi). Despite the essentially non-observable character of these structures and processes, they are nonetheless the object of research of cognitive science (Denhière, 1992).

2.1.1 The Cybernetic Movement

In the beginnings of cognitive science, it was observed that the characteristics of human intelligence closely paralleled those of the computer. This observation and the subsequent emergence of the "cybernetic movement" (Denhière, 1992) were based on two hypotheses: the first was that the functions of the human brain should be studied according to the laws of logic; and the second was that the human brain is conceived as an entity whose components follow principles of logic (Varela, 1989). The interconnections between the components would allow logical operations to be performed. The cognitivist current adopted the cybernetic hypothesis in that cognition was viewed as a manipulation of

symbols (Varela, 1989; Baars, 1986). At this stage of the evolution of cognitive science, the cognitive system was viewed as a processor, similar to a computer processor, and research interest was limited to the description of the program of this processor (Denhière, 1992; Baars, 1986)).

2.1.2 Constructivism

Even at the time that cybernetics was the main guiding framework of cognitive science, logic as the basis for cognitive science was questioned (Denhière, 1992; Varela, 1989). However, it was not until the 1980's that a new conception of the study of cognition began to emerge, one which differs significantly from the initial cognitive view (Varela, 1989). Constructivism is based on the notion that a description of cognition using only symbolic representations is inadequate (Denhière, 1992). The constructivist strategy consists of building a cognitive system, not from symbols and rules, but from simple, elementary forms of representation that are devoid of any interpretation and can be dynamically linked to one another (Varela, 1989; Miller, 1989). Constructivist models are vast networks of simple components that function in parallel (Denhière, 1992).

An important distinction to be made between the cybernetic view and the constructivist view of cognition is that the first deals with symbols that are manipulated in one particular way according to logic, whereas the second view presents a dynamic system of interrelated components. A

parallel distinction is made in memory research where one view - the “reappearance hypothesis” - (Neisser, 1967) is based on the reproduction of stored units of information; a more recent interpretation of the memory process is based on the “reconstruction hypothesis”, which suggests that remembering is more like problem-solving (Neisser, 1984).

2.2 Memory Research

The history of semantic memory research can be traced back to the work of Hermann Ebbinghaus on the recall of nonsense syllables, studies he first published in 1885 (Ebbinghaus, 1964). His experiments on learning and remembering nonsense units (syllables that were devoid of any significance) was the first attempt at establishing a relationship between learning strategies (the number of repetitions required to recall the material) and retention (short-term) of material. In contrast to this line of investigation which was purely based on the reproduction of intact material, Bartlett proposed a new theory in 1932 which suggested that remembering was based on a reconstructive process. In order to understand the distinction between “reappearance” and “reconstruction”, it will be useful to examine a number of concepts involved in memory research. First, we will distinguish between semantic memory and episodic memory. Then, we will examine two locales for memory research - laboratory and naturalistic settings.

2.2.1 Semantic Memory and Episodic Memory

After the Second World War, the emergence of computer technology had a definite influence on the field of cognitive science in general, and memory research in particular. The cybernetic approach to cognitive science led to a main distinction being made between short-term and long-term memory (Lieury, 1992). A number of information-processing models (Gagné, 1974) were proposed that assumed learned material was first stored in short-term memory, then perhaps transferred to long-term memory for later recall. The notion of storage for later use followed the general school of thought that units could be remembered in their intact state of storage. This somewhat simplistic view of memory has since been strongly contested (Neisser, 1982; Neisser & Winograd, 1988).

Tulving (1972) suggested that several experimental facts were difficult to explain based on single memory theories. His observations led to two hypotheses: the first suggested that clues for remembering information were only useful if they had been stored at the same time as the information; the second suggested that information could be remembered even if it was not recognized as having been learned. Neither of these hypotheses could be explained by single memory theories, and led Tulving (1976) to propose two memory systems. The first would be called “semantic memory”, a permanent system for knowledge of the meaning of words, objects, events, and the world in general. The second would be

called episodic memory, another system for storing personally experienced singular events, that are temporally and spatially marked and relate to specific contexts (Tulving, 1972). According to Neisser (1988), Tulving's major contribution to cognitive psychology "was to introduce an entirely new subject matter into the psychology of memory (...) to recognize the existence of a vast new class of memoria" (Neisser: 1988, p.357). This would suggest that people do not only remember facts but also momentary experiences.

The distinction between episodic and semantic memory systems is particularly important in so far as second language retention is concerned. The main difference lies in "whether or not temporal factors surrounding the conditions of presentation of to-be-remembered material are stored and retrieved. Recall of the temporal context of the learning situation is considered crucial to successful recall in tasks involving memory for discrete episodes, but relatively unimportant in recall of more or less permanently memorized information involving semantic relations" (Roediger & Crowder, 1982: p. 230). This argument is pursued in another study (Linton, 1982) whose findings suggest that the "number of trials (or experiences) has contrastive effects on episodic and semantic memories. Increased experience with any particular event class increases semantic (or general) knowledge about the event and its context. Increased experience with similar events, however, makes specific episodic

knowledge increasingly “confusing”, and ultimately episodes cannot be distinguished” (Linton, 1982: p. 78). These results suggest that repetition (as in language use) will cause memory for events to become confused although the same strategy will cause semantic knowledge to increase. These findings regarding semantic knowledge are in line with other results such as those of Ebbinghaus (1964) years ago that indicated improvement of recall with practice.

2.2.2 Laboratory Research and Naturalistic Research

In the preface to his book Memory Observed, Neisser (1982) distinguishes between two routes that have been taken by psychology in the study of memory: first, the search for “basic mental mechanisms that can be demonstrated in well-controlled experiments” (Neisser, 1982, p.xi); and second, the search for an understanding of the “specific manifestations of memory in ordinary human experience” (Neisser, 1982, p.xi). Neisser (1982) suggests that the first route (which he calls the “high road”) has been popular:

[...] since Ebbinghaus (1967) opened it over a century ago by memorizing long lists of nonsense syllables. Ebbinghaus argued that the laws of association would be best revealed by the study of rote learning, using meaningless material that was indifferent to the vagaries of individual experience. His argument prevailed (Neisser, 1982, p.xi).

Rote memory has since had an established place in experimental

psychology (Neisser (1982)). As a result of the emergence of new conceptions of information processing after World War II, the study of memory became one of the major concerns of modern cognitive psychology (Neisser, 1982). This new wave of modern cognitive psychology saw the proposal of hundreds of theoretical models of memory that were tested in numerous experiments, without producing many useful results (Neisser, 1982). In fact, Neisser (1982) suggests that we have accumulated the wrong kind of knowledge through those experiments. Results have yielded a great deal of information about performance in specific laboratory tasks but little is known about the “phenomena⁵ that motivate the study of memory in the first place” (Neisser: 1982, p.xii). The consequence of this research activity is that many of the theories of memory are too closely bound to particular experiments to be of any interest or so vague that they provide no intellectual satisfaction.

Neisser (1982) suggests that what is needed in the study of memory is a new approach that would allow us to learn how we use our past experiences to meet the needs of the present and the future. He suggests that it would be of interest to study this problem under “natural conditions”, such as in a school, at home, or on the job. Though the psychological laboratory might well be the easiest of settings in which to study memory, it might also be the least interesting.

⁵ In psycholinguistic terms, one could refer to competence as the ‘phenomena’ that is tapped through measurement of performance.

Since the indictment by Neisser (1982) of the traditional approach to the study of memory in cognitive psychology, an interest has developed in a more naturalistic (or ecological) approach. One researcher, in particular, Harry P. Bahrick has devoted a great deal of time and effort to the study of retention in natural settings. He began with an investigation of memory for places, former students, and high school classmates (Bahrick, 1983a, 1983b; Bahrick, 1984; Bahrick, Bahrick, & Wittlinger, 1975) and more recently has produced the results of a study of the retention of school-learned Spanish (Bahrick, 1984). Bahrick (1989) discusses the merits of naturalistic memory research in *The Laboratory and the Ecology: Supplementary Sources of Data for Memory Research*. He suggests that “content must generally be acquired in nonlaboratory settings if the acquisition period exceeds a few hours, if long retention intervals are of interest (...) (and that) laboratory memory research is therefore largely limited to the retention of content that is under direct control of an experimenter, that can be presented during a few hours or less, that is emotionally and motivationally neutral, and that is tested for retention within a few days following acquisition” (Bahrick, 1989, p.76). The argument for research on retention to be conducted outside of the laboratory, in natural settings, is a strong one. In order to discover what retention strategies may be conducive to long-term retention over long periods of time, more investigations such as that by Bahrick (1984) will be

needed. Just as Neisser (1982) deplored the lack of applicable results from years of laboratory research on retention, Bahrnick and Phelps (1988) have suggested that “the failure to investigate lifetime retention of semantic content leaves memory research largely irrelevant to education” (p.178). Since a primary goal of education is to establish and preserve knowledge, then it stands to reason that relevant memory research should be concerned with retention over long periods of time and the laboratory findings limited to short-term interval would be considered comparatively trivial (Bahrnick & Phelps, 1988). This view is echoed by Neisser (1988) who complained that research has not sufficiently concentrated on what is learned in school and suggested that we focus on whether or not students remember what we teach them.

2.3 Psycholinguistic Views

Before we examine the factors that might influence the long-term retention of language, it is important to examine the current trends in Second Language Acquisition (SLA) research. Research in SLA has followed a path similar to that described earlier for cognitive psychology. Just as the current view of cognition is based on a constructivist approach, language research has evolved from thinking of the mind in terms of one unitary whole to forming hypotheses as to the existence of a number of processes that interact.

2.3.1 Ausubel's Cognitive Learning Theory

A Skinnerian view of both language and language learning dominated second language teaching methodology for several decades: it postulates that any subject matter could be taught effectively and successfully by a carefully designed program of step-by-step instruction involving units of information to be retained (Brown, 1987). Although Skinnerian learning theory have contributed significantly to our understanding of the external conditions of human learning, there has emerged a new view of human behavior as essentially abstract in nature and composed of a complex of variables that make human behavior difficult to predict or control.

David Ausubel has proposed such a new view of learning, contending that it takes place through a process of relating new events or items to already existing cognitive concepts or propositions (Brown, 1987). Although he does not specify the nature of the organization of the mind, he does suggest that new learning is anchored on experience of post-knowledge insofar as meaning is a:

clearly articulated and precisely differentiated conscious experience that emerges when potentially meaningful signs, symbols, concepts, or propositions are related to and incorporated within a given individual's cognitive structure on a nonarbitrary and substantive basis (Anderson & Ausubel, 1965, p.8).

Brown (1987) suggests that the best way to understand Ausubel's

cognitive learning theory is to contrast “rote” and “meaningful” learning. When compared to rote learning the concept of meaningful learning takes on a new significance. Ausubel described the concept of rote learning as the process of acquiring material as “discrete and relatively isolated entities that can be related to cognitive structure only in arbitrary and verbatim fashion, not permitting the establishment of relationships” (Ausubel, 1968, p.108). In other words, rote learning involves the storage of items that bear little or no association with existing cognitive structure, such as the memorizing of telephone numbers that are rotely learned. On the other hand, meaningful learning implies relating and anchoring new material to relevant established entities in cognitive structure:

As new material enters the cognitive field, it interacts with, and is appropriately subsumed under, a more inclusive conceptual system. The very fact that material is subsumable, that is, relatable to stable elements in cognitive structure, accounts for its meaningfulness (Brown,1987, p.66).

According to Ausubel’s theory, two conditions can make any learning situation meaningful. The first is that the learners be able to relate the new learning task to what they already know and the second is that the learning task itself be relatable to the learners’ structure of knowledge.

There are two important implications of this theory on the current investigation of second language retention. The first concerns the suggestion that the way in which material is learned might influence whether or not it is retained over long periods of time. The theory implies

that rote-learning does not promote long-term retention, except in the case of material that is entertained by repeated use. On the other hand, meaningful learning does promote long-term retention (Brown, 1987). If this is the case, a possible retention strategy might already be in place in schools where the emphasis is on meaningful learning.

The second implication of this theory relates to the process involved in retrieving material for later use. In meaningful learning, it is suggested that material is organized hierarchically, similar to building blocks that form a structure. The idea is that new material becomes part of already established categories or systematic clusters of blocks, and that in the long term “systematic forgetting” occurs where “subsumed items are pruned in favor of a larger, more global conception (...)” (Brown, 1987, p.66). This theory suggests that material is somehow reorganized in the mind once it has been learned and that later production of the learned material might take on a different form than that in which it was stored. Items that relate to an established cognitive structure would be more immune to forgetting than independent items.

2.4 Reconstruction and Reappearance

Having examined a number of theoretical concepts that relate to the study of second language retention, we will now introduce two hypotheses that seem to emerge from the literature on the study of memory. As has

been discussed from essentially two complementary views (cognitive psychology and psycholinguistics), the evolution of psychological research has moved from viewing the mind as a unitary whole to considering an organized system of cognitive structures, and this trend extends to all aspects of psychology that are related to research in second language retention (memory research, language learning). As has already been mentioned, two views of the process of remembering have dominated the study of memory over the years - reappearance and reconstruction (Neisser, 1967). A study on retention would not be complete, therefore, without a presentation of the reappearance and reconstruction hypotheses.

2.4.1 Reconstruction

Bartlett (1932) was the first to offer a constructive view of the process of remembering. He argued that reorganization and change are the rule rather than the exception in memory, and suggested that the description of memories as fixed and lifeless is not a reasonable assumption (Lieuury, 1992). In his book Cognitive Psychology, Neisser (1967) states that it seems clear that past information is somehow preserved. However it is less clear what aspects of information are stored, how the learned material is organized, how and why it is recovered, and by whom (Neisser, 1967). These issues still have not been resolved today, given that the focus of most research has been laboratory-oriented and has

not dealt with long-term retention.

Neisser (1984) presents a list of studies in memory research which suggest that “remembering is like problem-solving rather than like reproduction” (p.33) and he proposes that instead of acquiring a set of isolated responses, second language learners discover a structured system of relationships. Their ability to retain knowledge of vocabulary, to recognize idioms, to state rules of grammar and to understand texts would depend on their mastery of that system. “Bartlett might have said that they acquire a schema (for the second language)” (Neisser: 1984, p.33). This hypothesis, as explained by Neisser (1984), suggests that each act of recall is a new production, even in the case of a single word that has been memorized separately, since its recall is supported by a wider web of knowledge. Indeed, Neisser’s conception of the reconstructive process is based on Bartlett’s (1932) theory. As described by Ehrlich and Tulving (1976), Bartlett considered that memory is composed of an ensemble of schemas that are interrelated as a result of the similarity of their elements. Each schema would be activated (or reactivated) under the effect of stimulation, even though there is no apparent relation between the schema and the actual effect of stimulation. A schema was defined as the common element between a past experience and a current experience; this common element would be reconstructed as a result of the effect of the current experience. In Bartlett’s (1932) view, remembering consists of

reconstructing (and not reproducing) a past experience from one of its composing elements, under the influence of current stimulation.

Neisser (1967) follows the same road as Bartlett (1932) in suggesting that both thought and recall are constructive processes. Neisser (1967) proposes as an analogy of this process a paleontological metaphor: "(...) out of a few stored bone chips, we remember a dinosaur" (p.285). This is to say that the reconstruction process involves taking the original "aggregate of information" (p. 185), which has been stored in long term memory, and adapting it to a new situation. The information on which reconstruction is based would consist of traces of prior processes of construction.

The reconstruction hypothesis rejects the idea that there are stored copies of "finished mental events, like images or sentences, but only traces of earlier constructive activity." (p. 285) In the case of recall in words, the reconstruction processes would entail producing a "new verbal synthesis which may be based on information from a number of sources, including not only traces of earlier verbalizations, but perhaps visual images and other constructions as well" (p. 285). Neisser (1967) therefore puts forth the idea that we store traces of earlier cognitive acts, not of the products of those acts. These traces would not simply be revived or reactivated in recall but rather the stored fragments would be used as information to support a new construction.

This view of the process of remembering is far-removed from the

conception of memory first put forth by Ebbinghaus (1964). His research which was laboratory-based dealt with the retention of nonsense syllables which were to be recalled. He was particularly interested in determining the number of times it was necessary to repeat syllables and in how many syllables could be remembered at once. His focus was not on the construction of new information but rather on the recall of stored syllables. This research constituted the beginning of a trend towards the Reappearance Hypothesis in memory research that still underlies many studies on memory today (Neisser, 1982).

2.4.2 Reappearance

Much of the memory research done in laboratory settings has examined the Reappearance Hypothesis. According to this view, mental processes are by no means constructive. Instead of the creation of something new in each act of remembering, there is the arousal of something that already exists. This view was very popular with behaviorists, in that reappearance would depend upon giving the appropriate stimulus to produce the appropriate response (Baars, 1986). The reappearance hypothesis is also popular with associationists (Lieury, 1992): the central issue of this approach to memory research is that the encoding conditions present during the learning process must be reproduced at a later time for retention to occur (Tulving, 1972). In other

words, subjects associate various aspects of the learning experience with the material learned. In order to recall this material, they would have to be prompted by the same conditions present at the time of the learning situation. For example, mnemonic devices are often used to facilitate retention of lexical items and certain scents or sounds may prompt a memory of a given past experience (Reuchlin, 1986). Although it has been shown that various devices do contribute to improving memory, it is doubtful that all learned material is organized in memory as a content to be retrieved in its intact form at a later time (Lieury, 1992).

Neisser (1967) states that the idea of stored information consisting of ideas that are suspended in a quiescent state from which they are occasionally aroused has a long history in psychology. "It implies that the same memory, image or other cognitive unit can disappear and reappear over and over again" (Neisser:1967, p.281-282). This hypothesis very poorly fits experience, given that in everyday life, one rarely repeats earlier acts or thoughts. It has nevertheless exerted an ongoing fascination for psychologists. It was not only adopted by associationism and psychoanalysis but also by behaviorism and Gestalt psychology (Neisser, 1967).

"Perhaps the simplest and the most influential account of memory is that given long ago by English empiricist philosophers. Hobbes, Locke, Hume, and Mill all assumed that one retains 'ideas', or 'conceptions', which

are nothing but slightly faded copies of sensory experiences. These ideas are linked to one another by bonds called ‘associations’” (Neisser: 1967, p. 281). Ideas would become associated whenever the original experiences occurred in rapid succession or simultaneously and also if they were similar. Since a person’s ideas are not all conscious at any given moment, it is difficult to know how they are recalled and which ones are selected for recall.

In the reappearance view, as explained by Neisser (1967), ideas would become aroused successively so that only one or a few are active at once. The order in which they come to mind would be “governed by the associative links. In this view, the process of remembering is by no means ‘constructive’. Instead of creating something new in each act of remembering, the person only arouses something that already exists. Ideas would then lie in a dormant state and spring to life intermittently when they are aroused” (Neisser, 1967, p. 281).

2.4.2.1 The Permastore Hypothesis

Baird (1984), offers a view of remembering that seems very much based on the reappearance hypothesis and which emerged as a result of what Neisser (1984) terms “a significant empirical discovery that the process of forgetting does not continue indefinitely” (p. 32). Baird’s (1984) study concerned the retention of school-learned Spanish for 773

subjects who had learned the language as far back as fifty years prior to being tested. The results indicated that although students soon began to lose what they had learned in class, the forgetting curve leveled off after five or six years. He was then able to detect a further decline after approximately 25 years, prior to which the academically acquired knowledge seemed to remain constant, even in people who had no occasion to use it.

Bahrnick (1984) has focused his research interest on theories that attempt to establish relations between manipulated variables and memory performance, without necessarily attempting to reach conclusions about internal processing. He suggests, in his interpretation of the data, that two important factors influence the amount that is retained. Retention of knowledge increased in proportion to the number of years Spanish was studied (first factor) and of the level of proficiency as exemplified by grades (second factor). Bahrnick's (1984) interpretation of the results of his investigation is based on the classical conception that learning consists of the acquisition and strengthening of independent items. Bahrnick (1984) does not seem to follow the current trend in cognitive theory which suggests that reconstruction is a more likely hypothesis. In his view, students learn a large number of responses, each of which has a definite life span. If much of what is learned is later forgotten while some of the material remains available, this means that many responses have been lost

but a few have survived. Bahrick (1984) suggests that the responses destined to escape forgetting must have been in a favored state to begin with - the permastore state. "I have called the portion of knowledge with a life-span in excess of twenty-five years the 'permastore content'" (p. 111). This hypothesis certainly contrasts with Neisser's (1984) view of remembering as a function of a reconstructive process, and goes against the general trend in psychology today of viewing the mind as a system of related cognitive structures. Nevertheless, an argument could be made that Bahrick's (1984) results suggest the value of rote learning in conferring immunity against forgetting. The subjects involved in his study were successful in recalling material seemingly as a result of learning and memorizing it over and over until it became stored in permastore.

2.5 Summary of Conceptual Framework

The conceptual framework on which the current investigation is based can be summarized in four main ideas. First, we examined the current trends in cognitive science and found that the general view of most cognitive psychologists support the constructivist strategy which consists of building a cognitive system from components that can be dynamically linked to one another. The second breakthrough occurred in memory research, in that despite the general acceptance of two memory systems (episodic and semantic) research is still in its infancy as far as identifying

how we remember material acquired in naturalistic contexts. Specifically, it was suggested (Neisser, 1982; Bahrick & Phelps, 1988) that relevant memory research should be concerned with retention over long periods of time of material learned in school. An examination of a third theoretical perspective, psycholinguistics, revealed that the constructivist view which prevails in cognitive science has also influenced research in second language learning. In particular, Ausubel's cognitive learning theory represents a departure from the prevalent behaviorist perspective and presupposes that in learning a language, one calls upon a number of structures in the mind.

No one theory, whether in general cognitive research or specifically in memory research or in language research, has emerged to satisfactorily explain the process of remembering. However, it seems reasonable, based on the various theoretical positions presented, that the process of remembering might involve some type of reconstruction. It must also be noted that the reappearance hypothesis cannot be completely dismissed, in light of the findings of Bahrick (1984). An exploration of these two hypotheses in terms of suggestions for future research will therefore be presented in the final chapter of this thesis.

Chapter III

Review of the Literature

Prior and present research on language retention conducted in various parts of the world (see e.g. Lambert & Freed, 1982; Weltens, De Bot and Van Els, 1986; Vechter, 1988; Weltens and Cohen, 1989; Van Els and Weltens, 1989; De Bot and Clyne, 1989; Cohen, 1974, 1975; Vechter, Lapkin and Argue, 1990) has shown that three major factors - initial level of proficiency, motivation, and use of the language - are relevant to the maintenance of second language skills. Although there is considerable agreement as to the relevance of these factors in maintaining a second language, there has been little attention given to defining specifically what is 'retention'. All studies reported have examined some or all three of these factors in terms of how they might promote or inhibit retention.

This research is mainly concerned with retention, however, results of studies that have dealt with attrition must also be included since both concepts are closely linked. As discussed in Chapter 1, Olshtain (1989) defined attrition on a continuum with language loss (when the individual claims no memory of the language) at one extremity and a high level of comfort in using of the language at the other. Retention, on the other hand, was defined as a learned behaviour (in this case language learning) that persists over time, after formal instruction has ended. By virtue of these

definitions, it is possible to infer that when attrition occurs, retention suffers and vice versa. It is in this context that results of attrition research will be reported. The review will conclude by taking a closer look at the study by Wesche (1992) which served as a baseline for this research.

Contrary to the research activity done on memory, most of which has been done in a laboratory setting, research in second language retention has been conducted mostly in naturalistic settings. Regrettably, however, the vast majority of these investigations (Edwards, 1977; Snow, Padilla & Campbell, 1988; Raffaldini, 1988) have been concerned with the influence of external factors (language use, motivation, and initial level of proficiency). It would seem appropriate to initiate research of a naturalistic nature while at the same time focusing on internal factors that promote or impede retention. Given that the focus of this research is on second language retention, the following review of the literature will examine the results that have been reported over the last two decades, since research in this specific domain is quite novel. At the beginning of the 1980's, Neisser (1982) published Memory Observed: Remembering in Natural Contexts in which he put out a call for memory research to focus on examining the "specific manifestations of memory in ordinary human experience" (p. xi). Since then, a number of studies that focused on retention have been undertaken, some of which will be reported in this chapter.

3.1 Level of proficiency

Bahrnick (1984) showed that remembering a content in a second language (L2) might be linked to the initial level of proficiency in reading. His study involved 773 subjects. One hundred forty-six of these were students who, at the time of testing, were enrolled in a high school or college-level Spanish course, or who had recently completed such a course. The tests were administered during the last week of course attendance, or within two months thereafter. Five hundred eighty-seven individuals had taken one or more Spanish courses during their attendance at high school or college. Their Spanish instruction had occurred from one to 50 years prior to being tested. These subjects were assigned to one of eight groups in accordance with the time elapsed since their last Spanish course. The remaining forty individuals had no instruction in Spanish. They were included in the study in order to establish a baseline for performance which differentiates knowledge acquired in Spanish classes from knowledge acquired incidentally, as well as correct answers based upon guessing. Twenty of these individuals ranged in age from seventeen to twenty-two and their performance provided a control for individuals currently enrolled in Spanish classes. The other twenty individuals (in the control group) ranged in age from forty-one to sixty-two and their performance provided a control for the inference of long-term memory from Spanish instruction.

All subjects were given a test and a questionnaire. The test consisted of the ten following sub-tests: 1) Reading comprehension; 2) Spanish-English recall vocabulary; 3) Spanish-English recognition vocabulary; 4) English-Spanish recall vocabulary; 5) English-Spanish recognition vocabulary; 6) grammar recall; 7) grammar recognition; 8) idiom recall; 9) idiom recognition; and 10) word order. The sub-tests were constructed in such a way as to minimize "built in" interdependence and were assembled on the basis of vocabulary lists and reading exercises available in textbooks or contributed by language teachers (Bahrick, 1984). This Spanish test yielded ten dependent variables (which represent each of the ten sub-tests) reflecting performance on the ten sub-tests.

In addition to taking a test of knowledge of Spanish, subjects completed a questionnaire designed to provide information about independent variables such as Spanish instruction, grades obtained, in Spanish courses and various opportunities to read, write, speak, or listen to Spanish and other Romance languages during the retention interval. These questionnaires yielded scores for a total of thirty-two independent variables specifying conditions of original training and of rehearsal during the retention interval. The answers to key parts of the questionnaire were verified for fourteen percent of the subjects, selected on the basis of convenience of access to records. It was found that eighty-one percent of subjects reported the number of courses taken accurately; fifty-seven

percent reported the retention interval accurately, and seventy-eight percent reported their grades accurately.

With this research design, Bahrick (1984) was able to examine the impact of the initial level of proficiency on long-term forgetting or remembering. Regression analyses were performed on the data and it was found that only three independent variables contributed significantly to the variance accounted for on any dependent variable. These three independent variables are: level of Spanish training, mean grade received, and the level of training in other Romance languages.

None of the rehearsal variables (practice) were found to have a significant influence in predicting performance on any of the ten sub-tests. Bahrick (1984) did not find it appropriate, however, to conclude that practice does not help in the retention of knowledge. He simply recognized that the subjects in this study reported little use of the language during the time interval, so that this factor did not have an influence in this particular case. As a result of this finding, Bahrick (1984) concluded that long-term "permastore" content was dependent upon initial level of attainment. In other words, the better the storage of initial semantic content, the more likely it would be to be preserved in its initial state (Neisser, 1984). From his analyses, Bahrick (1984) was able to infer that the higher the initial level of proficiency, the more content will be remembered in proportion to what was originally learned. He was also

able to establish a direct relationship between better marks in Spanish and better retention results. Distinctions were made between subjects who had a mean grade of A, B or C during their years of formal instruction⁶. Those who had a mean grade of A showed significantly higher results on the test than those who had a grade of C.

All of the results reported by Bahrick (1984), however, are somewhat mitigated by the fact that much of the data was provided by the subjects themselves in the above-mentioned questionnaire and is only accurate in so much as the subjects' memory of learning conditions dating back up to fifty years is reliable. In fact, one important methodological weakness of this study is that no pre-testing was done to establish the initial level of proficiency. Subjects were given a test only after the time interval (post-treatment), at which time they were also asked to fill out a language history questionnaire. It is difficult to ascertain what initial level of attainment the subjects had reached and therefore what level might promote "permastore" retention.

Some researchers (Clark & Jorden, 1984) have suggested that in order to ensure long-term permastore in second language, a "critical threshold"⁷ should be reached. As part of an in-depth study of the language acquisition, retention and attrition patterns of students and

⁶ Students were assigned a grade on a scale ranging from A to C, with A representing the highest mark.

⁷ Clark and Jorden (1984) define the "critical threshold" as a critical level at which skills are retained or lost; in other words there may be a point below which attrition is rapid and extensive, but at and above which, a large proportion of the initially acquired material is retained.

graduates of four Department of Education-sponsored Advanced Overseas Language Training Programs for Arabic, Chinese, Hindi, and Japanese, Clark and Jorden (1984) concentrated on assessing the language performance change of students whose training had taken place mostly in the United States. The researchers were not only interested in measuring retention/loss of skills, but also in the nature of the process of re-learning skills which may or may not have been 'lost'. Subjects were chosen from students at Cornell University who were enrolled in regular Japanese courses and from those who were enrolled in intensive FALCON (Full-year Asian Language Concentration) courses. The data collection included 1) an analysis of the individual student records, of final exams, of recorded interviews, and of written exercises; 2) student marks on the Japanese Proficiency Test, a standardized national instrument for reading and oral comprehension; 3) a comprehensive basic questionnaire which included detailed information on previous language training and a self-assessment in which the subject was asked to indicate his/her level of proficiency in four language skills at the time of filling out the questionnaire and retrospectively, at the end of his/her course; and 4) case studies involving nine of the subjects.

Based on the data collected, the researchers formed two groups: a general attrition group (n=16) and a non-attrition group (n=42). Contrary to expectation, the data indicated an inverse relationship in attrition/non-

attrition performance. The attrition group reported higher initial levels of proficiency, while the non-attrition group reported more frequent current use. The researchers observed that the “non-attriting” students made appreciably greater current use of Japanese in speaking, listening, and reading than they did upon completion of their formal study. This represented the reverse of the situation with the “attrition” students, who reported, in all three skill areas, relatively greater use of Japanese at the end of formal study than at the time the data was collected. This evidence led the researchers to develop a hypothesis suggesting a link between attrition and lack of use. They hypothesized that an individual’s reported attrition in proficiency in a given language skill area is directly related to the extent to which these individuals fail to make use of these skills following completion of their formal training. Not only did the researchers suggest the importance of use but they also put forth the idea of a critical threshold above which a large portion of the originally acquired material would be retained and below which attrition would be rapid and extensive.

The researchers concluded with the following observations and comments: 1) that language skills have varying attrition patterns; 2) that these patterns should be further investigated to determine skill saliency and rate of loss; 3) that there may in fact be a critical level at which skills are retained or lost; and finally, 4) that students should strive to attain these critical levels before completion of training.

This study did not, however, offer any suggestions as to the precise nature of the critical threshold, in terms of hours of training or proficiency level. In addition, no mention is made of the possible interaction between the level of attainment and use of the language.

Another study conducted in the Netherlands (Weltens, van Els & Schils, 1989) investigated the retention of school-learned French language skills in 150 Dutch high school students across a period of four years following the training period. Two training levels were examined separately, namely four and six years of training (400 and 600 hours respectively) while tests were given to students on three occasions: at the end of training, after two years of non-use, and after four years of non-use. The skills tested were all receptive: general receptive proficiency, listening and reading comprehension, and receptive phonological, lexical and grammatical skills. In addition, self-assessment measures were administered.

The results indicated that global skills improved, if anything, and that only lexical and particularly grammatical skills 'attrited' during the period investigated. Specifically, they found no significant attrition of receptive skills, two and four years after the end of instruction within the two groups of high school students, who had received four and six years of instruction respectively. This would suggest no difference in terms of the attrition that occurs (in this case, no attrition was observed) regardless of

the initial level of attainment. This observation was made despite reported non-use of the language after formal training had ceased. Weltens, Van Els and Schils (1989) did report, however, that the subjects' self-perception of their retention was much more negative than was indicated by the test results. It is possible, according to the researchers, that this discrepancy is indicative of the presence of attrition in productive skills and they suggest a need for further research in this area. Their findings also showed that the attrition that did occur, happened in the first two years, then levelled off, supporting Bahricks (1984) hypothesis of permastore retention.

Snow, Padilla & Campbell (1988) reported attrition in productive skills in a study of the second language retention of students who had completed a seven-year elementary Spanish immersion program. In this study the relationship between attitudinal factors, language use, self-assessment of Spanish proficiency, and second language retention was examined. Subjects were 38 immersion graduates, who were in Grades 7, 8 or 9, and 20 currently enrolled Grade 6 immersion students who provided a baseline comparison at the conclusion of the elementary immersion program. The researchers were interested in finding out the impact of not taking any further courses in Spanish, after Grade 6, versus continued study (at least two courses taken by Grade 9). They examined the difference in proficiency between the end of Grade 6 and Grades 7, 8

and 9, based on whether courses had been taken in Spanish. Two instruments were used to collect data: the Modern Language Association (MLA) Cooperative Test of Spanish, consisting of four sub-tests - listening, reading, writing, and speaking - and a 63 item questionnaire designed to obtain information about opportunities to use Spanish, interest in foreign languages, parental encouragement, and ethnocentrism. Analyses of variance (ANOVAs) were performed for each grade level (7, 8 and 9) on each group's previous Grade 6 reading and mathematics scores. All ANOVA's were non-significant, indicating no difference in the scores of those students who chose to continue studies in Spanish and those who did not.

The results showed that those subjects who had stopped formal training in Spanish in grade 6 and were tested for retention in grades 7 and 8 showed some language loss in writing and speaking, however, one or two years without instruction seemed not to have caused attrition of receptive skills. Three years later (in Grade 9), however, there was significant attrition in all four skills, but most notably in writing and speaking skills. Factor analysis of the questionnaire yielded four factors which were labelled 'Interest in foreign language', 'Encouragement and pride in work', 'Integrative orientation', and 'Parental/integrative orientation'. Three of the four factors (all except integrative orientation) were shown to be significantly related to productive skills and to

language-use opportunities. Findings (Snow, Padilla, and Campbell, 1988) also suggest that the attitudinal predisposition underlying the four factors influences the extent to which students retain their Spanish skills in writing and speaking. These same factors, however, appear to be unrelated to retention of receptive skills in Spanish.

The results of this study suggest, not surprisingly, that the level of attainment interacts with language use (continued training). More importantly, a specific level of attainment would seem to promote retention (only slight attrition of productive skills) of all four skills for two years. Receptive skills seem to suffer less than productive skills which show a definite decline by high school. These findings suggest a differential loss of language skills over time, with productive skills being lost sooner and receptive language abilities retained longer (Snow, Padilla and Campbell, 1988) despite a high level of attainment (seven years of immersion schooling). The interpretation of the results of this study is somewhat limited, however, by the small number of subjects. A greater number of subjects would have made it possible to test retention separately in each grade, rather than pooling Grades 7, 8 and 9. This might have yielded different results, particularly in terms of retention in Grades 7 and 8. Finally, mention must be made of the fact that Snow, Padilla and Campbell (1988) have considered continued training in Spanish as language use. An argument could be made that taking courses in Spanish

represents not only language use but indeed language learning. In this perspective, the researchers clearly would not have measured retention as we have defined it: maintenance of a learned behaviour after treatment has ceased.

Another study (Godsall-Myers, 1981) reported on the regression of German language skills in six female undergraduate university students who had reached the low-intermediate level of proficiency in German and then decided to interrupt their study of this language. During a period of one-year following the interruption of formal language training, the subjects were given a total of 23 tests that measured language skills such as morphology, vocabulary, writing, oral comprehension, written comprehension and attitudes toward foreign cultures. The tests were designed to verify four hypotheses, the first three of which were confirmed by the results: 1) L2 proficiency is lost differentially depending upon the skill (reading, writing, listening, speaking); 2) the regression of L2 skills is inversely proportional to the cumulative average grade obtained in the low-intermediate German course; and 3) structures of forgetting in the L2 reflect the order in which the language structures were learned and the frequency of use of these structures; 4) data was insufficient to confirm a fourth hypothesis, that the regression of L2 skills presents certain common features with pidginisation, decreolisation, language extinction and aphasia schemas.

The results indicate that regression of skills in German was inversely proportional to the cumulative grade obtained in a low-intermediate course and that writing skills had suffered more than reading skills. More importantly, language skills were found to have regressed more during the summer, than from fall to spring, supporting the notion of a series of plateaux suggested by Bahrick (1984). In addition to these findings, a correlation was found between the ability to correctly place verbs and general retention of knowledge (Godsall-Myers, 1981). In this case, researchers have established a relationship between a specific linguistic skill and retention of knowledge.

These results are somewhat mitigated by the small number of subjects and also by the short time interval (one year) after the end of formal training. It would have been interesting to further extend the study by testing for retention two or three years later. A more serious criticism of this study is that it does not report any control of language use during the testing period (one year after the end of formal training). The findings nevertheless suggest some relationship between how well a language is learned (grade obtained) and retention.

3.2 The Role of Motivation

A number of studies (Gardner, 1982; Gardner, Lalonde, Moorcroft and Evers, 1985; Gardner, Moorcroft, and Metford, 1989; Gardner and

Lysynchuk, 1990) have linked attitudes, motivation, and language use with retention. One such study by Gardner, Lalonde and MacPherson (1985) examined the effects of these three variables on the attrition of language skills (speaking, listening, reading) during the time interval following an immersion program. The research method used was a truly retrospective plan and included Can-Do type language proficiency evaluations.

Questionnaires were sent to 133 students who had participated in a six-week summer immersion program in Trois-Pistoles, Québec. The subjects ranged in age from 20 to 68 years and came from all regions of Canada, but mostly from Ontario. The majority of the subjects were between 20 and 30 years of age. Of 82 questionnaires that were returned, 79 were used for the study.

The questionnaire contained basic information on study grants received by the students for training in French, the language course in which the student was enrolled, marks received in Trois-Pistoles as well as in their current French course. The questionnaire also measured 12 variables, of which only 10 were retained in the final research report. The 10 variables examined were 1) attitudes towards learning French; 2) attitudes towards French-Canadians; 3) degree of motivation; 4) use of French since the course in Trois-Pistoles; 5) speaking proficiency in Trois-Pistoles; 6) listening proficiency in Trois-Pistoles; 7) reading proficiency in Trois-Pistoles; 8) speaking proficiency today; 9) listening proficiency today;

10) reading proficiency today. Six months after the end of the course, subjects were asked to rate themselves in terms of performance at the end of the course and at the time of filling out the questionnaire. The results were analyzed using T-tests and it was found that speaking and listening skills had declined significantly while reading skills had not suffered.

Two factors - use of the language and attitudes - were shown to be practically independent of one another, however, both had an influence on practice which in turn influenced performance in speaking and listening skills. Finally, a favorable attitude towards French and significant use of the language were linked to a high level of performance in speaking and listening skills once a course had been completed.

The results obtained by Gardner, Lalonde and MacPherson (1985) indicate a link between attitudes, motivation and use on the one hand and retention on the other hand. However, the findings are based on the subjects' perception of their performance. As such, one must be very cautious in drawing conclusions as to the influence of these variables on retention.

Similar research by Snow, Padilla and Campbell (1988) has previously been discussed in Section 3.1. They concluded based on questionnaires filled out by the subjects in their study that attitudes developed in relation to parental encouragement, interest and career orientation influenced retention of productive skills.

Edwards (1977) also showed that a supportive environment - one which promotes use of L2 skills: speaking, reading, writing and listening - seemed to have a positive influence on confidence and to encourage continued language use and retention of all these skills. A total of 209 anglophone learners of French as a second language (FSL) were compared to 246 francophone learners of English as a second language (ESL). All subjects were public servants who held bilingual positions in the Federal government in various regions of Canada. They were assigned to a group based on their overall rating prior to taking the language test, on the time elapsed since taking the test (6, 12 or 18 months), and on their work location. Two instruments were used to collect the data. The first was the same language test administered at the end of training which included sub-tests for speaking, reading, writing and listening. A questionnaire was also administered which dealt with previous training in the second language, the use of the language in the workplace and elsewhere, a self-evaluation of their proficiency in the second language, their level of confidence in using the second language, and their interest and motivation in using the second language in the workplace. A significant factor in this study concerns the fact that both the francophones and the anglophones returned to a predominantly English-speaking workplace at the end of training.

The results showed that the language proficiency of the subjects,

both francophones and anglophones, had not declined significantly during the first six months after the end of training. Variations in competence were observed, however, in those subjects who had completed their training for 6 to 12 months. Edwards (1977) concluded that in the long term, the anglophone subjects tend to forget their second language. Speaking regresses significantly while writing regresses very little and receptive skills remain unchanged. The francophones showed no regression in any of the four skills tested. Based on the data from the questionnaire, Edwards (1977) concluded that the decline observed in the anglophone subjects resulted from a lack of use which led to diminished confidence in their knowledge of French and in their capacity for expressing themselves in the second language. A further conclusion made by the author of the study is that a supportive environment, defined as one where practice is readily available, is the main condition for maintenance and mastery of a second language. It would seem that the environment is helpful for francophones in maintaining their English skills but not for anglophones who, at the end of their French course, return to their predominantly English-speaking workplace.

3.3 Use of the Language

Weltens, Van Els and Schils (1989) and Wesche (1992) both found conflicting results in terms of the influence of language use on test scores

and subjects' self-perception. In the study by Weltens, Van Els and Schils (1989), discussed earlier in Section 3.1, subjects reported a perception of attrition in lexical and grammatical knowledge although none was seen in the test results. Not only did the test results not concur with the subjects' perceptions, but gains were observed in listening and reading abilities. In this study, subjects also reported not using the language during the time interval (two of four years). This may suggest a problem in terms of the tests not accurately testing the abilities of the subjects (Weltens, Van Els and Schils, 1989). More importantly, however, is the implication that despite non-use of the language, test scores reflect very little attrition (Weltens, Van Els and Schils, 1989).

The study by Wesche (1992), on which we will report at length in Section 3.5, observed that subjects had "continued low French use" (p.231) but showed "receptive L2 skill maintenance in spite of infrequent use" (p. 231). What specific activities constituted use of the second language was not specified by Wesche (1992). However, as in the study by Weltens, Van Els and Schils (1989), little attrition was found in test scores. In contrast to Weltens, Van Els and Schils (1989) on the self-assessment measure, subjects did not report a decline in performance. A need for further research on the role of language use is therefore suggested by the results of these two studies.

Contrary to the results of Wesche (1992) and Weltens, Van Els and

Schils (1989), findings reported by Snow, Padilla and Campbell (1988) suggest the importance of language use in preventing attrition. This study has already been examined in detail in Section 3.1. It was found that productive skills (speaking and writing) had suffered more attrition than receptive skills (listening and reading). This suggests the importance of practice to maintain productive skills.

Raffaldini (1988) also sought to examine how language use might influence changes in communicative competence. Her study involved 60 subjects who had studied French in France and continued taking French courses in the United States during the year following their return. Raffaldini (1988) was mainly interested in finding out what impact classroom instruction had versus frequency of use outside the classroom on retention of communicative competence. She suggested that confidence and frequency of use outside the classroom during a nine-month interval, as opposed to classroom instruction, seem to be important factors in promoting retention of speaking skills. Four components of communicative competence were measured - linguistic, sociolinguistic, discursive, strategic - using the ACTFL (American Council on the Teaching of Foreign Languages) Oral Proficiency Interview, a standardized criterion-referenced test. A second test, developed by the researcher was also used to measure discoursal and sociolinguistic features in addition to grammatical competence which included a Can-Do type scale for collecting data on

attitudes and motivation. Subjects were tested following their return from foreign language training as well as nine months later.

Raffaldini (1988) found that practice influenced retention in all four components of communicative competence. Specifically, results showed that subjects did not improve in their ability to communicate despite taking French courses after their return from foreign studies. They did, however, begin to show some degree of loss, particularly in terms of linguistic competence. Sociolinguistic competence suffered the least, while discursive competence suffered medium loss. The researcher observed that those students who reported high levels of confidence as well as frequent use of the second language outside the classroom showed better retention than those who did not.

Raffaldini (1988) concluded that frequency of use and confidence are more important than classroom study in promoting long-term retention. It must be emphasized, however, that the small number of subjects (60) as well as the short time interval (9 months) limit the interpretation that can be made of these results. A longer interval and larger number of subjects might provide more insight insofar as the influence of classroom instruction and language use outside the classroom on long-term retention. Another limiting factor is that the study deals only with oral proficiency and thus does not offer a complete picture of the individual's retention of skills. Finally, as we reported in the case of the study by Snow, Padilla and

Campbell (1988), one must specify that retention is not defined by Raffaldini (1988) in terms of treatment having ceased, as we have done in this thesis. Raffaldini (1988) has examined the influence of continued treatment (language training) as well as language use (outside the classroom). We have defined retention in terms of formal language learning having ceased for a period of three years (the interval between pre- and post-test). In terms of our definition, it is difficult to interpret the results reported by Raffaldini (1988) as 'true' retention.

In Bahricks (1984) study of long-term retention (50 years), rehearsal or practice was not a factor that subjects reported as an influence on their retention of content learned in the past. This study has been described in detail in Section 3.1. Despite the fact that subjects reported little or no practice of learned material, measures of reading skills showed that a significant portion of knowledge persisted even after fifty years (Bahricks, 1984). This does not mean, however, that lack of use did not play a role in the attrition process but rather that too few subjects reported using the language for it to be considered a factor in this case. Further investigations are suggested by Bahricks (1984) that would aim at defining the role of language use to promote retention.

Two other researchers, Berman and Olshtain (1983) sought to identify which L2 features were retained by Israeli children who had previously learned L2 English and were tested after returning to their first

language (L1) environment. The study examined 30 children, aged 5 to 14 years, who had spent a minimum of two years in a country where English was the dominant language. They had come to master English like native-speakers. Researchers first conducted longitudinal case studies with 12 of the subjects, of 5 to 12 years of age. Data was collected using open interviews, semi-structured interviews, games and tests conducted by an individual whose mother tongue was English. The results of these interviews were used to develop the instruments used in the second phase of the project.

In the second phase, 18 participants were given oral and written tests designed to evaluate their knowledge of syntax, morphology and English vocabulary. These tests were given to all 18 participants on three separate occasions: a short time following their return to Israël, six months after their return, and finally one year after leaving the English-speaking country.

Berman and Olshtain (1983) expected to find three trends: 1) evidence of a link between L1 and L2; 2) an increase in loss of the L2, over a period of months, caused by transfer from the L1; and 3) that maturation would play a role in the attrition process.

Berman and Olshtain (1983) found that significant attrition was evident in vocabulary recall and in the ESL structures that differed significantly from Hebrew. They inferred from the results that those

structures which were most difficult to acquire were the first to suffer. Removing subjects from the English-speaking environment (where constant use was the norm) would seem to cause the attrition of structures that do not remain familiar because of its dissimilarity from the L1.

Finally, Berman and Olshtain (1983) did report a link between maturation and retention. They observed that the younger children showed some resistance in using English upon returning to Israël and had increasingly more difficulty in remembering English vocabulary as the months went by. These children also seemed to first forget the last learned (also more complex structures) truly English syntactic features. The older children did not follow this same trend, suggesting that their higher level of literacy in the second language enabled them to retain better in the long-term. This would suggest not only that maturation is a factor to consider in studying long-term retention, but also that how well the language is learned might also influence retention.

Findings which support the idea of permastore retention (Bahrick, 1984) were reported in the study of low-intermediate students (Godsall-Myers, 1981) who were learning German as a second language. This study was discussed at length in Section 3.1. Godsall-Myers (1981) reported that lack of use was found to inhibit retention. It was observed that skills had regressed more during the summer, when subjects did not attend school, than from fall to spring, when attendance in class provided practice of

skills. The results of this study also suggest a series of plateaux of attrition rather than a constant decrease. No reasonable explanation of these phases of decrease or of permastore retention has been definitively provided by Godsall-Myers (1981).

3.4 Summary of Factors Identified in the Review of the Literature

Three major factors have been discussed as influences on long-term retention. A number of studies have established a link between the level of proficiency and retention (Bahrick, 1984; Clark and Jorden, 1984; Weltens, Van Els and Schils, 1989; Snow, Padilla and Campbell, 1988; Godsall-Myers, 1981). Retention of both receptive and productive skills has been examined. It may not be clear, on the basis of previous research, what level of attainment is required to promote long-term retention. It seems, however, that the higher the initial level of proficiency, the better the retention in the long-term.

Motivation has also emerged as an important factor in promoting retention. Most notable in this area is a study by Gardner, Lalonde and MacPherson (1985) which found that attitudes had an impact on motivation which in turn had an impact on language use. Gardner, Lalonde and MacPherson (1985) further found that those who used the language retained better, thus establishing a link between motivation and retention. This was echoed in results reported by Snow, Padilla and Campbell (1988)

as well as Edwards (1977) who concluded that motivation and language use go hand in hand and that they in turn promote retention.

What level of language use or what kind of language use might promote retention remains unclear. Studies by Weltens, Van Els and Schils (1989) and Wesche (1992) show sustained performance over an interval of up to four years, despite questionable use of the second language during that period. Berman and Olshtain (1983), Godsall-Myers (1981) all show that lack of language use can inhibit retention to some extent. Snow, Padilla and Campbell (1988) and Raffaldini (1988), on the other hand, showed that performance can remain stable with continued language use, however, in both these studies, formal classroom teaching continued during the retention interval. These two studies give rise to the issue of defining what is language use. Lack of use has been shown by Bahrlick (1984) not to interfere with long-term retention in the case of subjects in his study. A number of questions remain unanswered as a result of examining the outcomes of investigations into the role of language use.

Finally, the study by Berman and Olshtain (1983) has shown that language use and retention may also be linked to maturation. It is unclear, from their results, how age might promote or inhibit long-term retention. This factor, while one that might be explored further, will not be a factor in this current investigation.

The subjects involved in the project by Wesche (1992), on which our

study is based, were of adult age for both the pre- and post-tests. The findings of Wesche (1992), that no apparent change in proficiency was observed between pre- and post-tests, as well as on the results of earlier studies are not conclusive as to the role of individual variables of language use in promoting retention. We have therefore decided to control the variables that are indicative of language use in order to more clearly specify the link between language use and long-term retention.

3.5 Wesche's Study (1992)

The starting point for this research was the study by Wesche (1992) of 154 high school graduates who had received between 3,500 and 7,000 hours of instruction through the medium of French in school. These students had completed an elementary school immersion program⁸ plus a bilingual high school program with approximately one-third of their credits in French. The study followed two cohorts of immersion graduates through three years of university studies after graduation from grade 13. Measures of language performance were taken from the first cohort (pilot study) in 1985 and again in 1988; a second cohort was tested in 1988 and 1991, after some revisions were made to procedures and testing instruments from the pilot study.

⁸ Some subjects had taken part in early immersion programs from kindergarten to grade 8 prior to entering bilingual high school, while other were involved in late immersion programs beginning in grade 7.

3.5.1 Research Questions

Wesche (1992) was interested in finding out how the second language performance of graduates from a French immersion program might have changed between the end of high school and three years later in their third year of university. Their attitudes towards French and immersion schooling were also examined. Their language performance was compared to that of francophone students both in oral and written skills. The effect that schooling in French may have had on the quality of English writing skills was also analyzed. It was also of interest to see whether there were any long-term differences between early and later immersion students' performance. Finally, measures were taken to examine the subjects' feelings about using the second language as well as their ethnolinguistic attitudes⁹. The actual questions posed can be summarized as follows (Wesche, 1992):

1. What can these students do in French at the end of high school and what can they do at the end of undergraduate studies?
2. How well can they write in French at the end of high school and has their English development, as reflected in writing ability, been affected by schooling largely through another language?
3. Does an early kindergarten versus a later starting age, such as grade 6 or 7, make a long-term difference?

⁹ This aspect of the study referred to how subjects perceived francophone Canadians, English/French relations in Canada, Quebec nationalism as compared to the attitudes of English stream graduates.

4. How do they feel about using French in their daily lives?
5. What do they actually do in French?
6. Has immersion made a difference in their ethnolinguistic attitudes?
7. What are their attitudes toward immersion schooling and toward specific program features?

3.5.2 Results

The results of the study showed that high school graduates who had received between 3,500 and 7,000 hours of French instruction in school had experienced no significant change in listening, reading, speaking and writing skills three years after graduation. However, with the first cohort, a self-assessment measure of skills performance found that early immersion students perceived their performance to be better than did late immersion students. The researchers also found a small significant difference between early and late immersion students both at the end of high school and three years later (Wesche, 1992). Results of the second cohort, which were thought to be more representative (the sample was larger), showed no significant difference on any measures of performance, including self-assessment. A summary of descriptive data for the results obtained by Wesche (1992) is presented in Table 2.

Table 2

French Proficiency Tests and Self-Assessment: Descriptive Statistics for Cohorts and Subsamples, 1985, 1988, 1991 (Wesche, 1992)

French Proficiency Measures	Max	1985 Cohort				1988 Cohort			
		1985 Full Sample (n=81)	1985/88 Subsample (n=48)	1988 Full Sample (n=154)	1988/91 Subsample (n=78)				
		M	S.D.	M	S.D.	M	S.D.	M	S.D.
Listening									
Comprehension	14	10,0	2,3	10,2	2,5	10,9	2,0	10,5	2,0
Dictation	28	--	--	--	--	22,9	2,8	22,7	2,7
Reading									
Comprehension	19	13,0*	3,0*	13,4*	3,2*	13,8**	2,7**	12,8	2,4
Cloze	35	26,5	5,2	26,5	5,2	24,8	5,4	23,6	4,7
Oral									
Interview	15	11,1	2,1	11,1 ²	2,1 ²	11,1 ²	1,5 ²	10,8 ³	1,2 ³
Elicited Imitation									
Exact								6,4	3,1
Equivalent								12,5 ⁵	1,7 ⁵
Self-Assessment									
1985 Version	300	268,4	29,3	--	--	--	--	--	--
1988 Version	200	--	--	--	--	148,3	27,7	148,56	28,06
* 1985 Version	*1988 Version	1 N=58	2 N=27	3 N=31	+ N=12	5 N=23	6 N=48		

Although no significant differences were found between the two anglophone groups (early and late immersion), compared with a francophone group, their performance was clearly not equivalent to that of native speakers of French (Wesche, 1992). Of particular interest are the results of the 'Elicited Imitation' sub-test which yielded high scores on semantically 'equivalent' repetition of sentences. However, exact repetition scores, a level of performance which native-speakers usually achieve (and did in Wesche's study), were relatively low. It is suggested by Wesche (1992) that this lesser ability of the immersion graduates could result from inadequate attention to form and lexical choice during the test or be due to "gaps in their internalized language knowledge, making on-line retention and native-like reconstruction of the sentences more difficult" (p. 217).

These results would seem to indicate that graduates of bilingual high schools, who have received immersion schooling (early or late) do maintain their second language skills. A number of factors may have played a role in promoting retention. The first concerns a group of variables whose influence on retention was not examined in the study, namely language use as defined by the number of courses taken in French, the number of books read in French, the number of hours of television watched in French, the number of movies seen in French, and the number of hours of other activities conducted in French. While all the subjects were selected at

random for participation in the study, the results were not analysed taking into account participation in activities in French which may promote more use of the language. The second factor that may limit the interpretation given to the results has to do with the nature of the population from which were selected the subjects. The study only examined the behaviour of graduates who were university-bound therefore one might wonder whether non-university bound graduates would also show no attrition after a similar time interval.

3.6 Summary of Review

In more recent years, a number of exploratory studies (Bahrick, 1984; Raffaldini, 1988; Snow, Padilla & Campbell, 1988; Weltens, van Els & Schills, 1989) have sought mostly to identify variables which play a role in causing attrition of second language performance. Research has generally focused on the external factors involved in retention. Little attention has been given to studying the internal processes of remembering linguistic knowledge. Previous studies have shown the importance of certain variables on retention. These can be grouped into three categories - the level of proficiency, the role of motivation and the use of the language. Most studies have dealt with a limited number of variables and have sought to establish a relationship between these variables and the retention of a few skills but rarely have all four skills (listening, reading,

speaking and writing) been studied together. One exception is Wesche's study (1992) which tested for change in receptive skills and productive skills, as well as studying a number of variables from all three of the categories discussed above. As has been noted, however, the practice variables during the three year interval between the pre- and post-tests were not examined in the data analysis. This might account for the level of retention found in the results, which differ from those of other studies that point to the occurrence of attrition usually within three years after acquisition (Bahrick, 1984). It will be of interest in the current study to examine whether language use might have helped promote retention.

Chapter IV

Methodology

In light of the conceptual framework presented in Chapter 2 and given the results of earlier research reported in Chapter 3, it was decided to further investigate the role of language use in promoting long-term retention. The study by Wesche (1992) provided a database from which to investigate the influence of language use by the subjects of the study, by controlling this factor. This chapter presents the methodology used in this research by describing the database, sample and instruments, in addition to providing information on instrument validity and reliability, on the procedure followed, as well as on the data retained for this study and the analyses performed.

4.1 Database

The objective of this study is to examine the retention process through a review of the literature and a new analysis of previously collected data of a study by Wesche (1992) of French immersion graduates. Time and resource constraints prevented the collection of new data but the results obtained by Wesche (1992) were made available for this study. This particular data was of interest for several reasons. First, the study focused on a number of key variables which impacted on the long-term

second language performance of subjects. Second, the three year interval between pre- and post-test measures was interesting since many studies (for example, Bahrick, 1984) have shown that attrition typically occurs within three years. Finally, this study not only had taken performance measures for all four skills (reading, writing, speaking and listening), but had also collected data on language use during the three year interval.

4.2 Sample

Subjects for the study by Wesche (1992) were graduates of bilingual high schools in the National Capital region attending nearby universities. Before entering high school, all had completed a full sequence of early-entry or late-entry immersion programs. Comparisons made by Wesche (1992) between students from both groups at university entry showed no significant differences between the two groups on any of the test measures, including speaking, writing, listening and reading. These results suggest that by the end of high school, late immersion students had bridged the performance gap with their early immersion colleagues. The graduates chosen for the study were attending four nearby universities (Wesche, 1992) whose sociolinguistic characteristics are the following: the University of Ottawa, a bilingual university with a mixed anglophone and francophone student body and a wide range of undergraduate and graduate programs in French and English; Carleton University, an English

language university, also in Ottawa, where the student body is mostly English-speaking and includes courses that are offered in French literature and grammar; Queen's University, an English language university in mainly English-speaking Kingston with courses offered also in French literature and grammar; and McGill University, an English language institution with some French programs, in the mainly French-speaking metropolitan city of Montreal whose student body includes approximately 20% of francophones in part by virtue of the fact that students may write assignments in French.

A pilot study first tested students in 1985 and 1988. In the spring of 1988, a second study located the graduating bilingual high school students, with the help of the Ottawa and Carleton Boards of Education, and the intent of collecting information on their future plans and family addresses. Those enrolled in the four universities were contacted in the fall at university entry. All those willing to participate in the study were convoked for a testing session. The 1988 cohort included 154 graduates who completed tests in 1988, 78 of whom were retested at the end of their third year of university studies in the spring of 1991 (Wesche, 1992). Some measures were obtained only from subgroups of these 78 subjects.

4.3 Instruments

Wesche (1992) reports that the instruments used in the

measurement of proficiency were either specifically developed for the project or were part of already existing batteries developed for high school and university students at advanced levels of French proficiency by the University of Ottawa's Second Language Institute, the Ottawa Board of Education Research Centre, the University of Western Ontario Research Group, and the Modern Language Centre of the Ontario Institute for Studies in Education. Tests used in 1988 and 1991 were a revised version (Wesche, 1992) of the initial test battery used in 1985 and included three types of measures - French Proficiency sub-tests, a Self-Assessment Questionnaire and a French Language Attitudes and Use Questionnaire.

The French proficiency measures (Wesche, 1992) were all based on texts selected from radio broadcasts, newspapers, magazines, brochures, and textbooks. The tasks required the ability to use French to understand, "and in some cases to reconstruct¹⁰, informationally dense material intended for adult native speakers, or to use the language in conversation or composition"(Wesche, 1992, p. 214). The list of sub-tests included Listening Comprehension, Listening Dictation, Reading Comprehension, Cloze, Oral Interview, Elicited Imitation, and Essay Writing, in addition to the Self-assessment measure.

The French Language Attitudes and Use Questionnaire (Wesche, 1992) dealt with Attitudes: Anxiety in Using French, Desire to Use French,

¹⁰ Wesche (1992) considers reconstruction to be necessary when statements are too long to be processed in short-term memory in terms of verbatim recall; when long-term memory is involved reconstruction is said to be involved in the recall process.

Reasons for Learning French; and French Use: Frequency of French Use, Expected Future Use, Specific French Language Use and Perceived Difficulty of University Study Activities in French.

Before describing the quantitative analyses performed on the results obtained, a brief description of each of the tests used by Wesche (1992) follows. In the article titled "*French Immersion Graduates at University and Beyond: What Difference Has It Made?*", Wesche (1992) gives a detailed description of each of the tests in the battery.

The Listening Comprehension test is described (Wesche, 1992) as measuring the understanding of spoken French in an academic context. It consists of three tape recorded passages which are excerpts from radio broadcasts. The topics discussed are solar heating in ancient times, pollution, and the proliferation of languages. Students listen twice to each passage, which is followed by several multiple choice content questions. They read the answer options in their text booklet, choosing the one that corresponds best to each question.

The Listening Dictation test (Wesche, 1992) taps the accuracy and completeness of listening to a passage extracted from an introductory university psychology textbook. The individual phrases vary considerably in length. The passage is read three times, the second time in varied length segments meant to challenge short-term memory and require

reconstruction¹¹. Scoring is applied on the exact comprehension of meaning rather than for spelling and grammatical correctness. Words which were correct as to meaning were counted and spelling errors were ignored. Sentence or word inversions were also given points if the sentence and/or word were still meaningful. Spelling errors were not counted as errors unless the word was unrecognizable and far-removed from the original meaning of the word. A general comprehension of phrases was not credited because of the fact that this was a dictation task.

The Reading Comprehension test (Wesche, 1992) measures the understanding of written French in an academic context. It consists of three texts that students read and they then answer multiple choice questions (Wesche, 1992).

The Cloze test (Wesche, 1992) provides a general measure of second language proficiency, including reading comprehension. It consists of a prose passage of an authentic text, in which selected words have been deleted to be filled in by students (Wesche, 1992). In this particular test, the text used was extracted from a journalistic essay on the proliferation of opinion polls. Words from the original text were deleted at regular intervals (every five words) and the student was asked to supply the missing words. The scoring procedure provides credit for any word which fits the context in addition to the exact word omitted from the original text

¹¹ Term used by Wesche (1992) in describing the inability of the student to simply reproduce statements through verbatim recall because the statements are too long to be processed in short-term memory.

(Wesche, 1992).

The Oral Interview (Wesche, 1992) is an individually administered interview involving three tasks: (1) a description of a sequence of drawings; (2) a discussion of tourist brochures; and (3) a simulated job interview for a summer tourism-related job. Each is scored by the interviewer (the same trained interviewer for all oral interviews) on a scale of 1 to 5, for five categories of linguistic features. (A detailed description of each of these categories was not available as part of the original database, however a sample scoring sheet can be found in Appendix A.) In Chapter 5 the three tasks of the Oral Interview are referred to as Oral 1, Oral 2, and Oral 3, respectively.

The Elicited Imitation test (Wesche, 1992) is a sentence repetition task based on a French language radio broadcast addressing an adolescent audience. Students first listen to the extended text, then listen to and repeat the individual sentences of varying length (12 to 15 syllables each) which compose it. The length of the sentences is designed to require subjects to process them in long-term memory and to reconstruct them. A shorter sentence could be reproduced in short-term memory (Wesche, 1992). Scoring appreciates accuracy of repetition in terms of various oral grammar points, such as optional or compulsory liaison, word stress, phrasal accentuation, vowel deletion or “syncope” and unstressed vowel reduction (Wesche, 1992). Also built into the passage are relevant

discourse features such as the use of past tenses (*imparfait* and *passé composé*) and the use of colloquial expressions in a continuous text (Wesche, 1992). Five scoring categories were included to reflect the various features tested. They were “Exact”- exact, word-for-word repetition; “Semantically Equivalent”- shows precise comprehension and close, but not exact, repetition; “Syntax”-refers to accurate reproduction of syntactic features; “Discourse”- refers to accurate reproduction of tenses and adverb placement; and “Other”- refers to accurate reproduction of liaison and syncope (dropping of unstressed vowels).

The focus of both the Listening Comprehension and Reading Comprehension tests is generally on understanding different levels of meaning of authentic recorded or written texts: for example, the main idea, the speaker’s or author’s attitude, or specific details (Bachman, 1990). In the study of the 1988 cohort, the results obtained with these measures corresponded with other studies (Swain & Lapkin, 1986; Genesee, 1987) which have shown that immersion students of different ages have, in a school situation, highly developed receptive skills.

Both the Listening Dictation and the Cloze tests (Oller, 1979) require subjects to go beyond global comprehension of meaning to a more precise semantic and syntactic analysis and reconstruction. The Listening Dictation test asks students to recall or reproduce every word they hear. The Cloze test requires them to insert semantically and grammatically appropriate

words. In Wesche's study (1992) subjects' performance on these two tests was slightly lower than on the two global comprehension tests (listening and reading).

The original (1985) Self-Assessment of French Proficiency questionnaire (Wesche, 1992) presented 60 statements about receptive French use ability. The student indicated his/her level of agreement on a 1 to 5 scale ('never' to 'always'). For example, statements include 'Over the phone I can understand some basic information in French, such as the name of the caller and the number where he can be reached.'; 'I can read an editorial in French and determine the areas of agreement and disagreement between the author's views and more.' Since the original questionnaire showed a strong ceiling effect, a revised version replaced the 32 easiest items with 12 more difficult items, including writing and speaking (e.g. 'There is no difference in my reading speed whether the text is in French or in my native language'). The questionnaire used with the second cohort (Wesche, 1992) presented 40 statements about receptive French use ability with which the student indicated level of agreement on a scale of 1 to 5 ('never' to 'always'). The minimum score was 40 indicating very low agreement and the maximum score of 120 would indicate very high agreement with the statements.

The French Language Attitudes and Use Questionnaire included several parts of which only a few measures were considered pertinent for

our current research. For this reason, only the latter are described in the following paragraph.

The measures concerning Specific Current Use were considered relevant to the examination of retention. As previously indicated in Section 1.3 (Research Questions), the activities that occurred during the three year interval from 1988 (end of high school) and 1991 (third year university) were of particular interest. The data collected regarding four variables - courses taken in French¹², books read in French, hours of television watched in French, movies seen in French, and hours spent at other activities in French - were considered essential to determining what influences might have acted on the retention process.

4.4 Validity and Reliability

Adequate levels of validity and reliability of the instruments were demonstrated through a variety of statistical calculations, including item analysis during test development and revision and subsequent coefficient alpha and corresponding standard error of measurement scores (Wesche, 1988). These analyses were done and reported specifically with regard to the Listening Comprehension, Reading Comprehension, and Cloze tests.

¹² As previously mentioned, these refer to courses taken in French, which may or may not include French language courses such as French literature courses, French as a second language, or French for francophones. All subjects reported taking at least one French language course of some type during their years of university study. However, the exact number of language courses taken was not provided in the data. The 'courses taken in French' variable emerged as a result of data provided by subjects on the number of courses in French, each year, on various topics without specifying whether these courses were actually language learning courses.

Evidence of concurrent validity was also provided for the total proficiency scores. The validity and reliability of the questionnaires were not demonstrated by Wesche (1992) through statistical analyses.

A group of 73 students took the revised battery of tests in 1986: the reliability (coefficient alpha) of the total score on Parts A, C, and D (Listening, Reading, and Cloze) with a maximum score of 60, was 0,92. The corresponding standard error of measurement was 3,1. The reliability (coefficient alpha) of Parts A and C of the test, with a total of 33 items, was 0,71 for the total group of 220 students who took this part of the test battery in the spring of 1988. This gives a standard error of measurement of 2,4. The total group included five students who took only these two parts of the test. These results suggest that the total score on Parts A, C and D (Listening, Reading, and Cloze) provide a reliable measure of French proficiency for students with backgrounds similar to those of the immersion graduates from Ontario schools (Wesche, 1988).

Item analysis data was used in the selection and revision of items for use in the revised version the French proficiency used in 1988 and 1991 (Listening, Reading, and Cloze) (Wesche, 1988). Two types of discrimination index were used, the first being the difference in the per cent of correct answers in the upper and lower 27 per cent of the group (according to their test scores). The second index is the biserial correlation between item score (right or wrong) and the total test score.

The Listening Dictation sub-test had not been used with the first cohort, therefore was revised prior to its use in 1988 and 1991. It had been used successfully in other studies at the university level and was therefore used in the 1988 battery.

Table 3 shows the relationships among the scores obtained on the four sub-tests in the group of over 200 students who took the proficiency test in the spring of 1988.

Table 3

Intercorrelations among Sub-tests, Spring 1988 (Wesche, 1992)

Test	<u>Pearson product-moment correlation</u>		
	Reading	Dictation	Cloze
Listening	0,52	0,40	0,48
Reading		0,52	0,59
Dictation			0,60

In addition to the above-mentioned sub-tests developed by the Second Language Institute, the Elicited Imitation sub-test was developed by the Modern Language Centre of the Ontario Institute for Studies in Education (Wesche, 1992). No information was available as to the validity or reliability of this instrument on its own.

However, validity of the test battery as a whole was demonstrated.

For a group of 42 students in the 1988 spring testing program at the grade 13 level, scores were available from the Oral Proficiency Test, involving rating on the three parts of an interview with the same tester. The total possible score was 15 and the mean score for this group was 10,5, with a standard deviation of 1,3. Using the total score on the oral interview as the criterion, the concurrent validity of the total proficiency test score was found to be 0,73, accounting for about half of the variance in the score on the oral test. This provided some assurance of the validity of the total battery of tests.

In addition to the French Proficiency Tests, two other instruments were used - A Self-Assessment Questionnaire and a French Language Attitudes and Use Questionnaire. Some details were given by Wesche (1988) as to their origins although their validity or reliability was not clearly demonstrated in the 1992 report.

The Self-Assessment Questionnaire was originally developed for use as a placement test for courses in French as a second language given by the Second Language Institute at the University of Ottawa (LeBlanc and Painchaud, 1985). It consisted of 60 statements about listening and reading activities in French and required about 20 minutes for completion. Since the level of difficulty of many of the tasks was not appropriate for the post-immersion students, a revised test was developed, with 20 items related to Listening and Speaking and 20 items related to Reading and

Writing. It was not field-tested, in its revised form, prior to use with the 1988 cohort, but it had been read and edited by a number of language teachers and researchers (Wesche, 1988).

The French Language Use Questionnaire provided self-report measures of anxiety/self-confidence when speaking French, information about current use of French in a variety of situations, personal reasons for learning French, and current university course work in French. Items were adapted from a number of sources and some minor revisions were made as a result of the use of this instrument in the pilot study (1985/88 cohort) (Wesche, 1988). The fact that these two questionnaires have not been validated and that their reliability has not been clearly demonstrated may account, in part, for the discrepancy reported in Section 3.3 between the subjects' self-perception of their proficiency and the actual test scores observed.

4.5 Procedure

A total of 78 subjects, who had initially been tested in 1988, were also tested in 1991 with the same battery of instruments. An initial sample of 154 subjects had been tested in 1988 (pre-test) but approximately half of these subjects were reached for post-testing.

Statistical analyses were performed on all the results from all these measures, with the exception of the written essay task which was only

administered in the 1988 battery of tests. First, descriptive analyses were performed on all pre- and post-test measures (listening comprehension, listening dictation, reading comprehension, cloze, elicited imitation as well as oral interview tests). Then analyses of variance with repeated measures were performed on all test scores, with the exception of oral interview scores on which t-tests were performed. The aim was to verify whether differences observed between pre- and post-test measures might be significant.

Although the sample sizes were relatively small¹³, the results suggest that further research should be pursued in this area. Where Wesche (1992) had found retention on all sub-tests (and even improvement, in some cases) between pre- and post-test, our analyses showed that by controlling the language use variable, retention was not a constant for all subjects on all sub-tests.

A discussion of the results obtained provides an overall picture of the role of language use on long-term retention. The outcome of the statistical analyses is examined in terms of the review of the literature presented in Chapter 3 and in view of the conceptual framework outlined in Chapter 2.

¹³ The largest number of scores available was on the Listening and Reading Comprehension as well as on the Dictation and Cloze with a total of 78 subjects.

4.6 Description of Data

The data to be analysed as part of this research can be classified in the following way. First, two sets of data were collected - results for 154 subjects in 1988 and results of a subgroup of a maximum of 78 students in 1991. Second, data were examined to determine both performance (Language tests and Self-Assessment) and use (French Language Attitudes and Use). Performance data was collected both in 1988 and in 1991 whereas language use data was collected only in 1991 (see Appendix B: Description of Data).

4.7 Data Analysis

A series of analyses were performed on the data collected both in 1988 and 1991, to determine whether there were any differences in pre- and post-test measures as a result of the use of French (as indicated by five independent variables) during the three year interval between the two measures.

Where numbers were larger than 40 subjects and the homogeneity of variance requirement was met (Bertrand, 1986) analyses of variance with repeated measures were performed to determine the combined influence of each of the five use variables (courses, books, television, movies and other activities) taken separately and combined with the time interval of three years. Analyses of variance with repeated measures

were performed for this study on reading, listening dictation, cloze, elicited imitation and the self-assessment measures.

Since only samples of less than 20 subjects were available for Oral Interview measures, a different method of analysis was adopted for these particular results. T-tests were first performed on the pre-test measures to determine whether there was a significant difference between the two groups (those who had used French, and those who had not) prior to the time interval during which language use may or may not occur. The two groups were formed by determining "use" and "non-use" of the language on the basis of the subjects' reported level of activity for each variable (books, courses, movies, television, and other activities in French during the three year interval). Since no significant difference was found on pre-test measures for the oral interview (Speaking sub-test), t-tests could then be performed on post-test measures to determine whether each of the use variables taken separately had an influence on performance. As previously described, the oral interview was divided in three parts (Oral 1, Oral 2, and Oral 3). Analyses were performed on the results obtained by subjects on each of these three parts.

Owing to the fact that the data used for this study had been collected for a previous study, the extent to which complex analyses could be performed was greatly limited. The major constraint to be dealt with was the fact that some of the subsamples were very small and precluded cross-

referencing of the effect of several variables. Analyses of variance (ANOVAs) with repeated measures and t-tests were nevertheless performed which yielded results that might suggest a need for future research.

Chapter V

Results

The results were analysed quantitatively in terms of the research questions of this study. It was intended to observe the difference between the performance of students at the end of high school (1988) and in their third year of university (1991). A number of sub-questions were also addressed, each one targetting the effect of specific language use variables on the students' performance.

5.1 Research Question - Change in Performance on the Basis of Varying Usage

Our intention was to see whether the pre- and post-test measures on each of the sub-tests were significantly different when controlling the various language use variables. The five variables considered were courses taken in French, books read in French, movies seen in French, television watched in French, and other activities practised in French. None of these variables had been specifically controlled in the study by Wesche (1992). The results of our subjects on each sub-test were examined in terms of each of the five variables. The analyses performed indicate that language use has a relative influence on the results.

5.1.1 Courses Taken in French

Analyses of variance with repeated measures on pre- and post-test measures, taking into account a group effect (courses taken and not taken in French) revealed that the effect of this language use variable was significant in producing improvement on post-tests. For all sub-tests, those students who reported taking courses in French did better on the post-test than on the pre-test. Those who reported taking no courses in French either maintained the same performance or did worse on the post-test than on the pre-test.

Nevertheless, the results were not significant on all sub-tests. The influence of taking courses in French varied, depending on the year in which the courses were taken. Analyses were performed separately on the influence of taking courses in first, second, third, as well as in all three years of university study.

5.1.1.1 Reading Comprehension Sub-Test

Those subjects who reported taking at least one course in French during any one of their three years of university study showed significant improvement on the reading comprehension test (see Tables 4 and 5). Those who did not take courses maintained a stable performance. Subjects who reported taking courses had a lower baseline performance that did not affect their motivation to take courses to maintain and indeed even

improve performance. Conversely, subjects who did not take courses in French do not seem to have been adversely affected but maintained their performance in reading comprehension.

Separate analyses on the influence of taking courses in French in any one of the three years of study were also performed. No significant differences were found between pre- and post-test measures of reading comprehension when analyzing each year of study separately.

Table 4

Means and Standard Deviations for Reading Comprehension Sub-Test in terms of courses taken in French during all three years of university study

Variable	Test scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
No course taken (n=67)	12,93	3,45	13,79	3,01
Courses taken (n=9)	8,77	5,95	12,33	3,46

Table 5

ANOVA with repeated measures for Reading Comprehension in terms of courses taken in French during all three years of university study (n=76)

Source	df	SS	MS	F
Between-subjects	74			
Group (courses taken or not)	1	124,64	124,64	7,18*
Error between	73	1267,23	17,36	
Within-subjects	74			
Test	1	77,55	77,55	12,03*
Interaction	1	28,70	28,70	4,45*
Error-within	72	464,35	6,45	
Total	148	1962,47		

* $p < 0,05$

5.1.1.2 Elicited Imitation Sub-Test

Results on the Elicited Imitation sub-test, whether they were exact responses or equivalent responses, were similar to those on the reading comprehension sub-test. Significant differences were observed for subjects who reported taking at least one course in French in their first year. In these latter analyses, as previously explained, only scores for exact or equivalent responses were compared on pre- and post-test measures (Tables 6 and 7). Separate ANOVAs with repeated measures were performed on both the scores for exact responses and those for equivalent responses, but the findings observed did not differ (see Tables

8 and 9). Subjects who had taken a course in French scored significantly better on the second test than on the first test, when compared to their peers who reported not taking any courses in French in their first year. Contrary to the results obtained on reading comprehension, both groups (courses taken and courses not taken) scored significantly lower on the pre-test than on the post-test, although the effect of taking a course did produce significantly better results.

As in the case of all sub-test analyses, the effect of taking courses in French in every year of study was examined. Only courses taken in first year produced significant differences between pre- and post-test measures of elicited imitation.

Table 6

Means and Standard Deviations for Elicited Imitation Sub-Test (exact responses) in terms of courses taken in French during the first year of university study

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
No course taken (n=39)	2,97	2,99	4,92	3,41
Courses taken (n=18)	1,94	2,48	6,78	3,35

Table 7

Means and Standard Deviations for Elicited Imitation Sub-Test
(equivalent responses) in terms of courses taken in French during the
first year of university study

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
No course taken (n=39)	4,54	3,32	11,82	2,56
Courses taken (n=18)	2,89	3,29	13,11	1,53

Table 8

ANOVA with repeated measures for Elicited Imitation with exact
responses in terms of courses taken in French in the first year of
university study (n=57)

Source	df	SS	MS	F
Between-subjects	55			
Group (courses taken or not)	1	4,19	4,19	0,30*
Error between	54	754,19	13,97	
Within-subjects	55			
Test	1	283,24	283,24	52,07*
Interaction	1	51,24	51,24	9,42*
Error-within	53	288,29	5,44	
Total	110	1381,15		

* $p < 0,05$

Table 9

ANOVA with repeated measures for Elicited Imitation with equivalent responses in terms of courses taken in French in the first year of university study(n=57)

Source	df	SS	MS	F
Between-subjects	55			
Group (courses taken or not)	1	0,79	0,79	0,07
Error between	54	596,70	11,05	
Within-subjects	55			
Test	1	1886,78	1886,78	351,17*
Interaction	1	53,23	53,23	9,91*
Error-within	53	284,68	5,37	
Total	110	2822,18		

* $p < 0,05$

5.1.1.3 Oral Interview Sub-Test

The limited number of subjects taking the oral interview precluded analyses of variance from being done. It was nevertheless of interest to examine whether a change in performance from pre- to post-test could be observed. T-tests were performed on pre-test measures and since no significant difference was present, post-test results were also compared using t-tests.

Descriptive tables (Tables 10 and 11) illustrate an apparent decline in performance for those subjects who reported taking no courses in

French during their first year of university study or during their second year of university. At the same time, those subjects who did report taking at least one course in French during either their first or second year of university study seemed to have either maintained the same scores or even improved on the post-test. The results were consistent on all three parts of the oral interview.

As in the case of the other sub-tests, analyses were also done on the influence of taking courses in third year or in all three years of study. The results were not significant.

Table 10

Means and Standard Deviations for Speaking Sub-Test (oral1, oral2, oral3) in terms of courses taken in French during the first year of university.

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
Oral1				
No course taken (n=7)	3,58	0,38	3,21	0,27
Course(s) taken (n=5)	3,60	0,42	3,60	0,42
Oral2				
No course taken (n=7)	3,33	0,41	3,07	0,35
Course(s) taken (n=5)	3,60	0,55	3,90	0,42
Oral3				
No course taken (n=7)	3,67	0,41	3,29	0,49
Course(s) taken (n=5)	3,80	0,45	3,90	0,82

Table 11

Means and Standard Deviations for Speaking Sub-Test (oral1, oral2, oral3) in terms of courses taken in French in second year university.

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
Oral1				
No course taken (n=8)	3,50	0,29	3,25	0,27
Course(s) taken (n=4)	3,75	0,50	3,63	0,48
Oral2				
No course taken (n=8)	3,36	0,38	3,19	0,46
Course(s) taken (n=4)	3,63	0,63	3,88	0,48
Oral3				
No course taken (n=7)	3,71	0,39	3,31	0,46
Course(s) taken (n=4)	3,75	0,50	4,00	0,91

T-tests performed on the post-tests of both groups (subjects who did take courses in French and those who did not) partially confirmed the impression given by the preceding descriptive analyses. Significant differences were found between the post-tests of subjects who had taken a course in French and those who had not (in first year or in second year),

but only on the second part of the sub-test (see Tables 12 and 13).

Table 12

T-tests performed on post-tests (1991) for Speaking Sub-Test (Oral 1, Oral 2 and Oral 3) in terms of courses taken in French during the first year.

		$\bar{X}$	SD	t
Oral 1	Group 1 (n=7)	3,21	0,267	-1,96
	Group 2 (n=5)	3,60	0,418	
Oral 2	Group 1 (n=7)	3,07	0,345	-3,76*
	Group 2 (n=5)	3,90	0,418	
Oral 3	Group 1 (n=7)	3,29	0,488	-1,63
	Group 2 (n=5)	3,90	0,822	

* $p < 0,05$

Table 13

T-tests performed on post-tests (1991) for Speaking measures (Oral 1, Oral 2 and Oral 3) in terms of courses taken in French during the second year

		$\bar{X}$	SD	t
Oral 1	Group 1 (n=8)	3,25	0,267	-1,78
	Group 2 (n=4)	3,63	0,479	
Oral 2	Group 1 (n=8)	3,18	0,458	-2,42*
	Group 2 (n=4)	3,88	0,479	
Oral 3	Group 1 (n=8)	3,31	0,458	-1,78
	Group 2 (n=4)	4,00	0,913	

* $p < 0,05$

5.1.2 Books Read in French

Analyses of variance with repeated measures were also performed to examine the impact of reading books in French on the change in performance between pre- and post-test measures. It was revealed that the effect of this use variable was significant in producing improvement on some post-tests, as compared to pre-test measures. In the case of the sub-tests where a significant difference was observed, those students who reported reading books in French during the three year period did better on the second test than on the first. Those who reported not reading books in French either maintained the same performance or did worse on the

second test than on the first. In addition, it was observed that those students who reported reading books had lower scores on the pre-tests than did their counterparts who reported not reading any books in their L2.

Significant results were obtained only for the reading comprehension and elicited imitation tests. The influence of reading books in French seemed therefore to be significant in only those two areas. This will be discussed in the next chapter.

5.1.2.1 Reading Comprehension Sub-Test

It was observed that those students who reported reading at least one book per month in French during their university studies had significantly different scores on pre- and post-test measures of reading comprehension than did their colleagues who reported not reading any books (see Tables 14 and 15). It is interesting to note, however, that those subjects who did read originally had an initial lower score on the pre-tests than their counterparts. It seems, therefore, that reading books helped the weaker students catch up to their peers so that their performance on the post-test was equivalent.

Table 14

Means and Standard Deviations for Reading Comprehension Sub-Test in terms of books read in French each month

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
No books read (n=64)	12,84	3,55	13,64	2,92
Books read (n=12)	10,25	5,58	13,50	3,94

Table 15

ANOVA with repeated measures for Reading Comprehension in terms of books read each month (n=76)

Source	df	SS	MS	F
Between-subjects	74			
Group (books read or not)	1	7,78	37,78	2,04
Error between	73	1351,93	18,52	
Within-subjects	74			
Test	1	82,75	82,75	12,88*
Interaction	1	30,41	30,41	4,73*
Error-within	72	462,90	6,43	

Total	148	1925,77		

* $p < 0,05$

5.1.2.2 Elicited Imitation Sub-Test

Students who reported reading at least one book per month in French during their university studies also had significantly different scores on pre- and post-test measures of elicited imitation but only for exact responses. Their colleagues who reported not reading any books showed less improvement between pre and post-test measures (see Tables 16 and 17). As in the case of reading comprehension scores, those subjects who did read had originally performed lower than their counterparts on the pre-test. Reading books, therefore, seems to have helped lower achieving subjects improve so that they performed better than their peers on the post-test.

Although significant differences were observed for exact responses, it is important to note that similar results were not found for equivalent responses in the Elicited Imitation task. It would seem therefore that reading books only improves performance in terms of exact recall. This point will be discussed in the next chapter.

Table 16

Means and Standard Deviations for Elicited Imitation Sub-Test (exact responses) in terms of books read in French each month

Variable	Test Scores			
	1988		1991	
	$\bar{X}$	SD	$\bar{X}$	SD
No books read (n=47)	4,43	3,30	12,04	2,50
Books read (n=10)	2,10	3,18	13,10	1,19

Table 17

ANOVA with repeated measures for Elicited Imitation with exact responses in terms of books read each month (n=57)

Source	df	SS	MS	F
Between-subjects	55			
Group (books read or not)	1	6,63	6,63	0,62
Error between	54	577,45	10,69	
Within-subjects	55			
Test	1	1428,94	1428,94	260,62*
Interaction	1	47,18	47,18	8,61*
Error-within	53	290,42	5,48	
Total	110	2350,62		

* $p < 0,05$

5.1.3 Movies, Television and Other Activities Practised in French

Analyses were performed for each of the other three variables referred to in the first research question - movies seen in French, television watched in French, and other activities practised in French. As in the case of books read and courses taken in French, it was our intention to observe whether these variables had any degree of influence on test results - pre- and post-interval. No significant difference was found on any of the sub-tests as a result of the influence of any of these three variables. It would seem that, in the case of the subjects who participated in the study by Wesche (1992), the number of movies seen, hours of television watched, and other activities practised in French did not have an influence on the pre-and post-test performance. The data available on these types of activities was not very detailed and may account for the lack of influence of this type of language use. Further research might find that these factors do indeed have an impact on long-term retention.

Chapter VI

Discussion of Results

The objective of this study was to examine the role of language use on the retention of a second language, both in terms of productive skills and receptive skills. The study by Wesche (1992) has established that the performance of subjects was maintained during the three years following graduation from high school, while studying at university. The language use factor had not been controlled, however, and this provided an opportunity to further probe the previously collected data. By controlling the language use factor, it was hoped that some differences would be found in terms of retention of second language skills. The results obtained, both by Wesche (1992) and by the present analysis, provide some insight concerning the role of each of the independent variables discussed earlier (courses taken in French, books read in French, television, movies and other activities practised in French).

We will now examine the role of each of these variables first by discussing the answers to each of the research questions posed in Section 1.3. These results will then be contrasted with the research findings presented in the Review of the Literature in Chapter 3. Finally, the outcome of this study will be analyzed in terms of the conceptual framework presented in Chapter 2.

6.1 Discussion of Research Questions

The results obtained by Wesche (1992) had revealed no decrease in performance between pre and post-test measures¹⁴ on any of the sub-tests of the battery. These findings would seem to imply that all of the students showed retention in all areas of language, both in receptive skills and in productive skills (see Table 2).

In the current investigation, however, significant differences were found between the pre- and post-test measures for subgroups of students on some sub-tests, under the influence of two of the independent variables presented in the research questions in Section 1.3. As reported in Chapter 5, no significant results were found for the third research question involving movies, television and other activities as variables. Pre- and post-test results on both the Reading Comprehension and Elicited Imitation sub-tests were significantly different, but no significant differences were found in the other sub-tests. Differences were also observed between post-test measures as a result of language use on the Speaking sub-test.

6.1.1 First Research Question: Courses Taken in French

As previously discussed, language use, as evidenced by courses taken in French during the three-year interval between pre- and post-tests, had

¹⁴ In the case of Reading Comprehension and Cloze performance, Wesche (1992) even observed significant gains which she attributes to a possible transfer from intensive L1 reading during university studies.

an impact on performance. The Reading Comprehension, Elicited Imitation and Oral Interview results were all influenced by this factor in that the subjects who reported taking courses in French all performed better on the post-test when compared to their peers who had not taken any courses in French. If we accept the notion that performance is an indicator of competence, we could then infer from these results that language use would help maintain competence in terms of Reading Comprehension, Elicited Imitation and Speaking skills.

6.1.1.1 Reading Comprehension Sub-Test

The results on this sub-test provide some insight into the role of language use as well as that of motivation in the promotion of retention and improvement in a second language. It was observed that differences were apparent in scores between subjects on the pre-test measures in terms of their enrollment in courses in French. In fact, subjects who showed the greatest motivation in maintaining their skills by taking courses in French are those who had lower baseline results. However, it cannot be said that language use is the only contributing factor in promoting retention, however, since those subjects who did not take any courses still maintained a stable performance from pre- to post-test. It may be that their level of attainment was sufficient to allow them to maintain their performance (Clark and Jorden, 1984; Weltens, Van Els and

Schils, 1989) whereas the subjects who had showed a lower baseline level of achievement needed practice with the language to maintain and even improve their performance in the L2.

6.1.1.2 Elicited Imitation Sub-Test

A different pattern from that observed with the Reading Comprehension sub-test was evident with the Elicited Imitation sub-test. Subjects who reported taking courses in French seemed better able to reproduce the sentences verbatim on the post-test. When compared to their peers, these subjects scored higher on the post-test although the performance of both groups had not differed on the pre-test. These results are particularly interesting in terms of providing some insight into the process of remembering since the test is specifically designed for this purpose (Wesche, 1992). Given the differences between the two groups in terms of language use, we are able to infer that those subjects who did better on the post-test are better able to reproduce a sentence due in part to taking courses in French.

6.1.1.3 Oral Interview Sub-Test

In the case of the Speaking sub-test, the t-tests performed revealed some significant differences between subjects who had taken courses in French and those who had not. Since no significant difference had been

found on pre-test measures of both groups, it is plausible to infer that the difference observed on post-test measures is somewhat related to the taking of courses in French. Although the subsample of subjects who were given the Oral Interview was very small, it is nevertheless important to note a change in performance as a result of language use.

6.1.2 Second Research Question: Books Read in French

Language use also had an impact on the results observed in terms of books read in French during the three-year interval between pre- and post-tests. In the case of this factor, however, only the Reading Comprehension and Elicited Imitation results were influenced by this factor. Subjects who reported reading books in French all performed better on the post-test when compared to their peers who had not read any books in French. It might be inferred that reading books can help maintain second language competence, since performance is seen as an indicator of competence (Ellis, 1986).

6.1.2.1 Reading Comprehension Sub-Test

It should not seem surprising that subjects who reported reading at least one book per month in French during the three-year interval between pre- and post-test measures performed better on the Reading Comprehension post-test than did their peers who did no reading in

French. It is also plausible that this better performance is also indicative of better competence.

One surprising feature of the Reading Comprehension results, in terms of the book reading factor, concerns the results on the pre-test. It was observed that those students who reported reading books were the subjects who had originally had the lowest scores on the pre-test (Reading Comprehension). This was also the case with the subgroups formed on the basis of courses taken in French. It could be that a lower score on the pre-test actually provides the motivation to read in order to improve performance.

No adequate explanation has been found as to why subjects who had the best scores on the pre-test were able to maintain their performance despite not reading any books during the three year interval between pre- and post-test. Perhaps, as was mentioned earlier, these better subjects had reached a threshold that allowed them to maintain their performance (Bahrick, 1984; Clark and Jorden, 1984; Weltens, Van Els and Schils, 1989).

6.1.2.2 Elicited Imitation Sub-Test

The results on the Elicited Imitation sub-test were similar to those on the Reading Comprehension sub-test. Once again, those students who reported reading books had been the lower achievers on the pre-test. They were able, by reading books, to catch up to their peers who, without

reading books, maintained a stable performance from pre- to post-test. This again suggest that reading books helps improve competence, as indicated by a better performance.

6.2 Discussion of Factors Identified in the Review of the Literature

Three factors were identified in the Review of the Literature (initial level of proficiency, motivation and language use) as having a possible influence on long-term retention. This research was aimed specifically at increasing our knowledge of the role of language use on long-term retention. Earlier studies had not examined specific variables of language use. The results of this study help pinpoint some of the activities that may help promote retention of second language skills (and even improvement of them, in some cases) both in terms of performance and competence.

The importance of the initial level of proficiency and of motivation had been discussed extensively in earlier studies. It was therefore felt that the need for further research centered on the role of language use in promoting retention. Some of the findings of the current investigation nevertheless conform to the outcomes of these earlier studies on other factors.

6.2.1 Language Use

Two particular variables were shown to have helped maintain

performance and competence: courses taken in French and books read in French. Other studies (Weltens, Van Els and Schils, 1989; Wesche, 1992) had examined retention while taking into account whether language use might be a factor. Berman and Olshtain (1983) and Godsall-Myers (1981) had found that lack of use caused a decline in performance. Snow, Padilla and Campbell (1988) and Raffaldini (1988) had also showed that practice with the language could help maintain skills. None of these studies, however, had combined two aspects that made the current research original: interruption of treatment prior to the retention interval (see the definition of retention in Section 1.2) and isolation of individual variables as indicative of language use. As previously discussed in Section 1.4 Scope of the Study, it was difficult to control the language learning variable in our study. ANOVA's with repeated measures did nevertheless indicate that if language courses were voluntary taken, these did not produce significant differences on any of the tests.

6.2.1.1 Courses Taken in French

Not surprisingly, the results indicate that taking courses in French may influence the retention of reading comprehension skills (receptive skills). Other studies (Weltens, Van Els and Schils, 1989; Wesche, 1992) have indicated that receptive skills remain stable even without practice. However, the outcome of this study shows that production skills are also

influenced by taking courses in French. Both the Oral Interview and the Elicited Imitation sub-tests indicated that those students who had taken courses in French were significantly better at maintaining their performance than their peers who had not taken any courses in French. Not only was maintenance evident, but in fact subjects who had taken courses in French showed significant improvement when compared to their peers. This finding differs from earlier studies by Raffaldini (1988) and Snow, Padilla and Campbell (1988) who had studied the influence of continued French language training on long-term retention. In our case, students were taking courses which allowed them to practise previously-learned French skills without actually taking French lessons in grammar or other linguistic aspects of the language. We controlled the number of courses taken in French, as an independent variable.

6.2.1.2 Books Read in French

The second variable that was shown to have a significant influence on long-term retention was language use in terms of reading books in French. Two sub-tests were shown to have been influenced by this variable: Reading Comprehension and Elicited Imitation. Again these findings support results obtained in earlier research that show that productive skills and receptive skills (Snow, Padilla and Campbell, 1988; Raffaldini, 1988) are both better maintained as a result of language use.

The results of our study, however, have isolated the book reading variable as one which, alone, can influence retention of two particular skills (reading and speaking).

In addition to suggesting the importance of taking courses and reading books in French on long-term retention, some of the results of our study seem to reinforce the findings of earlier studies regarding the influence of two other factors. These two other factors will be discussed in the next section.

6.2.2 Initial Level of Proficiency and Motivation

An interesting observation was made when analyzing the scores on both the Reading Comprehension and Elicited Imitation sub-tests. As we have already discussed, the influence of reading books is significant as far as producing a change in performance on both these tests. However, it was also observed that, on both these sub-tests, the subjects who read books had achieved lower baseline results than their counterparts who did not read books. On the post-test, both groups (readers and non-readers) had similar scores. These results could be interpreted in three ways.

First, it could be inferred that the higher achievers on the pre-test had attained a level (possibly a critical threshold) that allowed them to maintain their performance despite not reading books. Other research (Bahrick, 1984; Clark and Jorden, 1984) have discussed the possible

existence of an initial level of attainment that would promote long-term retention.

A second interpretation of the results is in line with research done by Gardner, Lalonde and MacPherson (1985) as well as Edwards (1977) which showed the importance of motivation in maintaining second language skills. It could be, in the current investigation, that those students who had not done well on the pre-test were motivated to read books as a way of improving their result on the second test. Finally, it should be considered that those students who reported on their book reading activities may also have been practising other activities in French. Absence of reading would not necessarily mean absence of language use. This might account for the fact that maintenance was achieved by those who did not report any reading.

6.2.3 Interpretation of Results

There are two considerations that mitigate the results of this study, which were discussed earlier in Section 1.4. The first concerns the presence of a variable, the number of language courses taken, which could not be controlled. The second concerns the size of the subsamples which limited the data analyses that could be performed and make it rather difficult to draw firm conclusions with any degree of confidence.

In the collection of data, subjects were asked to give answers on the

Attitudes and Use Questionnaire on the number of courses taken in French (the courses taken in French variable). They were also asked to indicate, in another question, whether they had taken any French language courses. All subjects gave an affirmative answer to this last question, indicating that they had taken at least one course during their three years of university study. Even though control of the number of language courses taken was not possible, we were able to perform analyses to examine the influence of this variable. The results of these analyses allowed us to dismiss the influence of this variable as insignificant on long-term retention. The 'courses taken in French' variable, on the other hand, did have a significant influence on retention for some sub-tests.

A second problem with the data, however, could not be so easily solved. This concerns the limited size of the sample (and subsamples) which did not allow complex data analysis involving several independent variables. As a result, we are only able to conclude that some change in performance has occurred (or that no change has occurred). We are unable to know whether several types of language use interacted to produce retention. Further research, allowing control of individual language use variables, with samples large enough to allow cross-referencing between variables, would be recommended.

6.3 Results in Terms of Conceptual Framework

In Chapter 2, current trends in cognitive science as well as memory research were discussed. A psycholinguistic perspective to the study of language retention was also examined. It was found that theoretically, in each of these fields, a constructivist view of the workings of the mind is prevalent. In examining Ausubel's Cognitive Learning Theory, we suggested that the way in which a language is learned might influence long-term retention and that if a meaningful learning approach is adopted, material would be organized hierarchically in the mind making it somehow easier to retrieve at a later time. The current investigation does not allow us to contrast different learning methods since all subjects were taken from a population of immersion graduates. It would be interesting, however, to pursue research in the area of learning methods as a way of promoting retention.

In Chapter 2, it was also suggested in discussing the process of remembering that two views have dominated in memory research during the past century: a reappearance hypothesis and a reconstruction hypothesis. Although the reconstruction hypothesis would seem to be more compatible with the current constructivist approach to the study of the mind, it would be premature to dismiss the reappearance hypothesis. Neisser (1967) has contrasted these two hypotheses suggesting the following definitions. The reappearance hypothesis proposes that

previously learned concepts lie in a dormant state in storage until called upon to become aroused. The reconstruction hypothesis would view the process of remembering as an act of creating something new each time the memory is activated.

Although this study was not designed to examine the process of remembering in terms of reappearance or reconstruction, it is nevertheless possible to suggest a link between language use and remembering, based on the definitions of both these hypotheses. The first researcher to experiment, in 1885, with reappearance as a process of remembering was Ebbinghaus (1964). As mentioned in Section 2.2, his results showed that memory for nonsense syllables was enhanced when increasing the number of repetitions of these syllables. The implication of these findings and of other subsequent experiments with rote learning, particularly by behaviorists is that language use, defined as repeated practice with words would promote reappearance (Tulving, 1972). This argument could be taken one step further to infer that second language retention, defined as a process of reappearance could be aided by repeated practice with a concept or word.

On the other hand, reconstruction has become popular since the 1960's, with a revival of the ideas first presented by Bartlett (1932). He contended that memory was dependent upon the ability to reconstruct previously learned material by mastering a structured system of

relationships between elements of a past learning experience. According to Neisser (1967), how well one is able to remember would depend upon one's ability to master this system and the more one was able to use the language, the better one would remember. It could then be inferred that language use would promote language retention, defined as reconstruction.

6.4 Conclusion

This study was aimed at investigating the role of specific language use variables in promoting second language retention. Based on earlier research, it had been determined that three main factors were influential in enhancing long-term retention. Previous findings had pointed to the importance of the initial level of proficiency as a factor (Bahrick, 1984; Clark and Jorden, 1984; Weltens, Van Els and Schils, 1989). It had also been shown that motivation was desirable, if not essential, for individuals to maintain their level of performance over a long period of time (Edwards, 1977; Gardner, Lalonde and MacPherson, 1985). The role of language use in promoting retention had also been taken into account in several studies (Weltens, Van Els and Schils, 1989; Raffaldini, 1988; Snow, Padilla and Campbell, 1988). Wesche (1992) had also discussed language use as a factor in her study of graduates of bilingual high schools. None of these studies, however, had controlled specific language use variables and taken into account the absence of language training during the time interval

between pre- and post-tests. Our study combined both these aspects.

No research project is ever conducted in ideal conditions and the current investigation was no exception to this rule. For several reasons outlined earlier, a number of constraints were present from the beginning to the end of the study. In future research endeavours that might aim at defining retention in terms of reconstruction or reappearance, it would be possible to reduce these limitations, specifically by collecting new data. None of the tests used in the study by Wesche (1992) were specifically designed so as to measure reconstruction or reappearance. It was not possible to make any inferences as to the process of remembering as a function of either of these hypotheses. A future investigation would therefore be advised to further inquire on the nature of the processes involved in retention.

Bahrack (1989) has suggested a new approach to the study of memory which could apply to second language retention. In order to test both the reappearance hypothesis and the reconstruction hypothesis, one could follow Bahrack's (1989) suggestion of a two-fold study involving data collection both in a laboratory and in a natural setting. The first setting would allow reappearance to be examined while the second setting would test reconstruction.

The objective of the current investigation was to specify the role of language use in promoting retention. As a result of this research, two

variables, courses taken in French and books read in French, have emerged as specific influences on long-term second language retention. Although their impact was limited to only three skill areas - reading comprehension, elicited imitation and oral interview - it is felt that we have succeeded in establishing a specific link between language use and retention. Further research will be required to define the precise nature of the process of retention in terms of both reappearance and reconstruction.

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Appendix A. Sample Scoring Grid for Speaking Sub-test**Grade 13 Speaking - Spring 1988**

NAME: _____ SCHOOL: _____

Part 1: OVERALL PROFICIENCY: 0 1 2 3 4 5

(Use the following if necessary)

FLUENCY/FLOW OF SPEECH 0 1 2 3 4 5

VOCABULARY 0 1 2 3 4 5

GRAMMAR/STRUCTURES 0 1 2 3 4 5

PRONUNCIATION 0 1 2 3 4 5

Part 2: OVERALL PROFICIENCY: 0 1 2 3 4 5

(Use the following if necessary)

FLUENCY/FLOW OF SPEECH 0 1 2 3 4 5

VOCABULARY 0 1 2 3 4 5

GRAMMAR/STRUCTURES 0 1 2 3 4 5

PRONUNCIATION 0 1 2 3 4 5

Part 3: OVERALL PROFICIENCY: 0 1 2 3 4 5

(Use the following if necessary)

FLUENCY/FLOW OF SPEECH 0 1 2 3 4 5

VOCABULARY 0 1 2 3 4 5

GRAMMAR/STRUCTURES 0 1 2 3 4 5

PRONUNCIATION 0 1 2 3 4 5

Appendix B. Description of data collected and analysed**1988****1991****QUANTITATIVE**

Performance Listening (n=143)
Data Reading (n=142)
 Dictation (n=145)
 Cloze (n=144)
 Oral - 1st part (n=31)
 Oral - 2nd part
 Oral - 3rd part
 Elicited Imitation (n=139)

 Self-assessment (n=140)

Use Data Anxiety (n=146)
 Desire (n=146)
 Reasons (n=146)
 Frequency (n=146)
 Books (n=146)
 Movies (n=146)
 TV (n=146)
 Other Activities (n=146)

Performance Listening (n=74)
Data Reading (n=74)
 Dictation (n=74)
 Cloze (n=76)
 Oral - 1st part (n=12)
 Oral - 2nd part
 Oral - 3rd part
 Elicited Imitation (n=55)

 Self-assessment (n=74)

Use Data Anxiety (n=75)
 Desire (n=75)
 Reasons (n=76)
 Frequency (n=76)
 Books (n=76)
 Movies (n=76)
 TV (n=76)
 Other Activities (n=76)

Number of courses in French

1st year (n=74)
 2nd year (n=73)
 3rd year (n=66)
 4th year (n=63)

CATEGORICAL**Types of courses (n=74)**

French second language
 Lettres françaises
 Français
 Sheltered

Family Data Parents' language
 (n=74) Language use in the home
 Parents' level of education
 Parents' work

Study habits (n=74)

Differences in Performance
 between French and English (n=74)

Intended Use of French
 in Career (n=74)