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THE ROAD TO SECOND LANGUAGE READING:

HOW DO WE GET THERE?

by

GAIL AUGUST

A dissertation submitted to the Graduate Faculty in Linguistics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

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This manuscript has been read and accepted for the Graduate Faculty in Linguistics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

THE ROAD TO SECOND LANGUAGE READING:

HOW DO WE GET THERE?

by

Gail August

Advisor: Professor Gita Martohardjono

This study investigated the relationship of various processes to second language reading (SLR) comprehension for fifty-five Spanish-speaking, adult subjects. Reading comprehension was defined as global reading comprehension, and was measured by a standardized multiple-choice reading test. A series of second language (L2) tasks were administered to assess the relationship of L2 micro-skills, word level skills, grammatical skills, and reading strategies. To assess the relationship of first language (L1) literacy, subjects were also given tests of Spanish grammar and Spanish reading comprehension.

Individual regression analyses were conducted to construct a model of SLR comprehension and to determine whether the same processes which are assumed to contribute to first language reading (FLR) contribute to SLR comprehension, specifically phonological, orthographic, and decoding skill. The results indicate that basic phonological skill did not make a direct contribution to the model SLR

comprehension, whereas complex, or lexically based phonological skill did make an important contribution. In this respect, the model of SLR comprehension was shown to differ from the model of FLR comprehension. Regression analyses confirmed the importance of L1 literacy. As Spanish reading comprehension made an important contribution to the model SLR comprehension. However, Spanish grammar made not make a direct contribution.

The study makes an important empirical contribution to the L2 literature and the reading literature because it links micro-skill proficiency to global reading comprehension, illustrates how the model of SLR comprehension corresponds to the language processing model of FLR comprehension, demonstrates the relationship of explicit L2 grammatical knowledge to SLR comprehension, and provides evidence for the transfer of FLR comprehension skill to SLR comprehension. The data from this study also suggests that there is an indirect relationship of basic L2 phonological decoding skill and L1 grammatical knowledge to SLR comprehension. In general, the study illustrates the crucial importance of L2 lexical knowledge, which was a strong component of all processes related to SLR comprehension.

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Chapter 1

Introduction

1. Overview

This study investigates what kinds of first language (L1) and second language (L2) processes contribute to good reading comprehension in L2. The questions addressed by this study are reflected in two wide-spread debates, The Reading Wars and The Language Wars.

The primary focus of this study concerns the relationship of various component sub-skills to reading comprehension. These questions have been very prevalent in the First Language Reading (FLR) literature, and frame the issues associated with The Reading Wars. The secondary focus of this study is to explore the relationship between L1 and L2 literacy. These questions appear in the second language acquisition and bilingualism literature, and have dominated debates called The Language Wars.

2. The Reading Wars

The Reading Wars derive from two different interpretations of the kinds of processes which are most essential to reading ability. These two competing constellations of processes are usually labeled bottom-up skills and top-down skills (Rayner & Pollatsek, 1989; Fowler & Scarborough, 1993).

Bottom up and top down skills may be conceptualized as a hierarchy of sub-skills which contribute to a complex process, such as reading. The bottom-up skills

are the micro-components. or the smaller elementary components of a process. For reading, they are the skills concerned with processing letters, groups of letters. sounds, and words. In the popular reading literature, they may be referred to as "basic skills." The top-down skills are the more complex processes. For reading, they are the linguistic and semantic processes more directly concerned with constructing meaning (Rayner & Pollatsek, 1989; Fowler & Scarborough, 1993; Stanovick, 1980; Adams, 1997).

Bottom-up theories are motivated by language processing theories, which claim that reading is text driven. In bottom-up models of reading, micro-skills are emphasized as the most important contributing skills in reading proficiency because, it is assumed that without these skills, other necessary processes are not possible. These models describe reading as an activity in which small micro-components are learned and practiced, providing a foundation for more complex cognitive skills . Bottom-up theories provide a framework to explain why proficiency at lower level skills affects proficiency at higher level skills, as these theories conceptualize reading as an information processing task in which efficient and automatic performance of the basic micro-skills are the essential building blocks to more complex processes. (Daneman, Carpenter, & Just, 1982; LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979; Rumelhart & McClelland 1981; Stanovich, 1980).

Top-down theories are motivated by "whole language" models, which claim that reading is hypothesis driven. In these models, the activity of reading does not

consist of processing information from the page in a letter-by-letter, word-by-word manner, but is instead a selective, hypotheses driven process, in which the reader uses contextual cues and world knowledge to construct meaning from the text. Top-down models place less emphasis on the micro-skills. Instead, these models tend to emphasize the importance of sampling, use of context, sensitivity to linguistic cues, and formulating and modifying hypotheses. (Goodman, 1970; Smith 1971; Tierney, Readence, & Dishner, 1985).

This dissertation study concerns the contribution of various kinds of bottom-up tasks to a model of Second Language Reading (SLR) comprehension, and so most of the background information and discussion will concentrate on the data and results as they support or refute claims of bottom-up theories.

3. Objectives in Response to The Reading Wars

3.1 Objective #1: Micro-Skills and Global Reading Comprehension

An objective of this study was to empirically demonstrate the relationship of the micro-skills to global reading comprehension.

3.1.1 Motivating Gap in the Literature:

As will be discussed in Chapter 2, there is a large FLR literature which investigates the relationship of various micro-skills to reading ability (Berninger, 1990; Adams & Huggins, 1985; Hogaboam & Perfetti, 1978; van den Bosch, van Bon, & Schreuder, 1995; Sinatra & Royer, 1993; Greenberg, Ehri, & Perin, 1997). In these studies, the outcome variable, the measure of reading ability is generally

construed as word decoding, or sometimes, sentence comprehension. However, these measures of reading ability are not the same as reading comprehension, and these studies have not really looked at how micro-skills predict reading beyond the word and sentence level. The study which will be presented in this paper has used many of the conventional micro-skill assessments for FLR. However, it differs from the bulk of FLR research because the outcome variable, is global reading comprehension.

3.1.2 Relevant Background: Global Reading Comprehension

In this study, reading comprehension is defined as global reading comprehension, the skill which goes beyond the recognition of words and the meaning of the words to the meaning and intentions of the author in selecting these words and arranging them into sentences and paragraphs. Global reading comprehension comprises various kinds of reasoning skills, such as recalling information, identifying main ideas and supporting details, comparing , classifying, evaluating, sequencing, predicting, determining cause and effect, awareness of implications, understanding the author's purpose, and sensitivity to the implications of writing style, vocabulary, and tone. In global reading comprehension, readers must be active participants, contributing their own factual knowledge, world knowledge, and print experience to achieve a personal response and an understanding of the text (Harris & Sipay, 1990; Celce-Murcia & McIntosh, 1979). In this study, a standardized reading comprehension test was used as the outcome measure.

3.1.3 Decoding Skill as an Independent Variable

In English FLR, basic micro-skill processes are known to predict good reading. Consequently, in most studies of reading proficiency in beginning FLRers assessment tasks for phonological or decoding micro-skills, such as word attack and word identification, are used as dependent variables, representing reading ability (Greenberg, Ehri, & Perin, 1997; Folwer & Scarborough, 1993). In the design of this study, word attack and word recognition are independent variables, assessment tasks for component reading sub-skills.

3.2 Objective #2: Micro-skills and Adults

A second objective of this study was to investigate how micro-skill proficiencies affect adult readers.

3.2.1 Motivating Gap in the Literature

As will be discussed in Chapter 2, there is a large FLR literature which investigates how reading component processes affect children learning to read (Adams & Huggins, 1985.) Although theories about adult learners claim that their processes are different from children (Knox, 1980; O'Donnel 1982, Fowler & Scarborough, 1993; Perfetti & Marron, 1995), there are few studies which concern adults (Balmuth, 1985; Kitz, 1988).

3.2.2 Relevant Background: Adult Reading

Greenberg, Ehri, & Perin (1997) did an important study comparing the FLR micro-skill processes of normally developing children with adult literacy students (to be discussed in Chapter 2). In the Greenberg, Ehri, & Perin (1997) study, the outcome variable was again word reading. An objective of the study which is presented in this paper was to build upon the research of the Greenberg, Ehri, & Perin (1997) study, but to use global reading comprehension as the outcome variable.

3.3 Objective #3: Word Knowledge and Global Reading Comprehension

The third objective of this study was to empirically investigate the relationship of word knowledge to global reading comprehension.

3.3.1 Word Knowledge Background

Although it is generally assumed that vocabulary knowledge is related to reading comprehension proficiency, this relationship is very complex and unclear. Also, much of the literature is very unclear about the definition of vocabulary knowledge. Is it meaning based, or recognition based? What does it actually mean to know the meaning of a word (Harris & Sipay, 1990; Tirney, Readence & Disnher, 1985; Nagy, Herman, & Anderson, 1985)? According to Perfetti & Hogaboam (1975) vocabulary knowledge appears to be distinct from decoding as a component skill of reading. Also, the relationship of vocabulary to reading comprehension is not necessarily a direct one. There are, in fact, many experiments which show that increasing vocabulary knowledge will not automatically lead to increased reading

comprehension ability (Carr, 1981; Fleisher, Jenkins, &Pany 1979; Blanchard & McNinch. 1980; Tan, Moore. Dixon, & Nicholson, 1994).

3.4 Objective #4: L2 Grammatical Knowledge and Reading Comprehension

Another objective of this study was to empirically investigate the relationship of grammatical knowledge to reading comprehension.

3.4.1 L2 Grammatical Knowledge

It is generally assumed that grammatical knowledge is an important component of reading ability. However, for FLR, which generally concerns children, it is notoriously difficult to test this knowledge, and this has just begun to be done. Although there are a few studies which demonstrate the relationship of syntactic awareness to reading ability (Carr, 1981; Tunmer & Hoover, 1992; (Chall, 1983; Levy & Carr, 1990; Celce-Murcia & McIntosh, 1979; Fowler & Scarborough, 1993), no study shows the relationship of explicit grammatical knowledge. So, at this point, the connection remains an assumption rather than an empirically documented relationship.

4. The Language Wars

The Language Wars concern controversial discussions about the role of the L1 in achieving proficiency in L2. Theories about this relationship are derived from studies and concerns about bilingualism, and derive from several hypotheses

proposed by Jim Cummins (Hoffman, 1991; Hammers & Blanc. 1989; Cummins, 1981; Cummins, 1984a; Cummins, 1984b; Cummins, 1986; Cummins, 1987; Cummins, 1991; Lucas, Henze, & Donato (1990); Spener, 1988; Ovando; 1990; Solomone; 1981).There are many questions, and very little consensus on the answers. Is L1 proficiency necessary for L2, is it always necessary, how proficient must the L1 be, exactly what is meant by L1 proficiency, and what is the best method for educating a person in L2 when the L1 is not sufficiently developed?

4.1 Objective #5: The Relationship of L1 Proficiency to Adult SLR comprehension

A secondary focus objective of this study was to look at the role of the L1 in SLR comprehension, and, specifically, in adult SLR comprehension.

4.1.1 Motivating Gap in Literature

Although there are many studies of SLR comprehension, there is a paucity of literature relating micro-skills to SLR comprehension (Koda, 1994; Eskey 1988.)

4.1.2 SLR Background

There are many studies of SLR, but these L2 studies look very different from FLR studies. While FLR studies concern micro-skills, or debate the relative importance of micro-skills, most SLR studies are concerned with top-down processes and reading strategies (Koda, 1994; Eskey, 1988). These studies of SLR are influenced by top-down theories originating with Goodman (1970) and Smith (1971), and

superimpose concepts from the "Whole Language" and "Language Experience" approach onto SLR. These investigations are basically motivated by issues of schemata, and how personal experience and background information can generate expectations about the text, thus facilitating the process of decoding. For example, in a review of the SLR literature, Eskey (1988) found that virtually everything published in the TESOL Quarterly from 1981 to 1984 was couched in the "Whole Language" framework.

5. Constructing a Model of SLR

5.1 Comparing Models of FLR to SLR

A general objective of this study was to examine whether the same basic processes that support a model of FLR make corresponding contributions to a model of SLR comprehension. We know that bottom-up models of FLR are based upon a foundation of phonological and decoding sub-skills, represented by the tasks of word attack and word identification. To investigate whether SLR results from a similar constellation of sub-skill processes, these same two assessments (word attack and word identification) were incorporated into this study. However, to develop a model of SLR, this study also went beyond micro-skills and also tested L2 word knowledge skills, L2 grammatical skills, and L2 reading strategies. With the evidence from this study, it should be possible to understand which skills are the most crucial to SLR, whether or not the SLR pattern corresponds to the FLR pattern, and in what ways the SLR pattern differs from the FLR pattern.

5.2 Comparing the Processes of Beginning FLR and Beginning SLR

Another goal of this study was to compare the processes of two different kinds of beginning readers. For beginning FLR, the first confrontation with reading involves the challenge of connecting the sounds of the language to a system of graphemic symbols. The understanding that such a relationship exists and the ability to isolate discrete sounds and to attach them to the appropriate symbols is, indeed, an enormous cognitive accomplishment for a young child. In the situation of SLR, however, the individual already understands this relationship and has learned to apply it to a specific language with a specific graphemic system. The objective for SLR is to transfer the knowledge of this relationship to another language and another (sometimes similar, sometimes quite different) graphemic system.

Because a SLRer already understands how to apply linguistic sounds to graphemic symbols, the first formidable challenge for beginning FLRers is not a necessary task for beginning SLRers. However, in spite of this very important difference, there is a striking degree of similarity between beginning FLRers and beginning SLRers. Both are low proficiency readers, tend to be slow and inefficient, have relatively small reading vocabularies, and generally have difficulty in comprehending complex textual materials. An important question for this study is whether these surface similarities are reflective of similar sub-skill process. By developing a model of SLR and comparing it to models of FLR, it will be possible to provide an answer to this question.

6. Population

This study was designed to address questions suggested by the above mentioned gaps in the literature. It was also motivated by the needs of a very specific group of English Language Learners. The subject group for this study consists of fifty-five Spanish-speaking adults with varying levels of L1 literacy who are studying in a community college. These individuals are learning English and, at the same time, are striving to develop sufficient reading competency to pursue academic and career goals. The considerable gaps in theory and pedagogical information concerning adult SLR comprehension make it difficult to design purposeful and effective curricula to facilitate the attainment of the educational objectives of this population.

7. Pedagogical Implications

Although this study is not about teaching techniques, a clearer model of SLR, and more complete knowledge about the relationship of various component skills to SLR comprehension, could make an important contribution to the development of a more effective curriculum for the population in this study.

The crucial issue in The Reading Wars is the relevance of lower level skill proficiency to the performance of more complex level skills. This debate motivates a fundamental pedagogical question: Are complex reading skills such as reading comprehension best achieved indirectly, by instruction which emphasizes lower level skills, or directly, by activities which specifically target these complex processes?

Although the issues which motivate The Reading Wars motivate discussion, research, and curriculum for FLR children, these questions are rarely applied to the population of this study, adults who read in L1 and are learning to read in L2. For adult students, it is assumed that the basic decoding skills are already in place, and consequently, the bottom-up skills which drive the language processing models are not relevant. Most of the emphasis for the teaching of SLR comprehension appears, instead, to reflect the assumption that this process is best characterized by a top-down model. Because of this, SLR pedagogical literature has generally neglected the possible influence of bottom-up skills and has concentrated on teaching techniques suggested by top-down models (Eskey, 1988; Koda, 1994).

The data from this study, and the model of SLR comprehension which emerges from this data, can provide evidence for the relative appropriateness of bottom-up or top-down skills, and, so, can influence the development of a more effective curriculum for adult SLR comprehension.

The crucial issue in The Language Wars is the contribution of L1 proficiency to L2 proficiency. This basic pedagogical question engendered by these controversies parallels the question suggested by The Reading Wars: Can SLR proficiency be best achieved directly, by exclusive L2 instruction, or indirectly, with supporting instruction in the L1

For children, there is a great deal of discussion concerning the relative merits of promoting and bolstering the L1 knowledge in order to achieve a solid level of L2 proficiency. With adults, this discussion has taken a different flavor. Most studies

recognize that adults who already have good L1 skills will find it easier to achieve a high level of L2 proficiency than those with poor L1 skills. However, for those adults with low L1 skills, it is necessary to again confront the same kind of question that is presented for bilingual children. Should teaching strategies follow the indirect route, giving additional support to the L1 skills, or is it more advantageous to teach directly to the academic objective, focusing exclusively on L2 educational goals?

8. This Study

This study was designed to answer questions suggested by the controversial discussions termed The Reading Wars and The Language Wars, and to address gaps in the literature as these questions apply to adult SLR comprehension. To accomplish this objective, the study will present hypotheses, assessments, and statistical analyses directed to the following objectives: 1) The relationship of L2 micro-skills to global reading comprehension; 2) The relationship of L2 micro-skills to adult readers; 3) The relationship of L2 word knowledge to global reading comprehension; 4) The relationship to L2 grammatical knowledge to global reading comprehension; 5) The relationship of L1 proficiency to adult SLR comprehension.

Chapter 2

Review of Literature

1. Background from First Language Reading

1.1 General Model: Reading Consists of Decoding and Comprehension

Gough & Tunmer, 1986, developed the "Simple Model" of reading, which emphasizes the two major components of reading: (1) Word recognition, or decoding, determining which words are represented in print, and (2) Reading comprehension, the capacity to derive meaning from this print. Each of these components involves several kinds of skills (Gouge & Tunmer, 1986; Hoover & Tunmer 1992).

1.2 General Definition of Decoding

Decoding, or word recognition, is the process of obtaining phonological codes (pronunciation) and context-appropriate lexical meanings from a visual display of words. Decoding consists of the identification of words in a rapid, efficient, automatic manner, and involves seeing and identifying letters, spaces, grapheme/phoneme correspondences, and knowledge of word regularities and irregularities as well as word-specific knowledge (Ehri, 1991; 1994). Decoding can be defined as the process which enables a reader to pronounce a word and/or identify the word from its printed representation (Adams, 1990) The term decoding can actually refer to many different ways of reading words: (1) the process of transferring print to speech (Adams, 1990) ; (2) sight reading, the process of accessing the lexical representation of words from

memory (Adams, 1990; Ehri 1991); 3) identifying words by analogy (Glusko, 1979) ; 4) identifying words by familiarity of orthographic patterns (Ehri,1991). Decoding can be accomplished by either of these two processes; depending on the skill of the reader and the familiarity of the targeted word. (Adams, 1990; Ehri. 1991; Foorman & Liberman, 1989; Glusko, 1979).

Learning to recognize words is a small, but absolutely essential component of reading. For new readers, it is necessary for sounding out and acquiring new words. For proficient readers, it is a back-up system, particularly useful with unfamiliar words. Relative to the overall demands of literacy, it is only one of many necessary components. However, it is crucial; without good decoding skills, the complex cognitive demands of reading comprehension are impaired (Adams. 1990; Perfetti, 1988; Rayner & Pollatsek, 1994).

1.3 General Description of Reading Comprehension

Reading comprehension is a complex activity, requiring all of the skills necessary for decoding, but also demanding knowledge of vocabulary, syntax, semantics, as well as cognitive skills and general background information (Fowler & Scarborough, 1993).

Reading comprehension has been described as an inter-active process between the text and the reader. From the text comes letters, words, sentences, and paragraphs. To this, the reader must bring a variety of personal and literary experiences as well as

many kinds of cognitive skills. These cognitive skills which reading comprehension may require include recalling information, identifying main ideas and supporting details, comparing , classifying, evaluating, sequencing, predicting, determining cause and effect, making inferences, understanding the author's purpose, and sensitivity to the implications of writing style, vocabulary, and tone (Harris & Sipay, 1990; Celce-Murcia, McIntosh, 1979).

Good reading is frequently defined as good reading comprehension. The research community generally agrees that the ultimate goal of reading is comprehension, to understand written material in order to achieve some purpose. "Reading comprehension has emerged as a remarkable consistent measure to compare differences between good and poor readers." (Braddeley, Logie, & Nimmo-Smith, 1985).

2. Development of Reading in Children

Chall (1983) presents a theory of reading acquisition which is based on Piagetian theory, and which can provide a framework for child FLR development. She conceptualizes six levels (referred to as levels 0-5) of reading skills. Each stage is qualitatively different from the previous stage, and progress occurs sequentially from stage to stage.

Since the earliest stage and the most advanced stages are not relevant to the subjects in this study they will not be discussed in depth. The earliest stage , level 0, which is from birth to age six, is the period in which rudimentary phonological and

orthographic awareness develops. The two most advanced stages, levels 4 and 5. involve reading skills which are 9th grade and above.

Stage 1, which occurs in grades 1-2, ages 6-7, is the initial reading or decoding stage. In this stage children master letter-sound correspondences, acquire a small reading vocabulary which consists of simple sight words, and learn to read simple texts which contain high frequency and phonetically regular words. Many research studies have linked success in mastering the skills of this stage, specifically the early phonological awareness skills, with later success in reading (Wimmer, Landerl, Linortner& Hummer, 1991; Juel 1988; Pratt & Brady, 1988; Calfee, Lindamood, & Lindamood, 1973).

Stage 2, which occurs in grades 2-3, ages 7-8, is the confirmation, fluency, and "ungluing from print" stage. Children integrate previous skills, move from oral to silent reading, and become faster and more efficient at decoding. At this stage, children need a broad exposure to print, which, in turn, increases reading fluency, automaticity in decoding, and lexical knowledge. The micro-skills develop, become more complex, phonological and orthographic knowledge becomes more integrated (amalgamated), and children become "morphemic spellers," which involves the shift from using letters to represent every sound to the use of familiar patterns in spelling words. The development of lexical skills is very important at this stage. However, the most important characteristic of this stage is that the consolidation of the micro-skills and word knowledge skills prepares readers to focus on a new skill: reading comprehension.

Stage 3, grades 4-5, in which children have mastered the fundamental reading processes, is the period when reading comprehension becomes the most important skill (Rayner & Pollatsek 1989; Backman, Bruck, Herbert & Seidenberg, 1984).

2.2 The Development of Reading in Adults

Chall (1990) has also applied her stages to adults who are achieving literacy in their L1, adult literacy (AL) students. In this scheme, she collapses the six children's stages into three. The first AL stage, which corresponds to child stages 0-2, describes individuals who have achieved a 1st to 4th grade level equivalent score on a standardized test, and is characterized by the attainment of pre-reading skills, decoding skills, and the acquisition of fluency. The second AL stage, which corresponds to child stage 3, is the stage for reading comprehension. The final AL stage , which is not applicable to this study, corresponds to grades nine to twelve, and is characterized by the reading of complex materials with multiple viewpoints.

2.3 General First Language Reading Model

It is possible to describe a model of FLR by elaborating on the concepts of Gough's "simple model of reading," which consists of word recognition and reading comprehension (Gouge & Tunmer, 1986; Hoover & Tunmer 1992).

Decoding is the most fundamental and essential process of FLR. It develops from basic phonological, orthographic, and decoding skills (Adams, 1990). As decoding becomes efficient, word recognition moves from the slower phonologically

based process to the more rapid process of sight word reading (Ehril, 1991). The basic micro-skills develop with practice, become more complex, and begin to support each other and become integrated (sometimes called amalgamation). As this occurs, the reader begins accruing lexical knowledge and word recognition becomes more automatic and rapid (Ehri, 1991).

The second major component of the FLR model, reading comprehension, depends upon the establishment of a strong foundation of the basic skills. These skills, which consist of micro-skills, word knowledge skills, and grammatical skill, are often called bottom-up skills The bottom-up skills continue to develop with increased maturity and print exposure. Reading comprehension, which is a complex skill which integrates the bottom-up and top-down skills, is continually enhanced as the reader accrues world knowledge, life experience, and develops skills and strategies to respond to texts of various styles and complexities (Harris & Sipay, 1990; Celce-Murcia, McIntosh, 1979).

It is possible to superimpose Chall's stages of reading upon Gouge's "simple model." Word recognition, the first component of Gouge's "simple model," corresponds to Chall's child stages 1 and 2 (or AL stage 1). Reading comprehension, the second component of Gouge's "simple model," corresponds to Chall's child stage 3 (or AL stage 2) (Chall, 1983; Gough & Tunmer, 1986).

3. Models of Reading

3.1 The Reading Wars

The Reading Wars result from debates about which of the competing models best describe the reading process: bottom-up models, top-down models, or interactionist models (Rayner & Pollatsek, 1989; Stanovich, 1980).

3.2 Bottom-Up, Top-Down, and Interactionist Models of Reading

There are three general models developed to describe the reading process: top-down models, bottom-up models, and interactionist models (Rayner & Pollatsek, 1989; Stanovich, 1980).

. Top-down models derive from Goodman's (1967) and Smith's (1971) psycholinguistic model of reading, which claims that reading is hypothesis driven, and considers decoding to be highly influenced by contextual factors. In these models, reading behavior is not primarily a process of picking up information from the page in a letter-by-letter word-by-word manner. It is rather a selective, imprecise, hypothesis driven process. Good readers read by predicting information, sampling the text, and confirming their predictions. (Because top-down models are not relevant to the design or conclusions of this study, they will not be discussed in detail in this review of the literature.)

For bottom-up models, which claim that reading is text driven, the main focus is on the process of mapping printed text onto an existing oral language system (Fowler & Scarborough, 1993). Bottom-up models are motivated by language processing theories, which claim that reading is text driven. Bottom-up models are

motivated by the work of LaBerge and Samuels (1974), and describe reading as a serial-stage process in which the output of one level of processing produces input for the next level (Gouge, 1976; LaBerge & Samuels, 1974). They use the formalism of information processing to account for how information is encoded, transformed, elaborated, stored, retrieved, and how it ultimately influences the psychological processes that underlie cognitive performance (Daneman, Carpenter, & Just, 1982). In these models, micro-skills are emphasized as the most important contributing skills in reading proficiency because, without these skills, other necessary processes are not possible (Daneman, Carpenter, & Just, 1982; LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979; Rumelhart & McClelland 1981; Stanovich, 1980).

Interactionist models describe reading as a combination of both top-down and bottom-up processes.

3.3 Information Processing and Limited Capacity Models

Both bottom-up and interactionist models of reading are motivated by information processing models. Information processing models apply the formalism of information processing to human performance, explaining cognitive activities with the analogy of a symbol manipulation device (Daneman, Carpenter, & Just, 1982). Information processing theories have been applied to reading, using limited capacity models and the concept of automaticity to show the relationship of decoding to reading comprehension skill. The goal of skilled decoding, or automaticity, is

achieved when words are decoded without attention (or with minimal attention) being directed to them. According to these models, automatic processing frees cognitive resources for the complex cognitive demands of reading comprehension (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979). The concept of automaticity and limited capacity motivates bottom-up models, attributing the success of complex cognitive processes to the efficiency of basic decoding processes. Interactive models, in which the interaction of many components may operate simultaneously, also use a limited capacity framework, and emphasize the importance of rapid decoding to skilled reading (Rumelhart & McClelland 1981; Stanovich, 1980).

Generally, limited capacity, or automaticity models make distinctions between control and automatic processes. Control processes demand cognitive resources, are vulnerable to interference, and may themselves interfere with other concurrent operations which demand the same capacity. Automatic processes, in comparison, demand fewer cognitive resources and are less vulnerable to interference. Control processes operate serially, whereas automatic processes operate in parallel. Control processes are intentional and are not obligatory, whereas automatic processes do not require intention and may be obligatory. Control processes are applied to new situations and are flexible, whereas automatic processes develop as a consequence of extensive practice, and, once learned, are difficult to suppress. With sufficient practice, some control processes will change into automatic processes. To state that a processes is automatic means that it has been extensively practiced, that it does not demand resource capacity, that it can operate in parallel with other concurrent

processes, and that its operation cannot easily be intentionally altered (Humphreys, 1985).

3.4 Laberge and Samuels

LaBerge & Samuels (1974) present a study, in which college students were required to match pairs of unfamiliar and familiar letters. The matching time for unfamiliar letter pairs was slower, but improved more with practice than the matching time for the familiar letter pairs. However, even after twenty days of practice, recognition speed remained slower for the unfamiliar pairs than for the familiar pairs. Because the time improved with unfamiliar pairs, the study was able to show that subjects were learning to recognize the new stimuli more quickly. However, the persisting difference in reaction time between the familiar and unfamiliar letter pairs gave evidence for the importance of the effects of overlearning. Improvement with the new items was possible after a short duration (i.e. twenty days), but a much longer amount of time would obviously be required for overlearning. This study demonstrated that processes, like the recognition of familiar letters, become overlearned as a result of long periods of practice. The process of overlearning is considered a first step, and a prerequisite, for automaticity.

3.5 What Language Processing Models Explain About Reading

Language processing models, which are also limited capacity models, explain

the importance of automaticity and practice in the process of reading. When reading is described in this framework, good readers are defined as those individuals whose decoding skills have become automatic as a result of practice (or overlearning). Automatic decoding processes permit readers to decode words without awareness of the process, without conscious control, and with minimal processing capacity demands (Adams, 1990; Just & Carpenter, 1987; Stanovich, 1990; LaBerge & Samuels, 1974). The goal of skilled decoding, or automaticity, is achieved when words are decoded without attention (or with minimal attention) being directed to them (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979).

Although many readers experience reading as a holistic process, LaBerge and Samuels (1974) argue that reading is actually a complex skill, a cluster of sub-skills.These models account for the effect of practice, which is explained as the reorganization of sub-skills into higher-order units, or chunks, which are eventually processed automatically. When readers become proficient, they no longer experience the separateness of these skills, and thus perceive the reading process as holistic.

Language processing models also provide a useful framework for understanding of how micro-skill proficiencies may affect complex processes like reading comprehension. Many different kinds of sub-skills have been shown to correlate with reading success; discrimination of letter location and letter order, use of orthographic regularity, use of spelling-to-sound regularity, memory for word order, identification of syntactic relations, flexibility in prediction from syntactic and semantic context, and context-specificity in semantic encoding. (Carr, 1981). Other

processing components, such as listening comprehension and efficiency of verbal coding skill have also been found to correlate with higher level reading skills (DeSoto & DeSoto, 1983; Hood & Dubert, 1983). The correlation of these micro-skills with reading comprehension can be explained by the limited capacity models, as the availability of sufficient processing resources to accomplish complex cognitive activities depends upon the automatization of lower level processes.

Language processing models also suggest an explanation for the relationship of memory to reading ability. There is some evidence that skilled readers can hold more in memory while reading. In an experiment in semantic access, poor adult readers showed slow semantic memory access speeds, or lack of organization in semantic memory, for both words and phrases (Chabot, Zehr, Prinzo, & Petros, 1984). In a Reading Span Test (where subjects were required to recall the final word of each sentence), those with large memory spans were better at retrieving facts, computing pronominal reference, integrating information, and detecting semantic or syntactic inconsistency (Daneman, 1988; Daneman, Carpenter, & Just, 1982).

However, the relationship of memory to reading ability is complex. Most research implies that poor readers do not have a deficiency in working memory capacity, but instead differ in the processes or procedures they have for utilizing their processing capacities. Limited capacity models can suggest reasons why good memory ability may be related to efficient lower level processing skills (Daneman, 1988; Daneman, Carpenter, & Just, 1982). Phonological coding, for example, is considered an excellent hedge against loss of information in working memory. The

rules determining English grapheme-sound correspondences are intricate. They are frequently conditional, depending on letter position, surrounding letters, the presence or absence of a silent signal letter, derivational history, syntactic function, and word specific knowledge. Only when this information is processed efficiently and automatically, can it be stored in working memory without overtaxing memory and processing capacity (Carr, 1981). Inefficient or inaccurate phonological coding skill will compete with other cognitive processes, imposing heavy demands upon memory. Under such conditions, working memory can actually be seen as a capacity tradeoff between decoding and storage processes.

3.6 Perfetti's Verbal Efficiency Theory

Several models use a limited capacity framework to relate the efficiency of micro-skills to reading comprehension. In Perfetti's Verbal Efficiency Theory (VET) (1986; 1988), verbal efficiency is the quality of a verbal processing output relative to its cost in processing resources. Certain processes are intrinsically more attention demanding than others; over-learning leads to reduced attention requirements for some activities, thus circumventing the constraints of working memory. The VET is a general theoretical framework for explaining individual differences in comprehension and the relationship of component processes to reading skill. It also explains the bottleneck hypothesis. The bottleneck metaphor views reading as an activity composed of interrelated component processes which are not necessarily functionally

independent: a gain in one sub-skill permits gains in others, and insufficient development in one sub-skill may inhibit the efficient performance of other sub-skills. A bottleneck occurs when deficiencies in lower level skills, namely those required for decoding, impair processing of the complex cognitive processes required for comprehension (Perfetti, 1988; Sinatra & Royer 1993; Stanovich, 1990; Just & Carpenter, 1987; Perfetti & Lesgold, 1977; Perfetti & Lesgold, 1979; Perfetti, 1986).

3.7 Interactive Models

Rumelhart (1994) found empirical problems with strict bottom-up models, which claim that processing at any level can only directly affect the immediately higher level. To more accurately account for the reading data, he developed an interactive model, in which all knowledge sources apply simultaneously, and in which our perceptions are the product of the simultaneous interactions among all of them (Rumelhart & McClelland ,1981).(These models should be distinguished from the top-down, interactive model of reading, in which the interaction takes place between the reader and the text, as the reader (re)constructs the information based on knowledge drawn from the text and on prior knowledge.) Stanovich (1980;1986) used an interactive model to develop his Interactive-Compensatory Theory of reading. This theory is interactive in that information is seen to be processed simultaneously from all knowledge sources; it is compensatory because a process at any level can compensate for deficit at any other level (Stanovich, 1981; Stanovich, 1980;

Stanovich, 1986; Samuels & Kamil, 1984).

4. Component Processes of Reading: Micro-Skills

The crucial issue of the Reading Wars is ultimately the relevance of lower level skill proficiency to the performance of higher level skills, or, in other words, the relevance of micro-skills to reading comprehension. In many discussions of FLR, the central reading sub-skill is word recognition, or decoding. (Fowler & Scarborough, 1993; Chall, 1983; Perfetti & Lesgold 1977; 1979; Stanovich, 1980; Stanovich, Cunningham, & Freeman, 1984).

4.1 Decoding

Decoding, or word recognition, is the central focus of the language processing model of reading, as skilled and efficient word recognition is assumed to be an essential prerequisite for reading proficiency (Fowler & Scarborough, 1993). Decoding is a complex micro-skill and it requires the knowledge of and coordination of various other micro-skills such as phonological and orthographic skill (Adams, 1990). Decoding can be defined as the process which enables a reader to pronounce a word and/or identify the word from its printed representation (Greenberg, Ehri, & Perin, 1997; Adams, 1990).

The term decoding can actually refer to several different ways of reading words: phonological decoding, sight word reading, decoding by analogy, and decoding by the recognition of familiar orthographic patterns.

Phonological decoding requires the application of grapheme-phoneme (spelling-sound) correspondence rules to translate a written word into a pronounced word (Ehri, 1991). This process is sometimes called "sounding out" a word (Celce-Murcia, McIntosh, 1979). When beginning FLRers do not have a particular word in their mental lexicon, they must rely on phonological decoding to identify words (Jorm & Share, 1983). This first method of decoding is a rather slow process. However, it is essential. For new readers, it is necessary for sounding out and acquiring new words. For skilled readers, it is a back-up system, and is particularly useful when confronting unfamiliar words (Adams, 1990).

Sight word reading is a more rapid method of decoding. In sight word reading. it is assumed that a dictionary of previously encountered words is stored in a mental "lexicon." Sight word reading is a very rapid retrieval process in which readers are able to recognize and identify words which have a representation in their mental lexicon. The fact that sight word reading is extremely fast is corroborated by empirical studies which show that these words can be read more quickly than nonsense words with analogous spelling patterns (Ehri 1991; Foorman & Liberman, 1989).

Individual words can also be decoded by the strategy of analogy, using a word one already knows, like *boy,* to decode a similar word, like *toy* (Glushko, 1979). Readers can also use knowledge of orthographic patterns to identify words (Ehri, 1991).

Decoding can be accomplished by any of these processes. It depends upon the skill of the reader and the familiarity of the targeted word. Beginning readers must use the slow processes of phonological decoding or analogy when they first confront a word. However, when they gain experience with a particular word, it is added to the lexicon, and can then be retrieved by the more rapid process of sight word reading. In this way, the slower and more elementary decoding processes facilitate the faster and more advanced processes. As readers gain skill and print experience, the mental lexical increases and readers are able to use sight word reading to access a larger number of words (Adams, 1990).

4.2 Phonological Knowledge

Phonological knowledge refers to the knowledge of the sound system of a language Stahl & Murray, 1994; Adams, 1990). Phonological processing is the ability to use the sounds in a language to help process oral language and print (Wagner, Torgesen, & Rashotte, 1994). It is a broad term which includes many kinds of processes such as phonological decoding and phonological awareness (Wagner & Torgesen, 1987).

Phonological decoding, which was discussed in the previous section on decoding, is defined as the process of transforming a written word into a sound-based representation (Wagner & Torgesen, 1987;Wagner, Torgesen, & Rashotte, 1994). It is one of the processes of decoding, which It is used by beginning FLRers as an early

method to decode words. This process is one of the very early reading skills and dontinues to develop as the FLR child's reading becomes more proficient (Wagner & Torgesen, 1987). Phonological decoding can be tested by asking subjects to distinguish real words from nonsense words, or by asking subjects to read pseudo-words (Adams, 1990).

Phonological awareness, awareness of the sound system of a language (Stahl & Murray, 1994), is another kind of phonological processing skill. For normally developing children, basic phonological awareness develops during the preschool years. It can be tested by asking children to tap out the syllables or sounds of a word. to reverse sounds in a word, or to repeat an item while omitting a specific sound or word part (Tunmer, Herriman, & Nesdale, 1988).

4.3 Orthographic Processes

Orthographic processes involve the memory for particular visual and spelling patterns of words or parts of words (Barker, Torgesen & Wagner, 1992; Stage & Wagner, 1992). Research has shown that orthographic knowledge is related to print exposure (Stanovich & West, 1989) and also to decoding ability (Cunninham & Stanovich, 1990; Stanovich & West, 1989). For beginning English language FLRers, the learning of the orthographic patterns formed by vowels and consonants is a formidable task. As FLRers gain reading experience and sufficient print exposure, they begin to move from the elementary orthographic process of decoding individual letters and begin to develop decoding strategies which allow them to recognize

familiar orthographic clusters of letters such as "ed", "ing", and "ment" (Adams, 1990). As FLR children gain understanding of the orthographic pattern of the language, they also develop spelling skill—a kind of reverse orthographic activity in which an individual translates the sounds of a word into its individual orthographic components. Since spellings are presumed to provide a concrete orthographic image which allows words to be conceptualized in smaller and more efficient units, FLR orthographic knowledge can be tested by spelling ability (Ehri, 1989).

4.4 Amalgamation Theory

Sight word reading, the rapid method of decoding described in section 4.1, occurs after individuals have seen a word several times. After a certain number of exposures to a word, readers are able to form an amalgamation of phonological and orthographic images in memory, thus facilitating rapid retrieval of words from the lexicon (Stanovich & West, 1989.) Ehri (1992) has developed a theory of amalgamation which stresses a visual-phonological pathway for word recognition (1992). Ehri (1989) suggests that it is easier to acquire lexical knowledge when the various contributing micro-skills work together, enabling awareness of spelling-sound correspondences to be linked to the knowledge of how orthography corresponds to phonology. In a study using kindergarten students, a group of children who knew letter-sound relationships were taught to use these relationships in decoding nonsense words. This group of children was better able to decode new nonsense words than a matched group who only knew the letter-sound relationships (Ehri & Wilce, 1987).

These results give evidence that, for FLR, in addition to phonemic knowledge, orthographic knowledge is also necessary to consolidate conceptual information about the phonemic structure of words (Ehri, 1989).

5. The Role of Decoding in Reading

Decoding, which incorporates phonological and orthographic skill, is the cornerstone of language processing models of reading. There is a large quantity of literature which seeks to distinguish decoding from other cognitive processes and to clarify its role in reading.

5.1 Decoding Skills Change as Reading Skill Develops

Decoding skill consists of many component sub-skills which develop and change as the reader gains proficiency. In a study with students in grades 2-5, younger proficient students showed advantages in letter processing, and word and pseudoword naming. Older students also showed advantages in these areas, but in addition, were also superior on tests of concept activation, and syntactic and semantic processing. In a one year follow-up, the younger students had caught up with some of the skills of the older children (Sinatra & Royer, 1993). To explain these changes, Sinatra and Royer (1993) suggest a three stage sequence to describe this developmental process. The first level is 'pre-encapsulation', in which decoding skill plays only a small role. This is followed by a second level, where decoding is essential, and is, in fact, the determining component of reading competence. In the third stage, decoding skill appears to equalize for readers of varying abilities, and competence is influenced by other, more

complex processes which are required to access the meaning of the text. They conclude that decoding processes make different contributions to reading competence at different stages of development. For beginning readers, such as students in the second grade, it does not appear to be the crucial component affecting individual differences in reading ability. However, later on, by grades three and four it becomes very significant. This developmental change is interpreted to imply that basic skills, such as decoding, must reach a threshold of performance before they can affect more advanced reading processes.

5.2 Good Decoding is Good Reading and Poor Readers are Poor Decoders

Decoding is an essential component of reading; without good decoding skills, the complex cognitive demands of reading comprehension are impaired (Adams, 1994; Perfetti, 1988; Rayner & Pollatsek, 1994). There is extensive literature in FLA which demonstrates the importance of good decoding skill to reading ability (Chall, 1983; Perfetti & Lesgold, 1977; 1979; Stanovich, 1980; Adams, 1990 (Dorgunoglu, Nagy, & Hancin-Bhatt, 1993, Greenberg, Ehri, & Perin, 1997; Shankweiler, Crain, Brady, & Macaruso, 1992). Decoding skill has even been shown to account for a good share of the variance in reading ability with college students.(Cunningham, Stanovich, & Wilson, 1990).

When analyzing reading process component variables, FLR research frequently concludes that all poor readers tend to look very similar. They have weaker

phonological and orthographic skills than good readers, and their decoding processes are slower and less efficient (Seidenberg, Bruck, Fornarolo, & Backman, 1985). Some researchers have developed theories which claim that the less proficient micro-skills of poor readers are manifestations of specific reading deficits (Stanovich, 1986; Bruck, 1990).

Research studies show that all varieties of poor readers are slow decoders. Groups of good, poor, and clinically diagnosed dyslexic 3rd and 4th grade readers were compared in a latency experiment, using words and non-words with regular or homographic (multiple possible pronunciations) spelling patterns. Differences between the poor and dyslexic readers were minor, giving evidence for the claim that all kinds of poor readers have similar deficiencies, whereas differences between the good readers and both groups of poor readers were substantial. This results suggest that there are no recognizable differences in decoding speed that distinguish poor from disabled readers. Basically, poor reading implies slow and, consequently, inefficient decoding (Seidenberg, Bruck, Fornarolo, & Backman, 1985).

Decoding speed has been shown to correlate with reading ability. Jackson and McClelland (1979) measured reaction-time tasks for university undergraduates of differing reading ability, finding a correlation between the speed of letter access and reading ability. They conclude that access speed is both a product of practice in reading and a cause of individual differences in reading ability. It affects mature readers as well as beginners. These results are interpreted to support the importance of

decoding skills, and to refute the top-down "psychoanalytic" view of reading, which claims that beyond the grade school level, individual differences in reading ability are only differences in comprehension ability.

5.3 Decoding Skills are Different from Other Cognitive Processes

Research has also shown that decoding is a skill which is distinct from other cognitive or semantic skills. In studies comparing good and poor readers, Perfetti, Finger, and Hogaboam (1978) found that differences in decoding skills are distinct from other cognitive skills such as recognition of nonverbal items, semantic access, and even the accuracy of reading. In these studies, decoding differences were confined to verbal material. There were no differences between good and poor readers in tasks which required naming colors, digits, or pictures. However, significant differences were found for words, and these differences were even larger as the numbers of syllables and letters increased. They conclude that reading ability differences are the result of verbal coding rather than general processing or word retrieval skills. Stanovich (1981b) also found decoding skills to be distinctive from general processing or word retrieval skills. In an experiment, good and poor first grade readers were able to name letters with equal speed. Only word naming speed differentiated the good from the poor readers. Other studies have also come to the same conclusion. Poor readers have poor decoding skills, and reading problems are the consequence of poor decoding (Golinkoff & Rosinski, 1976; Pace & Golinkoff, 1976).

Decoding skills are found to be different from semantic access. Golinkoff and Rosinski (1976) conclude that problems in reading comprehension should be attributed to poor decoding and cannot be attributed to a failure to obtain single word meanings. In tests of decoding and picture word interference, good and poor readers did not differ in semantic processing, which was defined as the ability to extract meaning from single words. However, significant differences occurred in word decoding, indicating that decoding and semantic processing are separate processes

In a study, with a picture naming task with easy and difficult words superimposed, decoding differences were found to be distinctive from access of meaning or knowledge of words, and also found to be different from general processing. Third and fifth grade subjects showed no difference in semantic interference with the easy words. However, with more difficult words, poorer and younger readers showed less semantic interference than the good readers. These differences are a consequence of differences in decoding speed (Pace & Golinkoff, 1976).

Decoding differences are also shown to be different from strategies for reading accuracy. In another experiment, groups of good and poor 4th grade readers, as well as groups of college students and 4th grade readers, were compared for speed and reading strategies. For all groups, fluent readers were better on speed of recognition and awareness of making a false word identification. However, these differences were confined to decoding skill and decoding speed. and skill of decoding. The

experimental groups showed no differences in strategies which produce reading accuracy (Samuels, Begy, & Chen, 1975).

5.4 Stroop-Type Interference Experiments

Evidence for automaticity comes from interference effects in Stroop-type tasks and priming studies. In these tasks, printed words are superimposed on pictures, colors, or other symbols. For example, in the Stroop color naming task, the subject is presented with a letter string or word printed on a colored background, and is required to name the color of the background. When the words do not correspond with the superimposed stimuli, response time is affected. The magnitude of these effects vary as a function of reading skill. Subjects who decode automatically will process the word and its meaning more quickly than they can name the color of the background, and so will experience interference when word and stimuli are not compatible. Poorer readers, with slower decoding speed show smaller interference effects than skilled readers (Rosinski, Golinkoff, & Kurkish, 1975; Golinkoff & Rosinski, 1976).

5.4.1 Developmental Changes with Stroop Effects

Developmental studies using Stroop techniques show that word decoding becomes automatized very quickly. It occurs after only a few exposures, and, at least for familiar words, is found in very young readers (Ehri, 1976).

Developmental studies using Stroop techniques show that familiar words are

read automatically by the end of the first grade. These experimental results are consistent with previous research that shows that word decoding may become automatized after only a few exposures. During the semester, first graders were tested with three kinds of stimuli: letters, high frequency words, and low frequency words. Between September and February, there was an increase in interference, showing evidence of achieved decoding automaticity. Moreover, the effects were related to reading skill, as better readers showed more interference and showed it earlier in the year. However, later in the semester there was little change in interference effects, implying that, for these items, decoding automaticity had already been achieved (Stanovich, Cunningham, & West, 1981). Many studies show these effects. In an experiment with children, correct or incorrect labels were superimposed on pictures. For all subjects, except poor second grade readers, there were interference effects with the discrepant words, and enhanced speed with congruent labels (Ehri, 1976).

Readers at different stages of development, and with different word recognition skills, show gradations of Stroop effects. (Schadler & Thissen, 1981; West & Stanovich, 1982; West & Stanovich, 1979; Guttentag & Haith, 1978). These developmental changes suggest that decoding consists of a number of component processes which improve as readers develop skill. In a Stroop task using readers and non-readers from first to sixth grade, results show that interference begins as children learn to read. Effects occur first with letters and later with words (Schadler & Thissen, 1981). When comparing children from kindergarten to third grade, there was evidence

of developmental changes as children attained more skills. In a task where young children (K-3) named colors of stimuli that either matched or did not match items concurrently held in memory, kindergartners only showed Stroop automaticity effects for letters and a few high frequency words. However, the older children showed these effects for all of the items (West & Stanovich, 1982). In another task, kindergartners showed evidence of automaticity for only letters and some high frequency words. Third graders showed these effects for letters, as well as for high and low frequency words. (West & Stanovich, 1979).

In a picture naming study, comparing groups of early and late first grade readers, groups of good and poor third grade readers, and adults, interference results showed a clear developmental pattern. Letters produced interference for all but a few poor first graders, word category for all but the first graders, and pronounceability for only the third graders and adults. The results of Stroop interference studies showed that all readers, even poor readers and normal children with only nine months of reading instruction, have acquired some automatic decoding ability, and that this skill increases with practice and experience (Guttentag & Haith, 1978).

5.5 Speed

Speed of decoding is important, as all varieties of poor readers are slow decoders. (Seidenberg, Bruck, Fornarolo, & Backman, 1985). Decoding speed is shown to correlate with reading ability (Jackson & McClelland,1979; McCormick &

Samuels, 1979; Lesgold & Resnick, 1982). Several studies show that there are effects occurring after decoding automaticity which distinguish good from poor readers. This evidence implies that speed, rather than automaticity, may also be a major factor in higher level skill development (Segalowitz & Segalowitz, 1993). With practice and overlearning, students attain more skill and evidence of interference will continue to develop. However, these later changes are generally attributed to speed rather than automaticity (Horn & Manis, 1987; Perfetti & Lesgold, 1977).

In many of the previously discussed Stroop-type interference experiments (Sections 5.4 and 5.4.1), ceiling effects occurred fairly early, with older children and adults showing effects for all of the items. Because decoding automaticity develops so early, and after only a few exposures, individual differences in automaticity may be difficult to observe except in situations with unfamiliar words or with poor readers. However, after automaticity is achieved, decoding ability still develops, and these changes, which are attributed to speed rather than decoding automaticity, distinguish skilled from unskilled readers (Carver, 1990; Horn & Manis, 1987).

In a dual task procedure, matching a word to semantic category while monitoring a tone, a distinction between decoding automaticity and speed is demonstrated. The most rapid changes in response rate occurred prior to grade two; these results are considered evidence of automaticity. However, changes continued to occur throughout the age range, with a large increase between the 5th grade and college. These later changes are evidence of increased decoding speed, distinct from

the early development of decoding automaticity (Horn & Manis, 1987). In a study of 4th graders, good and poor readers were similar on automatic word processing, but good readers were better on nine other measures of verbal processing abilities (DeSoto & DeSoto, 1983).

Ehri and Wilce (1983), suggesting that there is a level of reading proficiency beyond decoding automaticity, describe three phases in the development of word reading skill: accuracy, automaticity, and speed. First the reader must develop accuracy, the application of careful attention to the correct processing of letters and letter-sound relationships. In the second stage. automaticity develops, evidenced by rapid word recognition without attention to component letters. With further practice, the reader reaches a third stage, speed, exhibiting rapid rates of processing. Each of these stages can be affected by external factors such as stimulus clarity, rate of presentation, word frequency, familiarity level, and the age of the subject.

There appears to be differences between good and poor readers in the ability to advance beyond the level of automaticity to the third level of proficiency, the stage characterized as speed. In an experiment using the Stroop technique, unskilled readers were very slow to progress to higher levels of speed. Ehri and Wilce (1979; 1983) explain this problem as a consequence of difficulties in establishing complete representations of words in memory. Speed is achieved as a consequence of sufficient practice, but it cannot be attained unless the reader also has accurate graphic-phonological-semantic representations in memory. For poor readers, spellings

retained in memories are incomplete and it takes longer for a complete representation to be built up in memory. Without these complete representations, is not possible to develop and strengthen general knowledge of rule patterns, and hence it is difficult to achieve the level of competency characterized by speed.

6. Context

In discussing the effects of context, it is important to distinguish between levels in the processing system, as there are many types of context effects. It is possible to use context for the complex cognitive processes involved in comprehension, and it is also possible to use it for word decoding. In this discussion, we are concerned with theories and experimental evidence on the relationship of context to decoding.

Although top-down reading models consider context an essential strategy for identifying the meanings of words in a text, bottom-up models cite various kinds of empirical evidence to show that for skilled reading, context is rarely used in word decoding (Nicholson & Hill, 1985; Nicholson, 1992b; Nicholson, 1991; Nicholson, 1992a). Various proponents of bottom-up theories describe the contribution of context in different ways (Carr, 1981). Gough (1981;1983) considers it virtually irrelevant. Although context facilitation is possible, it rarely occurs. Context facilitation is feasible in highly predictive discourse, with frequent, easy-to-guess words. However, in these circumstances it is not necessary, because familiar words in customary environments are generally recognized without context. Where context

facilitation might be useful, in situations with words that are difficult to guess, textual cues are to ambiguous or insufficient to be helpful. According to Stanovich (1980), both good and poor readers use context, but they use it in different ways. Good readers use it strategically, to confirm word recognition or to disambiguate; poor readers use it for decoding. Skilled reading is text-driven. When context is used in decoding, it is a compensatory device for circumstances in which decoding fails. Poor readers use it when decoding skills are inadequate, and all readers use it with degraded stimuli.

6.1 Context: Empirical Studies

Goodman's (1965) study is customarily mentioned as evidence for a top-down, context-driven model of reading. According to Nicholson (1992a), this study, which has been cited at least 85 times, is methodologically flawed, and has never been replicated. In an analogous study designed by Nicholson, children were given a reading in which nonsense words were substituted throughout the passage. With the use of context, children were able to guess only 27% of the deleted words. Nicholson concludes that the strategic use of context is an ineffective method for decoding, and that there is no evidence to support the Goodman hypothesis. Moreover, the use of context as a pedagogical tool actually impedes the development of skilled reading. Context strategies divert processing attention from decoding and comprehension; guessing errors result in lost opportunities for decoding practice and vocabulary growth

(Nicholson & Hill, 1985; Nicholson, 1992b; Nicholson, 1991; Nicholson, 1992a).

In Stroop-type interference studies, context affects poor readers more than good readers. In a study where subjects identified words in a discourse context, context reduced latencies for both skilled and unskilled readers, but had a greater effect for low skilled readers. Only the less skilled subjects were affected by word length and word frequency (Perfetti, Goldman, & Hogaboam, 1979).

Poor readers experience larger contextual facilitation effects because their slow decoding processes allow the conscious-attention mechanisms sufficient time to operate, thus providing an opportunity for facilitation due to contextual information. Context effects are also stronger with degraded stimuli. Degraded stimuli take longer to process, slowing decoding sufficiently to allow contextual effects to be processed. (Stanovich, 1981; Stanovich, 1980; Stanovich, 1986; Samuels & Kamil, 1984).

Both poor readers and readers with degraded stimuli show latency affects with context. In a study, subjects named target words preceded by a congruous sentence context, an incongruous context, or no context. Stimulus conditions were normal or degraded. Under normal conditions there was contextual facilitation but no contextual inhibition. However, under degraded conditions, both facilitation and inhibition occurred. (Stanovich & West 1979; Stanovich, 1981a).

Context effects are developmental, as they are mediated by the increasing automaticity of word decoding processes as readers mature and become more proficient. Empirical data shows that increases in decoding speed correlate with

decreases in context effects. In an experiment, three groups (4th graders, 6th graders, and adults), read words preceded by a congruous, incongruous, or no-sentence context. The results reflected the age group of the subjects. Congruous contexts facilitated the reading times of all three groups. However, incongruous contexts slowed the responses of both groups of children, but not the adults (West & Stanovich, 1978). Briggs, Austin, and Underwood (1984) did a similar experiment with groups of nine and ten year old good and poor readers. Both groups, like the 4th and 6th graders in the above experiment, showed inhibition with incongruous contexts. However, unlike West and Stanovich (1978), only poor readers showed facilitation with congruous contexts.

6.2 Context: Explanations

Language processing models can account for individual differences in the use of context. Stanovich (1986) using a model of interactive-compensatory processing, describes context effects as compensation for poor decoding skill. This model maintains that the magnitude of contextual facilitation effects is inversely related to decoding skill. Briggs, Austin, and Underwood (1984) also support this model. However, they only find evidence for context inhibition and facilitation for poor readers, and no effects for good readers. They propose that differences between good and poor readers may have been integrated into contrasting reading strategies. Ehri and Wilce (1983) suggest that incomplete or inaccurate representations of words in

memory affect speed of decoding, and may be one explanation of why unskilled readers are forced to rely more on context. Stanovich and West (1979) suggest that the effects of Cloze tasks, frequently cited as support for the context strategies of good readers, can also be understood as the result of other reading skills, and are not explained by the strategic use of context. Proficiency on Cloze tests may reflect neither context strategies nor reading ability, but may instead be evidence of the larger stores of general and linguistic knowledge of skilled readers and adults (Stanovich & West 1979; Stanovich, 1981a).

The experimental data, and the above explanations, are all compatible with an interactive model, in which readers may use information simultaneously from all knowledge sources, and in which a process at any level can compensate for a deficiency at any other level. This model accounts both for the effects of context with degraded stimuli and with poor readers. When word decoding is automatic, only the fast-acting automatic activation component of context effects can operate. But when processing is delayed by slow decoding or a degraded stimulus, the conscious-attention mechanism responsible for inhibition becomes operative, and fluent readers will display a semantic context effect (Stanovich, 1986a).

To summarize, the greater a reader's level of skill, the less it appears that contextual cues are used, except in particularly challenging situations, when material is difficult, or degraded (Adams, 1994; Gough, 1983; Perftti, 1985; Stanovich,1980; Fowler & Scarborough, 1993; Grabe, 1991; Adams & Huggins, 1985; Jorm & Share,

1983). Low proficiency readers exploit contextual clues in text to compensate for their lack of automatic decoding skills (Stanovich, 1980). In a study with high school students, poor decoders had lower reading comprehension than good decoders. However, some poor decoders had better comprehension than others, suggesting that they are using other components, such as contextual prediction, to compensate for weak skills (Hood & Dubert, 1983). The performances of good and poor readers, and adults and children, are distinguished by differences in speed rather than a difference in the use of semantic and syntactic cues (Stanovich & West 1979; Stanovich, 1981a). Empirical evidence supports a model of individual differences, in which the source of difficulties for less skilled readers are determined to be bottom-up, at the word level, rather than top-down, at the context level (Perfetti, Goldman, & Hogaboam, 1979).

7. Vocabulary

The relationship of vocabulary knowledge to word recognition and reading comprehension is complex and not always direct (Harris & Sipay, 1990). According to Perfetti and Hogaboam (1975), vocabulary knowledge appears to be distinct from decoding as a component skill of reading. However, both decoding and vocabulary ability correlate with good reading comprehension (Carr, 1981; Nagy, Herman, & Anderson, 1985). Limited capacity models, relating lexical processing to reading comprehension, imply that increases in vocabulary knowledge should affect comprehension ability. However, the relationship of vocabulary to comprehension is not

that direct, as experiments show that increasing vocabulary knowledge does not automatically lead to increased comprehension ability (Carr, 1981; Fleisher, Jenkins, & Pany , 1979; Herman, 1985); Roth & Beck, 1987).

In an intervention study of vocabulary instruction, students showed gains in all tasks, from single words to text recall and comprehension (Beck, Perfetti, & McKeown, 1982). However, in an attempt to replicate this study, subjects showed gains in accuracy of word knowledge and speed of lexical access, but only marginal gains in comprehension (McKeown, Beck, Omanson, & Perfetti, 1983).

Results of some studies imply that for vocabulary knowledge to affect comprehension, it must go beyond establishing accurate associations between a word and its definition, and must promote the acquisition of a rich network of semantic connections. In studies comparing methods of vocabulary instruction, subjects who learned broader semantic definitions performed better in activities requiring broader semantic knowledge. In two studies, children trained with flashcards or unstructured lists learned to read words faster, but those trained with words in context learned more about semantic identities (Ehri & Roberts, 1979; Ehri & Wilce, 1980). Ehri and Roberts (1979) suggest a word identity amalgamation view of vocabulary acquisition, claiming that one's experience with words influences the particular aspects of words that get noticed and stored in the lexicon. Stahl (1983) also suggests that proficient reading comprehension requires vocabulary knowledge with rich semantic associations. In a study, definitional instruction was compared with contextually

instructed vocabulary. The group trained with both definitional and contextual information produced the highest comprehension scores.

8. Experimental Interventions

Many correlational studies demonstrate evidence of the relationship between decoding skill and reading comprehension. McCormick and Samuels (1979) for example, show that comprehension is related to decoding speed. Other studies also claim that readers with good comprehension, as measured in various assessment activities, demonstrate fast and efficient decoding (Lesgold & Resnick, 1982). However, as the evidence from these studies is correlational, it is not possible to claim a causal relationship, and they cannot show that skilled decoding predicts good comprehension.

The Laberge and Samuels study (1974) which motivated many of the language processing models of reading, also inspired a series of intervention experiments to test whether increases in decoding efficiency produced improved comprehension. These intervention studies use a paradigm in which subjects receive training to learn and to decode specific vocabulary words at a rapid pace, and are then tested to determine the effects of this training on reading comprehension. Many of these experiments use the metaphor of a "bottleneck" to express the constraints of the limited capacity model, claiming that slow decoding creates a bottleneck in processing, thus impeding the more complex processing activities necessary for comprehension. The essential

requirement for the bottleneck hypothesis, and for the experimental paradigm which tests it, is speed. Vocabulary knowledge must be learned and practiced so that lexical access is rapid and automatic. (Rayner & Pollatsek, 1989; Harris & Sipay, 1990) Fowler & Scarborough, 1993).

There are two versions of the bottleneck hypothesis. The strong version claims that fast decoding is a sufficient condition for good comprehension. Under this interpretation, any intervention that increases decoding speed should also improve comprehension. The weak version claims that decoding speed is necessary, but not sufficient for good reading comprehension. An intervention may increase decoding speed, but results may or may not affect reading comprehension (Blanchard & McNinch, 1980; Fleisher, Jenkins, & Pany , 1979; Herman, 1985; Roth & Beck, 1987).

8.1 Examples of Experiments

In an early study by Fleisher, Jenkins, and Pany (1979), subjects were trained to increase decoding speed of specified vocabulary, and subsequently tested for comprehension in passages containing the practiced words. The predicted results were not achieved. Subjects attained increased decoding speed of single words, but did not improve in comprehension performance. These results challenged the decoding-sufficiency view. However, this study has been criticized because of poor design. Subjects were not forced to respond quickly, so a bottleneck situation was not created. Also, the test passage was unreasonably difficult for the poor readers (Blanchard &

McNinch, 1980).

However, the outcome of a similar study by Blanchard (1980) was successful, thus providing support for the bottleneck hypothesis. In this case, flashcard vocabulary training improved students' reading comprehension. This experiment overcame many of the methodological problems of Fleisher, Jenkins, and Pany (1979). Poor readers were compared with poor readers rather than good readers, vocabulary training was sufficient for mastery and included vocabulary used in comprehension questions, and the difficulty level of the passages was reasonable for the reading level of the subjects. A control group received identical training, but not on words included in the comprehension passage.

A study with a three second language learners also obtained comprehension results, but these were not sustained in the reversal. However, there were methodological shortcomings in this study that might account for the lack of success. Reading speed was not forced, so it is possible that no bottleneck occurred. Vocabulary training consisted of only 25 words out of 300-500 word passage, possibly an insufficient quantity to produce an observable change in performance. And the small number of subjects meant that the results could only suggest a pattern, rather than provide solid evidence for or against a hypothesis (Tan, Moore, Dixon, & Nicholson, 1994). In a similar study with L1 children, there were positive results, and no reversal in follow-up testing. In this study, poor readers were divided into three groups for flashcard training: A single word training group, a phrase training group,

and a control group with no training. There was a comprehension advantage for both flashcard groups, with the phase training group as the most successful. This study, with its careful methodology, provided support for the bottleneck hypothesis (Tan & Nicholson, 1997).

Other intervention experiments, focusing on speed rather than vocabulary knowledge, have also shown that increased decoding speed affects comprehension ability. In an experiment with repeated readings, comprehension was improved (Herman, 1985). Roth and Beck (1987) used microcomputer programs to increase decoding speed of poor 4th grade readers. The program resulted in improvements in comprehension at the word and sentence level, but not at the passage level. In another experiment, dyslexic students were given training with speeded word games on a microcomputer, receiving feedback for speed and accuracy. Reaction time on word and sentence comprehension improved for both trained and untrained stimuli. Decoding automaticity and sentence comprehension accuracy improved for the trained, but not the untrained stimuli (Holt-Ochsner & Manis, 1992).

Decoding is a crucial bottom-up skill, but the weak form of the bottleneck hypothesis implies that this is not enough, and other top-down skills are also required for successful reading comprehension. Once critical levels of decoding skill have been achieved, other component processes make important contributions to reading comprehension. Variation in comprehension levels may best be accounted for by other, more complex component processes (Bruck, 1990). Perfetti (1988) claims that

decoding and comprehension processes are highly connected. However, beyond the first two years of schooling, individual differences in reading ability are also determined by the complex processes involved in reading comprehension.

9. Component Processes and Adult First Language Readers

Greenberg, Ehri, & Perin, (1997) did a study comparing the FLR micro-skill processes of normally developing children (CH) and adult literacy (AL) students. In their study, Greenberg, Ehri, & Perin, (1997) compared word-reading processes of AL students with those of grade school children matched for reading level, using assessments of orthographic and phonological processes to establish whether the two groups had the same or different strengths and weakness. Previous studies have found evidence that AL students are weaker on phonological than orthographic skills (Bruck 1990; 1992; 1993; Pratt & Brady, 1988;), and may have deficits in phonological processing (Kitz, 1988; Lindamood, Bell, & Lindamood, 1992; Marcel, 1980; Perfetti & Marron, 1995). They have also shown that AL students usually have a vocabulary advantage over younger students, an advantage which is generally lost by the 5th grade, when normally developing CH will surpass AL students in vocabulary knowledge (Fowler & Scarborough, 1993). This AL loss of comparative skill relative to younger readers may be understood as the result of Matthew effects, which is a term to describe the consequences of the different reading habits of good and poor readers (Stanovich, 1986; Fowler & Scarborough, 1993). Good readers read more

frequently than poor readers and, as a result, their skills progress more rapidly. As readers develop, the initial differences between the reading skills of the two groups becomes larger and larger. Normally developing readers acquire new vocabulary so rapidly that by grade 5 they begin to surpass adults who are not good readers.

The results of the Greenberg, Ehri, & Perin, (1997) study indicate that although the two groups read at the same level, as determined by scores on a word recognition test, they differed on most other skills. The AL group manifested phonological weaknesses and was stronger on orthographic than phonological tasks. For vocabulary, the AL subjects had a larger vocabulary than the 3rd and 4th grade CH, but the 5^{th} grade CH had a larger vocabulary than the AL subjects.

10. Second Language Reading (SLR)

10.1 The Language Wars: Jim Cummins

The Language Wars concern controversial discussions about the contribution of L1 proficiency to L2 proficiency. Jim Cummins proposed a theoretical framework to describe the relationship of L1 and L2 proficiency in bilingual children and to provide a rationale for the interdependency of L1 and L2 academic skills. To explain the interdependence of L1 and L2, Cummins proposed the Common Underlying Proficiency (CUP) model of bilingual proficiency. In this model he distinguished between two kinds of language skills: Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP). BICS refers to informal,

conversational language, which is context-embedded, whereas CALP refers to academic or formal written language, which is context reduced. Context embedded language (BICS) occurs when the participants have a shared informational context, and contains feedback, paralinguistic cues such as gestures and intonation, and situational cues. Context reduced language, (CALP) is more characteristic of language used in textual materials. It occurs when the participants do not have a shared context, and is dependent upon linguistic cues. The concept of a Common Underlying Proficiency (CUP) generally applies to academic situations. It suggests that development in either language can promote the proficiency underlying both languages, and that most academically important aspects of L1 and L2 ability are manifestations of the same underlying competence.

In order to explain the effects of bilingualism on the cognitive and academic achievements of bilingual children, Cummins also proposed two thresholds of linguistic proficiency. The first threshold is the threshold which represents the minimal L1 competence which must be attained in order to avoid cognitive deficits, which some theories have attributed to childhood bilingualism. The second, higher threshold, is the threshold which must be attained to facilitate the positive cognitive advantages, which some theories attribute to bilingualism (Hoffman, 1991; Hammers & Blanc, 1989; Cummins, 1984a; Cummins, 1984b; Cummins, 1891; Cummins, 1987; Cummins, 1991).

10.2 Top-Down SLR Theories

Most of our current views of SLR are shaped by research on FLR. Many models of SLR are influenced by top-down theories originating with Goodman (1970) and Smith (1971), emphasizing the "psychoanalytic" view of reading and superimposing concepts from the "Whole Language" and Language Experience Approach onto FLR. Their investigations are basically motivated by issues of schemata, how a reader's background and experience generate expectations about the text and aid in the process of decoding (Koda, 1994). In fact, according to Eskey (1988), practically everything published in TESOL Quarterly from 1981 to 1984 uses this framework. Frequently these theories are called interactive (not to be confused with interactive models like Rummelhardt's). as reading is described as a process in which the reader actively interacts with the text, producing hypotheses about the message and sampling textual cues to confirm or reject these hypotheses.

This paper will not discuss top-down models, or research which supports them. Eskey (1988) discusses these hypotheses, concluding that SLR needs more attention to bottom-up processes. He criticizes top-down approaches for promoting the model of a skillful, fluent reader with automatic decoding, and fostering the illusion that texts are information. Aside from the issue of whether this model is appropriate to any reader, for the developing second language reader, this is an extremely inaccurate picture. Texts should not be viewed as information, but instead should be viewed as a collection of graphic symbols which can only be transformed into information with the

aid of accurate decoding skill and essential linguistic knowledge. Until these skills are acquired, neither background knowledge nor top-down strategies can possibly convert graphic symbols into meaning. In his discussion, Eskey (1988), suggests that a better SLR model would include skill at rapid, context-free word and phrase recognition, combined with appropriate higher level comprehension strategies.

10.3 SLR Threshold Theories

There are some theories of SLR which propose thresholds to examine the relationship of L1 and L2. Two general hypotheses are proposed to account for SLR difficulties. The poor L2 reader could either be a poor L1, reader or a good L1 reader unable to transfer his L1 ability because of deficiencies in L2. (Alderson, 1984; Clarke, 1988). There is also a hypothesis of reading universals, which claims that L2 readers may compensate for their less developed L2 skills by means of L1 reading skills (Taillefer, 1996).

The short circuit hypothesis, proposed by Clarke (1988) claims that poor language competence in the L2 impedes, "short circuits," the good L1 reader, making it impossible to use efficient SLR behavior, particularly when confronted with difficult or confusing text (Alderson, 1984; Clarke, 1988). Hudson (1982) discusses the short circuit hypothesis, emphasizing the importance of L2 linguistic knowledge in SLR. He argues that teaching techniques which use context to establish meaning inherently contribute to the short circuit, as these strategies prevent readers from

responding to linguistic cues. He calls for a renewed emphasis on traditional or decoding views. which define reading as parasitic on language.

Taillefer (1996) proposes that SLR equals L1 reading plus L2 language proficiency. She tested university students reading texts in the L2, varying both the cognitive complexity of the reading tasks and the proficiency level of the L2 students. Her results demonstrate that both L1 reading ability and L2 language proficiency are statistically significant predictors of SLR. The results showed evidence of the importance of L2 knowledge; when L1 ability was held constant, readers with higher L2 proficiency scored higher, particularly in the more difficult tasks. However, the data did not support the short circuit hypothesis. There was no evidence that L1 ability gained importance as L2 proficiency increased. Skill development displayed a continuous pattern, and there appeared to be no abrupt change or threshold signaling the achievement of some critical proficiency level, enabling readers to incorporate skills and strategies from the L1.

When Carrell (1991) tested the short circuit hypothesis, she obtained mixed results. For Spanish students learning English as a second language (ESL), L2 ability was more important than L1 reading proficiency, giving some support to the short circuit hypothesis. But for English students learning Spanish as a foreign language (SFL), L1 reading ability was more important than L2 proficiency, a pattern which provides no evidence of a short circuit. However, there were methodological problems with this study, as there were substantial differences in the learners and with the

learning environments as she was comparing foreign language students with second language students. Also, in the study she described, it was not possible to determine and compare L1 and L2 proficiency levels of the two groups.

10.4 SLR Language Processing Research

There is a small amount of SLR research which looks at bottom-up skills, using the language processing view of reading. This literature examines underlying cognitive processes, the interaction of component skills, and the effect of micro-skills in supporting comprehension processes. It also examines the influence of L1 script and syntax and the contribution of L2 proficiency.

Bernhardt (1984) and McLaughlin, Rossman, and McLeod (1983) suggest a language processing definition of SLR comprehension, supporting models which relate incoming or new information to information already stored in memory. Bernhardt (1984), in a discussion of the SLR literature, concludes that schema-theoretic perspectives, the use of inside-the-head factors to determine the interpretation of discourse, cannot fully account for the process of reading comprehension. McLaughlin, Rossman, and McLeod (1983) compare FLR development with SLR. In FLR, children establish basic skills with the use of controlled processing. As reading progresses to more advanced levels, these controlled processes become automatic. Increased reading proficiency follows a developmental pattern, with changes occurring at various stages. At each stage there

are transitions to automatic processing which result in reduced discrimination time, more attention to higher-order features, and the ability to ignore irrelevant information. This developmental model also applies to SLR and predicts that SLRers will experience difficulties whenever lower-level skills are not sufficiently automated.

McLeod and McLaughlin (1986) studied SLR word recognition, proposing a hypothesis of restructuring. According to this hypothesis, decoding skill is not a continuous process, with a gradual accretion of automaticity, but is more accurately described as a discontinuous processes, with restructuring changes occurring at various levels of proficiency. In an oral experiment, subjects were given a cloze task, and responses were analyzed for the proportion of semantically meaningful to non-meaningful errors. Results showed substantial differences between both high and low proficiency ESL groups as compared to native speakers. Both ESL groups produced a greater percentage of meaningful errors, and their error patterns were more similar to each other than to those of the native speakers. This was interpreted to show that neither ESL group had reached a level of decoding skill which could be characterized as restructured (McLeod & McLaughlin, 1986; McLaughlin, 1987). Segalowitz , Watson, and Segalowitz (1995) tested the same hypothesis, using timed lexical decision tasks. Their results showed that, before high levels of reading proficiency can be achieved, increases in decoding skill need to show a qualitative change as well as an increase in speed (Segalowitz & Segalowitz 1993; Segalowitz, Watson, & Segalowitz, 1995).

Segalowitz did several studies to examine the effects of decoding automaticity in SLR. He used bilingual subjects with highly proficient reading, comparing groups who read equally quickly in both languages (Equal Reading Rate) to those who read more slowly in the second language (Unequal Reading Rate). Evidence from a lexical decision task with primes suggested that slower reading is associated with less automatized processes. The Unequal Reading Rate group fuctioned like skilled readers in L1, but functioned like less proficient readers in L2, showing more inhibition effects than the Equal Reading Rate group. However, they showed no context facilitation effects, and so no evidence of compensatory reliance on context (Favreau & Segalowitz, 1983).

Other experiments show how practice and experience affect SLR reading speed. When comparing Equal Reading Rate and Unequal Reading Rate groups for reading speed, Segalowitz (1991) found that the Unequal Reading group read faster in the L1 than the Equal Reading group, suggesting some sort of tradeoff between L1 and L2 reading speed. In another study, using a primed lexical decision task, good bilingual readers actually read faster in their L2 than in their L1. After comparing the results of a long SOA (Stimulus onset asyncrony) to a short SOA, Segalowitz claims that these results reflected changes in controlled rather than automatic processing. With the long SOA, subjects showed facilitation for expected targets, and inhibition for unexpected targets. This response is assumed to reflect conscious expectancies, and can be interpreted as an index of controlled processing. For the short SOA, effects were confined to semantically related targets, which was interpreted as an index of

automaticity. The explanation for these results is that intensive experience with L2 reading may take practice time away from L1 reading. Automatic L1 processes are not affected by this lack of practice, but L1 controlled processes become slower.

In a task requiring subjects to listen to compressed speech, Favreau and Segalowitz (1982) investigated whether the processing differences in bilinguals occured across modalities, reflecting a general L2 processing factor, or whether they were specific to reading. For both reading and listening, the Unequal Reading Rate bilinguals were found to be slower in the L2. This slower listening rate was not related to vocabulary or syntactic knowledge, since both groups had equal levels of comprehension. However. these slower results may also be explained by differences in phonological skills, as the Unequal Reading Rate group was judged to have a less native-like accent than the Equal Reading Rate group.

Segalowitz's studies with Equal and Unequal Reading Rate groups showed that subtle but nonetheless significant processing differences may differentiate subgroups within a sample of highly skilled bilingual readers. He proposes that even for some highly skilled SLRers, there are some individuals whose underlying cognitive mechanisms function less efficiently when processing the L2, as compared to the L1. These cognitive processes are assumed to be lower level processes, and are not related to higher syntactic, rhetorical, or stylistic knowledge. For these skilled SLRers, slow reading is not the result of inadequate strategic ability, or undeveloped linguistic knowledge. Instead, slow SLR is probably associated with reduced decoding

automaticity and less effective use of phonologically coded information in memory. For these readers. L2 semantic word representations may be activated less deeply than L1 activations. Under this interpretation, the slower SLR processes of skilled bilinguals may be the result of less efficient transfer of lower levels of cognitive information for use in higher level, complex cognitive processes.

Segalowitz (1986) hypothesizes that processing differences may also affect the degree to which bilinguals phonologically recode the visual input. It has been proposed that the visual perception of print generally automatically activates both word and phonemic codes consistent with the visual letter input. If the reader is skilled and visual processing is rapid. these prelexical phonological codes may not be normally involved in lexical access. However, they are hypothesized to be useful in providing a stable code for items in immediate memory. Less skilled SLRers decode more slowly, and, because of this, they may have more opportunity to use these codes. However. the codes they generate may not be as phonologically accurate as L1 phonological representations, thus diminishing the effectiveness of an important processing and memory resource.

To test this hypothesis, Equal Reading Rate subjects and Unequal Reading Rate subjects were compared on a sentence verification task using homophones (phonologically coded congruent words), and on a lexical decision task using pseudohomophones. In the sentence verification task (with homophones) both groups made errors, but the Unequal Reading Rate group was slower in the L2. This implied

that the two groups were not different in generating the code, but differed in the rapidity in which the code was processed, with the Unequal Reading Rate group as less efficient in the L2. In the lexical decision task, both groups showed a slower rate of access with pseudohomophones than with control non-words, but the Unequal Reading Rate group made more errors. The overall results were interpreted to show that both groups generate phonological codes in the same way, but the Unequal Reading Rate group was slower in one task, and made more errors in another. The results are consistent with idea that it is the higher level processes utilizing phonological codes, rather than those processes which generate them, that function less effectively in some highly proficient bilinguals.

10.5 Processing Effects on Cognitive Processes

Koda (1988; 1989; 1990; 1994; 1996) has several studies comparing different language groups, showing variations in component skills in FLR and SLR. The data is interpreted as evidence for the transfer of processing patterns from L1 to L2, resulting in cognitive transfer from FLR to SLR.

Koda hypothesizes that control strategies developed to master new information may be incorporated into an individual's style of learning, thus affecting cognitive behavior, and that the experience of learning to read in a particular language affects how a person approaches other language learning situations. Although decoding is usually considered a bottom-up cognitive process, for new readers it requires

enormous cognitive resources. When a child is learning the orthographic system, or when a beginning student approaches an unfamiliar orthography, controlled processing and cognitive strategies are necessary to master the new information. There is evidence that from this learning experience, an individual develops specific skills and strategies for information processing to master the characteristic linguistic and orthographic features of the L1, and that these processing patterns persist, affecting SLR. Koda suggests that once these strategies are assimilated into the reader's processing behavior, they affect both bottom-up and top-down processes. Consequently, orthographic differences in L1 influence decoding processes in L2, and, in turn, affect the more complex top-down processes. In a study, skilled readers from four contrasting L1 orthographic backgrounds were shown to process L2 words differently. This evidence of different L2 strategies derived from L1 patterns is interpreted as an indication that L1 orthographic structure exerts a significant influence on the cognitive processes involved reading other languages (Koda, 1988).

Koda (1990) studied SLR, comparing groups whose L1 uses phongraphic script with those that use morphographic script. These L1 orthographic differences were shown to affect strategies of phonological decoding. When essential phonological information was inaccessible, SLR speed was impaired for readers of L1 phonographic languages (Arabic, Spanish, and English). Similar phonographic inaccessibility did not affect the SLR performance of L1 morphographic (Japanese) readers.

Comprehension was also affected by these differences in the accessibility of phonological coding. Phonological decoding, accessing the sound of a word, is believed

to aid comprehension by allowing readers to register information in working memory as input for the operation of comprehension-oriented processes. In an experimental situation in which phonological recoding was not possible, Japanese ESL readers did better than native English speakers in recalling English letter-strings. These results imply that readers from morphographic L1 orthographies are not as dependent on phonological coding for memory. They also suggest that readers apply the cognitive strategies that underlie L1 word-level processing to cognitive processes in SLR, and that readers of different orthographic backgrounds may use different processes (Koda,1989).

Koda suggests that an interactive model, describing reading as the interaction of many components, can explain why the effects orthographic differences may impact the development of more complex reading processes. A study compared two groups of students learning Japanese as a second language, using a test battery containing grammar, vocabulary, reading comprehension, and speed of letter identification and word recognition. Groups of students with logographic L1 languages (Korean and Chinese) were compared with students with non-logographic L1 languages (English, Brazilian, and Spanish). Students from logographic L1 backgrounds did much better than from those with non-logographic L1 orthographic backgrounds. This is interpreted as a case of Matthew effects, in which an initial learning advantage magnifies its effects over time, as task complexity increases. In this case, the advantage was obtained from transferred orthographic decoding skill. When these students began to learn Japanese, non-logographic L1 students were at a disadvantage because of processing differences

in orthography. Consequently, these students had poorer verbal processing skills and slower L2 decoding speeds. Because of these deficiencies in processing, they learned less vocabulary than the logographic L1 students. These combined deficiencies in processing and vocabulary ultimately caused them to be less sensitive to L2 linguistic cues. The results support a limited capacity model of reading acquisition, with evidence that a deficiency on a lower level processing component limits the ability to make simultaneous use of several other knowledge sources, and impairs performance on more complex cognitive tasks (Koda, 1989).

Koda (1996) discusses the unique aspects of SLR which distinguish it from FLR: 1) Prior reading experience; 2)The effects of cross-linguistic processing; 3) Compensatory devices stemming from efforts to solve comprehension problems with limited linguistic knowledge. She raises many questions for further SLR research. Decoding is specified as an extremely important area. What are specific aspects of linguistic knowledge underlying L2 decoding? What factors distinguish their acquisition processes from other aspects of L2 linguistic knowledge? What variables contribute to the effective use of linguistic knowledge during decoding? Does automaticity involve a structural reorganization of the processing components? Other questions concern the nature of and differences in L2 vocabulary knowledge. When acquiring L2 vocabulary, mature readers bring conceptual knowledge, and knowledge of function but not identity. How does this facilitate L2 vocabulary learning and its impact on reading comprehension?

Eye movement studies show that information sampling techniques also differ in L1 and L2. As processing speed and accuracy improves, L2 eye fixation patterns become more similar to L1 patterns. Which component skills are influencing these processes and developmental changes? Since SLR involves the manipulation of unfamiliar linguistic codes at various processing levels, how do basic linguistic skills affect processes at different cognitive levels of reading behavior? In what ways do morphosyntactic structures of L1 and L2 constrain processing procedures? (Koda, 1994). Because of the prevalence of schema-theoretic views of reading comprehension, there is very little information about L2 decoding. Many theorists emphasize the importance of L2 top-down skills, assuming that L2 verbal processing skills will automatically develop as L2 ability increases. However, this may be a false assumption. Even FLRers with normal development manifest considerable variation in decoding ability. We cannot assume that SLRers will inevitably develop a high level of decoding skill concomitant with other aspects of L2 language acquisition. L2 linguistic knowledge may certainly be a necessary, but cannot be a sufficient prerequisite for decoding competence (Koda, 1994).

Chapter 3

Description of Study

1. Population

The fifty-five subjects in this study are Spanish speaking students in a community college who are learning English. They are all students in the English as a Second Language (ESL) program within the college. The individuals in this study were drawn from all levels of ESL except for the lowest one. The subjects, who range in age from 18-55, are immigrants to New York City, and are of working class economic status. Most of the subjects come from the The Domincan Republic, but a few are from Puerto Rico, Mexico, Columbia, Ecuador, El Salvador, and Peru. According to entry level Spanish language testing done at the college, many of these individuals are considered to have low L1 literacy. In personal interviews, most subjects indicate that they have had very limited L1 educational backgrounds.

2. Assessments

2.1 Overview of Assessments

The criterion measure, or dependent variable, for this study was a test for SLR comprehension, The Stanford Diagnostic Reading Test (SDRTCOMP). The predictor variables, or independent variables, consisted of five categories of component reading skills: 1) L2 micro-skills; 2) L2 word knowledge; 3) L2 grammatical skill; 4) L2 reading strategies; 5) L1 grammatical skill and reading comprehension.

2.2 Criterion Skill: Reading Comprehension

The criterion measure for this study was the total score achieved on the reading comprehension section The Stanford Diagnostic Reading Test (SDRTCOMP), Fourth Edition, Form K, Purple Level; Karlsen and Gardner, 1995, designated for grades four to six. This assessment, which was used to represent reading comprehension ability, is a standardized reading comprehension test which has been normed for children and adults. It consists of nine passages of three to four paragraphs, followed six multiple-choice questions, for a total of fifty-four questions. and must be completed in fifty minutes. The reading comprehension passages include both narrative and informational texts. There are questions to measure understanding (initial understanding of directly stated ideas and relationships), interpretation (inferences, predictions, conclusions), critical analysis (evaluation), and process strategies (recognizing text structures and types of text).

Two different scores were obtained from the reading comprehension section of the Stanford Diagnostic Reading Test. The first score, termed SDRTCOMP in the data analyses of this study, is a measure of how many questions the subject answered correctly in the designated amount of time. This is the standard way of scoring reading comprehension tests, and is the measure which the test uses in computing percentile and grade level equivalent information. SDRTCOMP was the criterion measure for this study, and was used in the statistical analyses which were performed

on the data and in reaching the conclusions for this study. Raw skills from SDRT (0-54) were utilized for the data analysis.

The score represented by SDRTCOMP is the conventional way of deriving a measure of reading comprehension ability. In using the scoring procedure prescribed by this test, subjects are given a limited amount of time to complete the test, and it is assumed that that reading speed and efficiency in answering questions will make an important contribution to the final measure. However, some educators disagree with the methods of standardized reading comprehension tests, claiming that a timed test does not accurately reflect the ability of slower readers. Since this study is about SLR, and because SLR is generally slower than FLR (Fevreau & Segalowitz, 1983; Segalowitz, 1986), another reading comprehension measure was also computed, using the subjects' total score on the Stanford Diagnostic Reading Test. This second measure, termed SDRTPERC, was determined by calculating the percentage of correct answers to the number of questions answered. SDRTPERC was not used in the analysis of the data or in reaching conclusions for this study. However, it will be referred to in the discussion, as it gave additional information about the effect of speed upon the performance of a few of the component skills.

2.3 Categories of Skills Tested by Assessment Variables

There were fourteen different tasks used as independent variables. The tasks were used to assess five categories of component reading sub-skills:

1) Micro-skills include phonemic, orthographic, and decoding knowledge. These skills are necessary in order to translate graphemic symbols into their corresponding sounds, and into the words they represent. Assessment tasks for L2 micro-skills were word attack, deletion, letter pattern recognition, spelling, word identification, and speed.

2) Word knowledge, or vocabulary knowledge, concerns the meaning of words. This knowledge can consist of the ability to define and give a synonym for a word, or can be the ability to recognize a previously encountered word. Word knowledge combines phonemic, orthographic, semantic, and syntactic information and depends on extensive experience with the language. Assessment tasks for L2 word knowledge skills were vocabulary and irregular word reading.

3) Grammatical knowledge concerns information about the structure of the language and the morphological components of a word, enabling an individual to extract meaning from text. Assessments for L2 grammatical knowledge were listening grammar and reading grammar.

4) Reading strategies concern the choices an individual must make to comprehend various kinds of textual materials and to accomplish the diverse purposes of reading. Assessments for L2 reading strategies were scanning and the four strategies included within the reading comprehension section of the Stanford Diagnostic Reading Test: initial understanding, interpretation, critical analysis, and process strategies.

5) L1 grammatical skill and reading comprehension are those grammatical and reading comprehension skills that were attained in the L1. Assessments for L1 skills were Spanish grammar and Spanish reading comprehension.

2.4 Tasks Used as Independent Variables

1). Phonological knowledge: phonological decoding

Task: Word Attack (WATTACK); Woodcock, WRMT-R, Form H, Revised (Woodcock, 1987).

The Word Attack sub-test of the Woodcock Reading Mastery Tests, Revised. Form H. WRMT-R (Woodcock. 1987), which is a non-word decoding task. was used to assess phonological decoding ability. In this task, the subject reads from a list of forty-five pseudo-words, creating syllables by matching letters with sounds, and then pronouncing the resulting pseudo-word which is constructed from these syllables. The task has been normed for both children and adults. The conventional procedure for this test was modified for the ESL subjects in this study, as generally testing terminates after subjects pronounce six consecutive incorrect items. In this study, there was no ceiling level at which testing ceased, and subjects were given the opportunity to read all of the items. Raw scores (range 0-45) were utilized for data analysis.

Example: *dee, ap, bufty*

2). Phonological knowledge: phonological awareness

Task: Deletion (DELETION); auditory analysis task (Rosner and Simon. 1971).

Rosner and Simon's (1971) Auditory Analysis Task, which requires deletion of phonemes or syllables from forty spoken words, was used to assess phonological awareness. For this task, the examiner says a word and the subject is required to repeat the word two times, first in its entirety, and next without a specific segment. Raw scores (range 0-40) were utilized for the purposes of data analysis.

Example: *birth(day), bel(t), (m)an, ti(me), g(l)ow, cr(e)ate, auto(mo)bile*

3). Orthographic knowledge: orthographic sequential redundancy

Task: Letter Pattern Recognition (LPATT): Siegel et al., 1998.

The letter pattern recognition task is designed to measure orthographic knowledge by awareness of sequential redundancy. In this task, subjects are presented with sixteen pairs of nonsense words and instructed to circle the item in the pair that looks most like an English word. Each pair contains an example with a digraph that does not occur in a specific position in English and an example with a digraph that does occur in English. Raw scores, representing correct responses (range 0-16) were utilized for data analysis.

Example: *nitl/nilt, cnif/crif.*

4.) Orthographic knowledge: spelling

Task: Spelling (SPELL): Bear & Barone (1989).

Bear & Barone's (1989) spelling inventory follows Henderson's (1985) developmental stages of spelling skill. This task, in which subjects spelled twenty

words to dictation, is used as an assessment for orthographic knowledge. For this task, the experimenter reads a word, says the word in a sentence, repeats the word again, and then asks the subject to write the word. Spelling items are graduated in difficulty. Raw scores, representing correct responses (range 0-20) were utilized for data analysis.

Example: *bed, drive, inspection, fortunate*, (many subjects could spell these words) *squirrel* (no subject could spell this word correctly)

5). Decoding knowledge: word identification

Task: Word Identification (WIDENT): Woodcock, WRMT-R, Form G, Revised (Woodcock, 1987).

The Word Identification sub-test of the Woodcock Reading Mastery Tests, Revised, Form G , WRMT-R. (Woodcock, 1987) was used to test decoding, or word recognition. This task, in which an individual reads from a list of 106 words, has been normed for both children and adults. The conventional procedure for this test was modified for the ESL subjects in this study, as generally testing terminates after subjects pronounce six consecutive incorrect items. In this study, there was no ceiling level at which testing ceased, and subjects were given the opportunity to read all of the items. Raw scores (range 0-106) were utilized for data analysis.

Example: *is, you, and , up, certain, human, twilight*

6). Decoding knowledge: decoding speed

Task: SPEED

With the assistance of Dr. Diane Bradley a word matching task was designed for use on a computer, using DMASTER. For this assessment, subjects were presented with pairs of words on a computer screen and instructed to push a green button when word pairs were the same and a red button when they were different. Reaction time was measured from the onset of the display until the subject's response. Feedback was given for correct/incorrect responses as well as reaction speed. Items consisted of very familiar words (SPEED1), less familiar words (SPEED2), legal letter strings (SPEED3), and illegal letter strings (SPEED4). Subjects' response times were recorded and the data was analyzed as evidence of decoding speed.

Example: SPEED1 (very familiar words) *work/work, love/live;* SPEED2 (less familiar words) *fire/fire, burn/born;* SPEED3 (legal letter strings) *flup/flup, muke/moke;* SPEED4 (illegal letter strings) *dplr/dplr, kslm/kblm.*

7.) Word knowledge: meaning-based vocabulary knowledge

Task: Vocabulary (SDRTVOC): the Stanford Diagnostic Reading Test, Fourth Edition, Form K, Purple Level; Karlsen and Gardner, 1995.

The vocabulary section of the Stanford Diagnostic Reading Test, which is totally independent of the reading comprehension selection, was used as a test of meaning-based vocabulary knowledge. This task consists of thirty vocabulary items, and requires subjects to chose a synonym from one of four multiple-choice answers. Individuals have ten minutes to complete the task. Vocabulary items are selected to assess knowledge of synonyms, classification, word parts, and content-area vocabulary. Raw scores (range 0-30) were utilized for data analysis.

Example: To *leap* is to: *turn, slide, stumble, jump*

8.) Word knowledge: irregular word decoding

Task: Irregular Word Reading (WREAD): Adams and Huggins, 1985.

This task, which requires subjects to read orally from a list of fifty irregular words compiled by Adams and Huggins, 1985, is a test of the ability to recognize words in print. Because the items in this assessment do not follow basic spelling-sound rules, they test sight word reading skill. When these items are pronounced correctly, it is considered evidence of print experience because the individual demonstrates the ability to make the association between the pronunciation and the written form of the word. Raw scores (range 0-50) were utilized for data analysis.

Examples: *ocean, guitar* (only those subjects who had seen this word in print were able to pronounce it), *ukulele* (which apparently none of the subjects had seen in print and no one could pronounce)

9) L2 Grammatical knowledge: L2 listening grammar

Task: L2 listening grammar (GRAMLIST): The Michigan ESL Placement Test, Form A, Spann and Strowe.

The Michigan ESL Placement Test, Form A, which was designed for use by institutions offering courses in English as a foreign language, was used as an assessment for l2 grammatical knowledge. The format of this section of the test, which contains twenty items, consists of an oral prompt followed by four written multiple-choice answers Grammar items include auxiliaries, connectors, verb forms, adjective forms, prepositions, etc. Raw scores (range 0-20,) were utilized for data

analysis. (There was also a composite score of listening and reading grammar, GRAMTOT, consisting of fifty items.)

10) L2 Grammatical knowledge: L2 reading grammar

Task: L2 reading grammar (GRAMREAD): The Michigan ESL Placement Test, Form A, Spann and Strowe.

The Michigan ESL Placement Test, Form A, which was designed for use by institutions offering courses in English as a foreign language, was used as an assessment for L2 grammatical knowledge. The format of this section of the test, which contains thirty items, consists of a written prompt followed by four written multiple-choice answers. Grammar items include auxiliaries, connectors, verb forms, adjective forms, prepositions, etc. Raw scores (range 0-30,) were utilized for data analysis. (There was also a composite score of listening and reading grammar, GRAMTOT, consisting of fifty items.)

11.) L2 Reading strategies: Scanning

Task: Scanning (SDRTSCAN): The Stanford Diagnostic Reading Test, Fourth Edition, Form K, Purple Level; Karlsen and Gardner, 1995.

The scanning component of the Stanford Diagnostic Reading Test, which is independent of the reading comprehension section, was used as an assessment for the reading strategy of scanning. It consists of thirty items, in a fifteen minute, multiple-choice, timed test format. The scanning assessment contains two informational selections that resemble the dense text typically found in textbooks or encyclopedias. Raw scores (range 0-30) were utilized for data analysis.

12). L2 Reading Strategies: Reading comprehension strategies

Task: Reading comprehension strategies (INITIAL, INTERP, ANALYSIS, PROCESS): The Stanford Diagnostic Reading Test, Fourth Edition, Form K, Purple Level; Karlsen and Gardner, 1995.

The reading comprehension section of the Stanford Diagnostic Reading Test was also used as an assessment for reading strategies. Each of the questions on this test is designed to measure one of four reading strategies. These strategies consist of initial understanding (initial understanding of directly stated ideas and relationships), interpretation (inferences, predictions, conclusions), critical analysis (evaluation), and process strategies (recognizing and identifying text structures and types of text).

13). L1 Knowledge: L1 Grammar

Task : L1 Grammar (SPANGRAM): The University of Wisconsin College-Level Spanish Placement Exam, Form 901.

The University of Wisconsin College-Level Spanish Placement Exam, Form 901, was used to assess L1 grammatical knowledge. This exam was developed by the University of Wisconsin Spanish Placement Test Development Committee as a placement exam for Spanish as a Foreign Language (SFL). The grammar component of this exam contains thirty-eight multiple choice items in a timed test format. Subjects have sixty minutes to complete both the grammar and reading comprehension components of this test. Raw scores (range 0-38) were utilized for data analysis. (In this study, SPANTOT will refer to the composite score of Spanish grammar and Spanish reading comprehension.)

14) L1 Knowledge: L1 Reading comprehension

Task: L1 Reading comprehension (SPANREAD): The University of Wisconsin College-Level Spanish Placement Exam, Form 901

The University of Wisconsin College-Level Spanish Placement Exam, Form 901, was used to assess L1 reading. This exam was developed by the University of Wisconsin Spanish Placement Test Development Committee as a placement exam for Spanish as a Foreign Language (SFL). The reading comprehension component of this exam contains thirty-nine multiple choice items in a timed test format. Subjects have sixty minutes to complete both the grammar and reading comprehension components of this test. Raw scores (range 0-39) were utilized for data analysis. (In this study, SPANTOT will refer to the composite score of Spanish grammar and Spanish reading comprehension.)

3. Procedure

3.1 Informed Consent

Permission forms were signed by all participants.

3.2 Testing

The testing was conducted between September 1998 and March 1999. Students from five different classes, representing three levels of ESL, participated in the testing. Any student in the class who chose to participate, and who was present for the testing periods, was recruited for the project.

The assessments of SDRTCOMP, GRAMLIST, GRAMREAD, SPANGRAM. SPANREAD, LPATT, and SPELL were given in the classroom. The assessments of WIDENT, WATTACK, WREAD, DELETION, and SPEED were done in private sessions. Subjects also signed consent forms and filled out a small questionnaire about their personal history. Additional extensive interviews were conducted with a few of the subjects to obtain a more in depth picture of their literacy and linguistic experience. The classroom testing took about three and one-half hours and the private sessions (excluding the extensive personal interviews) required approximately two half-hour periods per subject. In the first private session, the subjects read the items from WIDENT and WATTACK. In the second private session they were tested on WREAD. DELETION, and SPEED.

Chapter 4

Hypotheses from FLR Background Literature and L1 Literacy Literature

1. General Description of Hypotheses

This study proposes nine hypotheses to investigate the relationship of sub-component skills to a model of SLR comprehension. For all hypotheses, the dependent variable will be the score on The Stanford Diagnostic Reading Test, (SDRTCOMP), a test of global reading comprehension.

To investigate questions and assumptions raised by The Reading Wars, this research study proposes seven hypotheses (numbers one to seven) to examine the relationship of L2 micro-skills, L2 word level skills, L2 grammatical skill, and L2 reading strategies to SLR comprehension.

To explore questions and assumptions raised by The Language Wars, this research study proposes two hypotheses (numbers eight and nine) to examine the relationship of L1 grammar and reading comprehension to SLR comprehension.

2. Hypotheses

2.1 L2 Micro-Skills

HYPOTHESIS #1 (PHONOLOGICAL KNOWLEDGE): SLR comprehension is affected by L2 phonological knowledge.

HYPOTHESIS #2 (ORTHOGRAPHIC KNOWLEDGE): SLR comprehension is affected by L2 orthographic knowledge.

HYPOTHESIS #3 (DECODING SKILL): SLR comprehension is affected by L2 decoding skill.

2.2 L2 Word Knowledge

HYPOTHESIS #4 (WORD KNOWLEDGE): SLR comprehension is affected by L2 word knowledge.

2.3 L2 Grammatical Knowledge

HYPOTHESIS #5 (GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L2 grammatical knowledge.

2.4 L2 Reading Strategies

HYPOTHESIS #6 (SCANNING): SLR comprehension is affected by the strategy of L2 scanning.

HYPOTHESIS #7 (READING COMPREHENSION STRATEGIES): SLR comprehension is affected by the L2 strategies of initial understanding, interpretation. critical analysis, and process strategies.

2.5 L1 Knowledge

HYPOTHESIS #8 (L1 GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L1 grammatical knowledge.

HYPOTHESIS #9 (L1 READING COMPREHENSION): SLR comprehension is affected by L1 reading comprehension.

Chapter 5

Hypotheses and Rationale for Assessment Tasks

1. L2 Micro-skills

General Rationale: To read and understand the meaning of a text, it is first necessary to read and understand the meaning of the words within the text. Decoding forms the foundation for all reading skill (Baron, 1979; Chall, 1983; Perfetti & Lesgold, 1977; 1979; Stanovich, 1981). Components of word recognition, also called micro-skills, include phonological knowledge and orthographic knowledge (Ehri, 1991; Greenberg, 1997). When these components are mastered and integrated, efficient reading can occur. Amalgamation theory explains this process, explaining that when visual and phonological information merge in memory, readers are able to access familiar words quickly and directly (Ehri, 1992).

There is almost no research concerning micro-skill proficiencies in SLR adults (Eskey, 1988; Koda,1994). The assessment tasks in this study were developed for FLRers, and are generally used to test micro-skill proficiencies in FLR. This study presents assessments for three categories of micro-skills: phonological, orthographic. and decoding knowledge

HYPOTHESIS #1: (PHONOLOGICAL KNOWLEDGE): SLR comprehension is affected by L2 phonological knowledge.

Assessments: Assessments were WATTACK (non-word decoding) and DELETION (Deletion) .

General Rationale: Phonological skill is the ability to use the sounds in a language to help process oral language and print (Wagner et. Al, 1994; Greenberg. 1997).

WATTACK Rationale: Phonological decoding refers to the reader's transformation of a written word into a sound-based representation (Wagner & Torgesen, 1987). Inexperienced FLRers who do not have a large store of words in their lexicons tend to rely on phonological correspondence rules to help them read words (Jorm & Share, 1983). Word Attack is a task which measures how well individuals can read unfamiliar words. The words in the task are nonsense words (pseudo-words), thus assuring that the items are unfamiliar to the subject. This is considered a good test of phonological decoding or because, with nonsense words, it is not possible to apply visual or "whole word" strategies (Stanovich et al., 1984; Pratt & Brady, 1988; Read & Ruyter, 1985; Greenberg, Ehri, & Perin, 1997). FLRers who can read nonsense words well are more likely to be good readers because they are able to use spelling-sound correspondence rules or analogy strategies to decode words. (Stanovich et al., 1984).

DELETION Rationale: Deletion is a test of phonological awareness. The performance of this task, which requires an individual to repeat a word without a specified phoneme, syllable, or word part, requires phonological awareness (Greenberg, 1997; Adams, 1990), and has been shown to correlate with reading ability (Pratt & Brady, 1988; Rosner & Simon, 1971).

HYPOTHESIS #2 (ORTHOGRAPHIC KNOWLEDGE): SLR comprehension is affected by L2 orthographic knowledge.

Assessments: The assessments were LPATT (Letter Pattern Recognition) and SPELL (Spelling).

General rationale: Orthographic skill consists of the memory for particular visual and spelling patterns, enabling readers to identify specific words and word parts in written language (Barker et al., 1992; Stage & Wagner, 1992; Greenberg, 1997; Morris & Perney, 1984). Orthographic knowledge is related to print exposure (Stanovich & West, 1989). For FLR, orthographic knowledge increases as children become more proficient readers, explaining 3% of the variance in word reading for first graders and 20% of the variance for second graders (Juel et.al.. 1986).

LPATT Rationale: Orthographic awareness refers to knowledge of legal and illegal letter sequences in a specific language (Morris & Penney, 1984). Letter pattern recognition is a test of this awareness. Ehri (1991) claims that readers can use orthographic patterns as a strategy to identify unfamiliar words. Read and Ruyter (1985) hypothesize that it is possible for FLRers to compensate for phonological deficits by developing orthographic skills. Stanovich and West (1989) show that orthographic knowledge accounts for some of the variance in FLR children's word recognition.

SPELLING Rationale: Stage & Wagner (1992) claim that spelling tests assess orthographic knowledge. It is hypothesized that experienced readers become efficient by forming an amalgamation of phonological and orthographic images in memory

(Ehri, 1992). Spelling knowledge facilitates this amalgamation (Stanovich & West 1989). Correct spelling is evidence that readers know how orthographic knowledge corresponds to phonology (Ehri 1989). For FLR children, and also for FLR adult literacy students, there is evidence that spelling knowledge is related to word recognition ability (Bear et al., 1989).

HYPOTHESIS #3 (DECODING SKILL): SLR comprehension is affected by L2 decoding skill.

Assessment: The assessment was WIDENT (Word Identification).

Rationale: WIDENT is a test of word decoding skill. For FLR, decoding is considered one of the main building blocks for reading and makes an important contribution to reading comprehension. (Dorgunoglu, Nagy, & Hancin-Bhatt, 1993, Greenberg, Ehri, & Perin, 1997; Chall 1983; Perfetti & Lesgold 1977; 1979; Stanovich, 1980; Shankweiler, Crain, Brady, & Macaruso, 1992). Without good decoding skills, the complex cognitive demands of reading comprehension are impaired (Adams, 1994; Perfetti, 1988; Rayner & Pollatsek, 1994). Poor readers have poor decoding skills, and reading problems are the consequence of poor decoding (Golinkoff & Rosinski, 1976; Pace & Golinkoff, 1976). A reader must be able to recognize at least 80% of the words in a text in order to comprehend the meaning (Fowler & Scarborough, 1993). For children, the correlation between decoding and reading comprehension scores is very high (Perfetti & Hogaboam, 1975, Greenberg, Ehri, & Perin, 1997). Fifth graders who do not demonstrate automatic decoding ability have problems with reading comprehension (Perfetti & Hogaboam, 1975). Decoding skill

accounts for a good share of the variance in reading ability, even with college students (Cunningham, Stanovich, & Wilson, 1990).

2. L2 Word Knowledge

HYPOTHESIS #4 (L2 WORD KNOWLEDGE): SLR comprehension is affected by L2 word knowledge.

Assessments: The assessments for word knowledge were SDRTVOC (vocabulary) and WREAD (irregular word reading).

General rationale: Word knowledge is a skill which requires orthographic, syntactic, and semantic knowledge. Word knowledge may be either meaning-based, requiring the individual to identify the meaning of the word, or recognition based, requiring only prior experience and familiarity with the word (Tierney, Readence, & Disner, 1985). The development of word knowledge depends upon experience with print (Stanovich, Cunningham, & Freeman, 1984; Stanovich, 1986).

SDRTVOC Rationale: This is a test for meaning-based vocabulary knowledge. For FLR children, there is a high correlation between vocabulary knowledge and reading ability (Cunningham & Stanovich, 1990; Stahl, 1983; Beck, Perfetti, & McKeown, 1982).

WREAD Rationale: Irregular word reading is a test for the ability to recognize irregular words in print. Because irregular words do not follow basic spelling-sound correspondence rules, the ability to read these words can be considered a measure of sight word reading (Adams & Huggins, 1985; Ehri, 1991). For FLR, the ability to

read irregular words increases with grade level and is correlated with overall reading ability (Adams & Huggins, 1985; Fowler & Scarborough, 1993). Exposure to print is an important factor in increasing lexical knowledge; without sufficient print exposure, readers are unable to identify irregular words such as *suede* and *island* (Juel et al.,1986).

3. L2 Grammatical knowledge

HYPOTHESIS #5 (GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L2 grammatical knowledge.

ASSESSMENTS: The assessments were GRAMLIST (the section of the L2 grammar test in which the prompt is orally presented) and GRAMREAD (the section of the L2 grammar test in which the prompt is read from the text).

RATIONALE: Research indicates that language skills are predictive of reading skills (Chall, 1983; Levy & Carr, 1990; Celce-Murcia & McIntosh, 1979; Carr, 1981; Fowler & Scarborough, 1993: Tunmer & Hoover, 1992).

4. L2 Reading Strategies

HYPOTHESIS #6 (SCANNING): SLR comprehension is affected by the strategy of L2 reading scanning.

HYPOTHESIS #7 (READING COMPREHENSION STRATEGIES): SLR comprehension is affected by reading comprehension strategies.

Assessments: The assessment for scanning was SDRTSCAN (a separate section of The Stanford Diagnostic Reading Test which concerns scanning). The assessments for the reading comprehension strategies were the four categories of strategies included within the reading comprehension segment of The Stanford Diagnostic Reading Test (initial understanding, interpretation, analysis, and process strategies).

General rationale: Beyond the micro-skills, word knowledge, and grammatical knowledge, readers must be skilled in using different reading strategies for different kinds of texts and comprehension tasks (Adams, 1990; Fowler & Scarborough, 1993). Strategies which produce skill in reading accuracy are different and distinct from decoding abilities. (Samuels, Begy, & Chen, 1975). There are features of discourse structure and paragraph organization that may interfere with reading comprehension. Effective readers need flexibility in order to apply appropriate strategies in reading for different kinds of information (Celce-Murcia & McIntosh, 1979).

5. L1 Knowledge

HYPOTHESIS #8 (L1 GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L1 grammatical knowledge.

HYPOTHESIS #9 (L1 READING COMPREHENSION): SLR comprehension is affected by L1 reading comprehension.

Assessments: The assessment for L1 grammatical knowledge was SPANGRAM, a test of Spanish grammar. The assessment for L1 reading comprehension was SPANREAD, a test for Spanish reading comprehension

General rationale: There is a great deal of second language acquisition research and bilingualism research which claims that L1 knowledge affects L2 academic proficiency (Hoffman, 1991; Hammers & Blanc, 1989; Cummins, 1984; Cummins , 1984 (wanted), Cummins (role) Cummins, 1987; Cummins, 1991; Lucas, Henze, & Donato; Cummins, 1986; Spener. 1988; Ovando; 1990; Solomone: 1981).

Chapter 6

Statistical Results

1.Description of Data Tables

The data from this study are presented in thirteen tables, which include a description of the assessment tasks, overall results, correlations, factor analysis, and regression analyses.

Table 1 presents a description of the assessment tasks for the study. Table 2 presents the overall results, including totals, means, standard deviations, and the mean percentage of correct answers for each task.

Table 3 presents a correlation matrix for the main variables. The p values are two-tailed, and those correlations which are significant at the 0.01 and 0.05 level are marked with asterisks. Correlations which are significant at the 0.1 level are also highlighted by a boldface type.

Table 4 presents correlations of the reading strategies with the independent variables. The p values are two-tailed, and those correlations which are significant at the 0.01 and 0.05 level are marked with asterisks. Correlations which are significant at the 0.1 level are also highlighted by a boldface type.

Table 5 presents the variances of the five factors identified by the factor analysis.

Table 6 presents the rotated component matrix of the five factors identified by the factor analysis.

Table 7 presents the summary of the main factors identified by the factor analysis.

Table 8 presents results of regression analyses using the factor of ENG-READING as the dependent variable and other factors as independent variables.

Table 9 presents the results of individual regression analysis, in which each independent variable was regressed against the dependent variable, SDRTCOMP. SDRTCOMP, the criterion measure for this study, represents SLR comprehension, and it is based on total number of correct responses on a reading comprehension exam.

Table 10 presents the results of individual regression analysis, in which each independent variable was regressed against the dependent variable, SDRTPERC. SDRTPERC is an alternate measure of reading comprehension, which is derived from the percentage of questions answered correctly.

Table 11 presents the results of individual regression analyses, in which each of the reading strategies was regressed against the dependent variables of SDRTCOMP and SDRTPERC.

Table 12 presents the results of individual regression analyses, in which each independent variable was regressed against the dependent variable SDRTSCAN, which is an assessment measure for the strategy of scanning.

Table 13 presents the results of regression analyses, using word identification (WIDENT) and Spanish reading comprehension (SPANREAD) as dependent variables.

2. Hypotheses and results

This study proposed nine hypotheses to investigate the relationship of various skills to SLR comprehension. For all hypotheses, the dependent variable was a test for reading comprehension, The Stanford Diagnostic Reading Test, SDRTCOMP.

To investigate questions and assumptions raised by The Reading Wars, this research study proposed seven hypotheses to examine the relationship of L2 micro-skills, L2 word level skills, L2 grammatical skill, and L2 reading strategies to SLR comprehension.

To explore questions and assumptions raised by The Language Wars, this research study proposed two hypotheses (numbers eight and nine) to examine the relationship of L1 grammar and reading comprehension to SLR comprehension.

2. 1 L2 Micro-Skills

HYPOTHESIS #1 (PHONOLOGICAL KNOWLEDGE): SLR comprehension is affected by L2 phonological knowledge.

Assessments: Assessments were WATTACK (non-word decoding) and DELETION.

Results: The hypothesis was not supported for WATTACK, but was supported for DELETION.

The contribution of word attack was not significant.

Deletion accounted for 26% of the variance (p=<.000).

HYPOTHESIS #2 (ORTHOGRAPHIC KNOWLEDGE): SLR comprehension is affected by L2 orthographic knowledge.

Assessments: The assessments were LPATT (Letter Pattern Recognition) and SPELL (Spelling).

Results: The hypothesis was weakly supported for LPATT and for SPELL.

Letter pattern recognition accounted for 8% of the variance, (p.=<.042).

Spelling accounted for 9% of the variance (p.<.027).

HYPOTHESIS #3 (DECODING): SLR comprehension is affected by decoding skill in L2.

Assessment: The assessment was WIDENT (Word Identification).

Results: The hypothesis was supported.

Word identification accounted for 16% of the variance, (p.=<.003).

2.2 L2 Word Knowledge

HYPOTHESIS #4 (WORD KNOWLEDGE): SLR comprehension is affected by L2 word knowledge.

Assessments: The assessments for word level skills were SDRTVOC (vocabulary), WREAD (irregular word reading).

Results: The hypothesis was supported.

Vocabulary accounted for 21% of the variance (p.=.000).

Irregular word reading accounted for 24% of the variance(p.=.000).

2.3 L2 Grammatical Knowledge

HYPOTHESIS #5 (GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L2 grammatical knowledge.

Assessments: The assessments were GRAMREAD (reading grammar, the written section of the L2 grammar test) and GRAMLIST (listening grammar, the orally presented section of the L2 grammar test).

Results: The hypothesis was supported for reading grammar but was not supported for listening grammar.

The contribution of listening grammar was not significant.

Reading grammar accounted for 10 % of the variance (p.=<.022).

2.4 L2 Reading Strategies

HYPOTHESIS #6 (SCANNING): SLR comprehension is affected by the strategy of L2 scanning.

Assessment: The assessment was SDRTSCAN (the section of the Stanford Diagnostic Reading Test which concerns scanning).

Results: The hypothesis was supported.

Scanning accounted for 13% of the variance (p.=<.006).

HYPOTHESIS #7 (READING COMPREHENSION STRATEGIES): SLR comprehension is affected by the L2 strategies of initial understanding, interpretation,

critical analysis, and process strategies.

Assessments: The assessments were those sections from the Stanford Diagnostic Reading Test which were identified as representing each of the above four strategies.

Results: The hypothesis was supported.

Initial understanding accounted for 80%, interpretation 89%, critical analysis 37%, and process strategies 49% of the variance (p.=<.000).

2.5 L1 Knowledge

HYPOTHESIS #8 (L1 GRAMMATICAL KNOWLEDGE): SLR comprehension is affected by L1 grammatical knowledge.

Assessments: The assessment was SPANGRAM (Spanish grammar).

Results: The hypothesis was not supported.

The contribution of Spanish Grammar was not significant.

HYPOTHESIS #9 (L1 READING COMPREHENSION): SLR comprehension is affected by L1 reading comprehension.

Assessments: The assessment was SPANREAD (Spanish reading comprehension).

Results: The hypothesis was supported.

Spanish reading comprehension accounted for 12% of the variance (p.=.012).

Chapter 7

Discussion of Statistical Analysis

1. Statistical Tests

The purpose of this study was to show the relationship of various component skills to SLR comprehension. A test for reading comprehension, The Stanford Diagnostic Reading Test, SDRTCOMP, was used as the criterion task (or dependent variable) to measure SLR comprehension. All other tasks were predictor (or independent variables), used to measure their relationship to SLR comprehension. The overall results for this study were maximum possible scores, means, standard deviations, and a score which represented the percentage of correct answers for each task. The statistical tests used to draw conclusions from the study's data were correlation, factor analysis, multiple regression, individual regression, and a test for the difference between *rs* .

1.1 Description of Tasks, Overall Results, and Correlation Matrix

A description of the thirteen main tasks in this study is presented in Table 1. Overall results for all subjects, including maximum possible scores, means, standard deviations, and a score which represents the percentage of correct answers for each task are presented in Table 2. Fifty-five subjects completed all tasks.

Table 3 shows a correlation matrix for the thirteen tasks. From the matrix it is clear that many of the tasks for reading sub-skills show high degrees of inter-correlation with each other.

1.2 Factors Influencing the Choice of Statistical Tests

The correlation matrix shows that many of the component sub-skills are highly correlated with each other. This relationship is not surprising, since reading is a complex activity which integrates many kinds of skills, and although the tasks in this study are presumed to represent discrete sub-skills, many of them cannot be accomplished without the application of the micro-skills of basic phonological and decoding skill.

Two questions were presented by this situation of inter-correlated data:

1) What is the best way to determine whether the various tasks are really measuring different component skills or whether they are actually measuring the very same skill?

2) When there is inter-correlated data, it is difficult to get a clear picture from the results of multiple regression analyses because one variable is likely to cancel out the effects of another related variable. What is the best way to obtain a meaningful understanding of the relationship of the component tasks from regression analysis in a situation in which the relationship of one variable may be obscured by the relationship of a highly correlated variable?

To answer the first question, a factor analysis was done to determine whether the data could be grouped into composite factors which would then represent discrete categories of reading sub-skills. To answer the second question, a series of individual regressions were done, using one predictor variable at a time. These individual

regressions produced a set of variables which were shown to be significantly correlated to SDRTCOMP and could be said to make significant contributions to the model of SLR comprehension.

2. Factor Analysis

2.1 Factors

With the assistance of Dr. Ralph W. Larkin, of Academic Research Consulting Service (2000), a factor analysis was done to determine whether the data could be grouped into factors which would then represent discrete categories of reading skills (Tables 5,6,7). Fourteen tasks were analyzed using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. Bartlett's Test of Sphericity was done to determine that the data had a normal distribtution, and a one-sample Kolmolgorov-Smirnov Test was done to confirm that all measures were within a range of possible values. After the factor analysis was completed, reliability analyses were done on all tasks, using the Alpha Scale.

For the factor analysis, the Principal Component Analysis extraction method was used. Table 5 presents the total variances of the five composite groups that were formed by the factor analysis. Using those tasks with eigenvalues equal to or greater than 1.00, five components were extracted which accounted for 32.8% of the variance. The five principal axis factors were orthogonally rotated using a Varimax rotation procedure with Kaiser Normalization. Rotation converged in seven iterations. Orthogonal rotation of the factors yielded the factor structure given in Table 6 which

presents the rotated component matrix, and indicates the components of five interpretable factors.

The results of this factor analysis (Table 7) produced a model which indicated that most of the assessments of the study could be grouped into three independent factors:

Factor 1) The L2 micro-skills, L2 word knowledge skills, and L2 grammatical skill clumped into one factor, which was labeled ENG BOT-UP, and which accounted for 32. 832% of the variance.

Factor 2) The L2 reading comprehension and L2 reading strategies grouped into a second factor, which was labeled ENG-READING, which accounted for 15.984% of the variance.

Factor 3) The L1 skills grouped into a third factor, which was labeled SPANISH, and which accounted for 7.362% of the variance.

The factor analysis showed that there were two other factors which did not group with other factors and which accounted for only a small percent of the variance. These last two factors were the test for speed (SPEED), and the test for letter pattern recognition (LPATT) (Larkin, 2000; Kline, 1994).

2.2 Regression Analysis of Constructs from Factor Analysis

To determine the relationship of the three main factors created by the factor analysis, a forced entry regression analysis was done, using Factor 2 (ENG-READING) as the dependent variable, and factors 1 and 3 as the independent

variables (Table 8). (These regression analyses were done as part of the factor analysis, and should not be confused with the individual regression analyses done later). The results of this regression analysis showed that both ENG BOT-UP and Spanish reading comprehension were significantly correlated with SLR comprehension, together accounting for 15% of the variance, ($p.<.006$). However, the relationship of ENGBOT-UP was shown to be stronger, as only the variance of ENG BOT-UP was significant (Beta=.32, $p.<.023$), whereas, the variance of Spanish reading comprehension was not significant (Beta = .18, $p.<.188$). Spanish grammar and one of the orthographic skills, LPATT, made no contribution to the model (Larkin, 2000).

3. Individual Regression Analyses

For the purposes of this study, the regression analysis done with the factor analysis was only exploratory. It identified a general picture of what processes contribute to a model of SLR comprehension. However this picture, in which all of the L2 bottom-up skills are combined into one factor, and the L2 reading comprehension and L2 strategies into a second factor, provides little information about which of the skills within each factor can actually be said to make significant, essential contributions to a model. In addition, it does little to clarify the theoretical issues raised by The Reading Wars or The Language Wars, and cannot suggest directions for pedagogical objectives. So, to obtain a more accurate and productive representation of SLR comprehension, it was necessary to do additional regression

analyses using the Stanford Diagnostic Reading Test (SDRTCOMP) as the dependent variable, and each of the individual tasks in the study as independent variables.

Generally, the results of multiple regression analyses will indicate which variables have a significant relationship to the dependent variable, and will also show the relative weights of the relationships. However, in a situation in which variables are closely related, the results of multiple regressions can be unclear since the relationship of one skill can obscure or even cancel out the relationship of another closely related skill. Because of this inter-correlation in the data, the best option for this study was to use the factor analysis as a general guidepost, to follow with exploratory multiple regressions, and finally, to do a series of individual regressions, using a single independent variable at a time. In the data produced by a series of individual regressions, the interpretation of the regression coefficient is straightforward, and can yield information about which of the inter-correlated skills are making significant contributions to the criterion measure of SLR comprehension. The data from these individual regression analyses will be used for the conclusions and discussion of this study (Green, Salkind, & Akey, 1997; Norusis, 1998).

4. Test for the Difference Between rs

A test for the difference between two rs was done to determine whether it was possible to say that the differences in regression results for the different independent variables were significant. In other words, would it be possible to claim that deletion which shares 26% of the variance, is a better predictor of SDRTCOMP that word

identification, which shares 16% of the variance. However, the range of variances produced by the individual regression analyses was not large enough to claim that the differences were significant. Consequently, the results of this study will show which processes are significantly related to SDRTCOMP, but not whether one process is more significantly related, or shares more of the variance, than another (McNemar, 1962).

5. Two Measures for SLR Reading Comprehension: SDRTCOMP and SDRTPERC

This study concerns reading comprehension and what kinds of skills in L1 and L2 may contribute to the successful attainment of this skill. Although it is generally agreed that reading comprehension is the ultimate goal of reading proficiency (Braddeley, Logie, & Nimmo-Smith. 1985), there is little agreement on what might be the best way to assess this skill, particularly in the case of non-traditional students, adult students, and SLR students (Fowler & Scarborough, 1993; Greenberg, Ehri, & Perin, 1997; Harris & Sipay, 1990). For this study, The Stanford Diagnostic Reading Test, a standardized, timed reading comprehension test with passages and multiple choice answers, was the criterion measure for reading comprehension.

However, using a standardized reading comprehension test for the subjects in this study poses some possible problems. This test was designed to measure FLR comprehension and the subjects in this study are SLRers. SLRers tend to read more slowly than FLRers (Favreau & Segalowitz, 1983; Segalowitz, 1986; 1991;

Segalowitz & Segalowitz, 1993), and scores on standardized reading comprehension tests are highly influenced by the reading speed of the subject. To determine whether another measure might give a more accurate indication of the subjects' reading comprehension ability, two different kinds of scores were devised from the same test. The first score, SDRTCOMP, corresponding to the conventional way of scoring, is a measure of the total number of questions which were answered correctly in the specified amount of test time. The second score, SDRTPERC, is a measure of the percentage of questions that were answered correctly in the specified amount of test time.

By devising a score which is less dependent on speed, and by comparing the two scores, it was possible to extrapolate the influence of speed on SLR comprehension skill. It was also possible to observe which sub-skills of reading comprehension were most affected by speed. However, for the purposes of this study, and to draw clear conclusions from the proposed hypotheses, SDRTCOMP, the conventional way of scoring reading comprehension, was used as the criterion measure, or dependent variable.

Chapter 8

Discussion

1. Introduction

The primary objective of this study was to use empirical data to determine which processes predict SLR comprehension, and then to construct a model of SLR comprehension. This model of SLR was developed by applying some of the questions and assumptions which characterize The Reading Wars to adult SLRers. To accomplish this objective, several hypotheses were proposed to examine the relationship of L2 micro-skills, L2 word level skills, L2 grammatical skills, and L2 reading strategies to SLR comprehension. A secondary objective of his study was to explore how the influence of the L1 affects a model of SLR comprehension. The effect of the L1 on SLR comprehension was examined by applying some questions and assumptions discussed in The Language Wars to adult SLRers. To accomplish this objective, additional hypotheses were proposed to examine the relationship of L1 grammar and reading comprehension to SLR comprehension.

2. Overall Results

2.1 Comparing Percentages of Correct Responses

Table 2 shows a similar pattern of correct responses for the different categories of skills. For the L2 decoding skills, subjects scored an average of 60% correct for word attack and 62% correct for word attack word identification. For the other L2 skills, the average percentage of correct responses (except for letter pattern

recognition) ranged from 34% to 47%. For the Spanish language skills, the average percentage of correct responses ranged from 81% to and 87%.

2.2 Correlation Matrix

Table 3, the correlation matrix, shows that many of the independent variables are highly correlated with each other. This inter-correlation was not surprising, since reading is a complex activity which integrates many kinds of skills (Carr, 1981; Gouge & Tunmer, 1986; Hoover & Tunmer, 1992). Although the tasks in this study are presumed to represent discrete sub-skills, many of them depend on other skills. For example, none of the tasks can be accomplished without the application of at least the basic phonological and decoding skills (Adams, 1990; Fowler & Scarborough, 1993).

2.3 Tasks that Did Not Contribute to the Model

Three assessment tasks will be excluded from the discussion of the data. The results of the factor analyses show that the assessment tasks for letter pattern recognition and speed were non included in the factors that represented the L2 skills (factors 1 and 2) (Tables 5,6,7). And so these two assessments will not be included in the discussion. As reading grammar proved to be a better assessment for L2 grammar than listening grammar, listening grammar will also be excluded.

The results of the L2 assessments indicate that word attack, one of the phonological tasks, did not show a significant relationship to the criterion measure,

SDRTCOMP (Table 9). All of the other L2 skills which will be discussed were significantly correlated with SDRTCOMP. Also, the results of the L1 assessments indicate that Spanish grammar did not show a significant relationship to SDRTCOMP. However, Spanish reading comprehension was significantly correlated with SDRTCOMP. The results concerning word attack and Spanish grammar raise important questions about the model of SLR comprehension

3. Important Results and Questions

3.1 Questions Raised by the Results of Word Attack

Word attack, which is a test of phonological decoding, is an important predictor of FLR (Adams, 1990; Fowler & Scarborough, 1993). One of the most important results of this study was the fact that word attack did not show a significant relationship to SDRTCOMP (Table 9).

These results motivated three questions:

1) What is the difference between the two phonological tasks, word attack and deletion? Why was deletion, a test of phonological awareness, significant, but not word attack, a test of phonological decoding?

2) What is the difference between the two decoding tasks, word attack, the decoding of pseudo-words, and word identification, the decoding of real words? Why was word identification significant, but not word attack?

3) Since word attack, which is an important predictor of FLR, did not show a significant relationship to SLR , can we then claim that the models of FLR and SLR

are different?

3.1.1 Word Attack and Deletion

Phonological skill is the ability to use the sounds in a language to help process oral language and print (Wagner & Torgesen, 1987; Wagner, Torgesen, & Rashotte, 1994; Fowler & Scarborough, 1993). For reading, phonological knowledge is considered the most basic micro-skill, as it enables an individual to relate graphemic symbols to the sound system of the language (Wagner & Torgesen, 1987: Wagner, Torgesen, & Rashotte, 1994).Two assessments were given to test phonological knowledge; non-word reading (word attack) and deletion. The regression analyses results showed that word attack made no significant contribution to SLR comprehension, whereas deletion made a very important contribution (Table 9). The difference in these results can be explained by the fact that word attack is a simple, micro-skill, while deletion is a complex, lexically based micro-skill.

Simple micro-skills are defined as those skills which consist of a single task and do not depend on lexical knowledge. Word attack is a simple micro-skill because it requires knowledge of the relationship of letters to sounds, but does not require language specific knowledge. In fact, it would theoretically be possible to perform word attack, which was created as an English language micro-skill, without knowing a single word in the English language.

Lexically based micro-skills are defined as those skills which require semantic and lexical knowledge. Deletion, a test of phonological awareness, is a lexically based

micro-skill, and cannot be performed without some knowledge of the L2. It requires that a subject pronounce a word in its entirety, for example *reproduce* and then to repeat it without a specific segment, as in *reduce.* This task requires a substantial amount of experience with the language, and its syllabification system, in order to retain a word in memory, manipulate it, and then to create and pronounce the word segment that results from that manipulation (Tunmer, Herriman, & Nesdale, 1988).

3.1.2 Word Attack and Word Identification

In the task of word attack, the subject decodes pseudo-words; in the task of word recognition, the subject decodes real words. Both of these tasks are important predictors of FLR (Adams, 1990; Fowler & Scarborough. 1993; & Greenberg, Ehri. & Perin, 1997), but only word identification showed a significant relationship to SDRTCOMP (Table 9). This difference can also be explained by the fact that word attack is a simple micro-skill, but word identification is a complex, lexically based micro-skill.

It is not possible, at least in English, to perform a skill like word identification by only applying letter-sound correspondences. To correctly pronounce many of the words for the task of word identification, letter/sound correspondences must be integrated with language specific orthographic and semantic knowledge (Adams, 1990; Ehri & Wilce, 1987). Although it does not require the individual to define or use the items presented, word identification nevertheless demands experience with the vocabulary and spelling patterns of the language. Examples in like *this, is, come, you*

, *book, two* are high frequency English words, but nonetheless do not follow the most common English spelling-sound correspondence rules. For example, although *this* and *is* may both be considered "regular" words, the pronunciation of *this* can not be analogized to the pronunciation of *is*, as the sound */s/* is pronounced as an /s/ in *this* and a /z/ in *is*.

3.1.3 Word Attack and the Model of SLR: Are Models of FLR and SLR Different?

Does the fact that word attack does not make a significant contribution to the model of SLR comprehension, mean that the models of FLR and SLR are different? There are three possible answers to this question:

1) One answer is that the models of FLR and SLR are indeed different. The model of FLR contains both simple micro-skills and lexically based micro-skills, whereas the model of SLR contains only lexically based micro-skills. If this answer is correct, it could be explained by the fact that the demands of reading in a L2 magnify the importance of lexical knowledge, and consequently, only lexically based skills make a contribution to the model of SLR.

2) Another answer is that it is not possible to compare the models of FLR and SLR because we do not have enough evidence from the FLR literature to claim a direct relationship between word attack and global reading comprehension.

As was discussed in Chapter 2, most models of FLR use word or sentence reading as the dependent variable In fact, many use the task of word identification as

the measure of reading ability (Fowler & Scarborough, 1993; Shankweiler et. al., 1992; Greenberg, Ehri, & Perin, 1997; Biemiller, 1977). So, what can be claimed with certainty is that, in FLR, the task of word attack is a good predictor of word and/or sentence reading. On the basis of the FLR literature, it is not really possible to claim that word attack also predicts global reading comprehension. Because this study uses global reading comprehension as the dependent variable, we do not enough about the relationship of word attack to FLR global reading comprehension to compare the models of FLR and SLR.

3) A third answer is to assume that the models of FLR and SLR are the same. because in both models word attack has either a direct or an indirect relationship to reading comprehension. In this study, although word attack did not show a direct relationship to SDRTCOMP, it did show an indirect relationship. Word attack shared 50% of the variance of the micro-skill processes, and shared 34% of the variance of word identification (Table 13), and these lexically based decoding skills were significantly related to SDRTCOMP (Table 9). It is up to the FLR research literature to clarify this problem by empirically showing whether the relationship of word attack to global reading comprehension is direct, indirect, or not significant.

The fact that word attack does not predict SLR comprehension does not imply that phonological decoding skill is not an essential component of SLR reading ability. Although word attack did not predict SLR comprehension, it accounted for 34% of the variance of word identification, and word identification was an important predictor of SLR comprehension. Also, one can assume that the Spanish speaking

subjects in this study have mastered the skill of phonological decoding. The Spanish language has a very consistent and transparent system of grapheme/phoneme correspondences and the subjects in the study presented here appear to have basic phonological decoding skill. In comparing the word attack results of these subjects to the AL and FLR children in the Greenberg, Ehri. Perin (1997) study, we find that the SLR subjects in this study scored higher than L1 subjects in that study who were more advanced readers.

3.2 Simple vs. Lexically Based Micro-Skills

In this study, only lexically based micro-skill processes showed a significant relationship to SDRTCOMP. There are two possible explanations for this pattern of results:

One explanation lies in the nature of SLR. Because SLR involves a second language, and because it comes after an individual has learned to decode in L1, the nature of SLR suggests that basic micro-skills will not be predictive of reading skill. Only those micro-skills which incorporate lexical information about the L2 reading language will predict reading ability in that language. A different explanation lies in the nature of global reading comprehension The nature of this process suggests that basic micro-skills will not be predictive and only micro-skills which are lexically based will predict global reading comprehension.

Of the two explanations, it is more likely that the first is better than the second. Studies which show that poor adult FLRers have evidence of phonological

deficits, and have great difficulties with tasks like word attack (Bruck 1990; 1992; 1993; Pratt & Brady, 1988; (Kitz, 1988; Lindamood, Bell, & Lindamood, 1992; Marcel, 1980; Perfetti & Marron, 1995).), imply that in FLR, basic phonological decoding skills predict all kinds of reading skills, reading comprehension as well as word and sentence reading.

3.3 Word Identification and Evidence for a Language Processing Model of SLR

In this study word identification, which was used as a measure of word decoding skill, made an important contribution to SLR comprehension. In this respect the data from the study showed that the model of SLR comprehension corresponds to the model of FLR comprehension (Table 9).

In the language processing model of FLR, word decoding is considered the most central skill, the bridge between the more basic bottom-up skills and the top-down skills (LaBerge & Samuels, 1974; Perfetti, & Lesgold, 1979; Stanovich, 1980).Word decoding is derived from and based upon basic phonological and orthographic micro-skill proficiency Adams, 1990, Fowler & Scarborough, 1993). And, in turn, skillful and efficient word decoding is claimed to be a necessary prerequisite for the complex cognitive processes involved in reading comprehension (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979). In fact, word recognition is considered so central to reading skill that many studies use it as the criterion measure of reading ability (Fowlet & Scarborough, 1993; Shankweiler et al., 1992; Greenberg, Ehri, & Perin, 1997; van den Bosh, van Bon, & Schreuder, 1995).

The relationship between word decoding, the central bottom-up skill, and reading comprehension, the activity which requires the integration of bottom-up and top-down skills, has been suggested in many models of FLR. Language processing models presume that efficiency at decoding skill, which is a bottom-up skill, frees processing resources, making it possible for the cognitive demands of top-down skills (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979). There are many FLR studies and descriptions which claim that decoding is one of the main building blocks for reading, and that good decoding skills are an essential prerequisite for reading comprehension. (Adams, 1994; Perfetti, 1988; Rayner & Pollatsek, 1994; Fowler & Scarborough, 1993; Shankweiler, et. al., 1992; Perfetti & Hogaboam, 1975; Perfetti & Hogaboam, 1975; Cunningham. Stanovich, & Wilson. 1990.)

The purpose of this study was to obtain data to either support or challenge the assumptions of the language processing model, presenting empirical evidence to demonstrate the relationship of word decoding to reading comprehension. Because the data shows that the task of word identification makes a strong contribution to the model of SLR comprehension, the results of this study give very strong support to the language processing model.

3.4 Problems with Orthographic Assessments and Orthographic Skill

This investigator does not believe that the results from this study can answer questions about the relationship of orthographic knowledge to SLR comprehension because there are serious questions about both of the orthographic assessment tasks.

For the first task, letter pattern recognition, the regression results show that its relationship to SLR comprehension was barely significant (Table 9). Because of the small amount of shared variance, and because the factor analysis excluded letter pattern recognition from the factor which contained all of the other L2 bottom-up skills (ENG BOT-UP) (Table 5,6,7), letter pattern was not included in the model of SLR comprehension developed from the data in this study.

This investigator also believes that spelling, the second orthographic assessment, may not be as reliable at predicting SLR ability as it is in FLR. In L1, children generally learn to spell as they learn to read, and, as expressed by Ehri's (1992) amalgamation theory, the coordination of these skills reinforces and supports efficient and accurate lexical storage and retrieval. However, the situation is not the same with SLR, particularly with adult SLR. Generally, adult learners are not presented with a systematic curriculum which teaches all of the basic language skills (Koda, 1994; Eskey, 1988), and have many different cognitive styles for learning new material (Koda, 1988; 1989; 1990). It is very likely that some SLRers may become very competent in recognizing L2 words without learning how to spell them, bypassing the "reverse" orthographic skill of spelling, which requires an individual to translate a word into its orthographic components. Clearly, for some SLRers , spelling ability is a useful skill and contributes to reading ability. However, for other SLRers, it may very well be possible to achieve a high level of reading proficiency without developing L2 spelling skill.

3.5 The Importance of Word Knowledge

One of the most striking effects of this study is the importance of word knowledge in SLR comprehension. The importance of this skill may indeed be the factor which distinguishes the model of FLR comprehension from the model of SLR comprehension.

The examination of the contribution of L2 micro-skills in the context of word knowledge can clarify the special contribution of word knowledge to the process of SLR comprehension. In fact, as the results of this study show, only those complex micro-skill tasks which require the integration of word knowledge had a significant relationship with SLR comprehension. The simple phonological micro-skill of word attack, which does not rely on word knowledge, showed no direct relationship to SLR comprehension. This is very different from the model of FLR, in which simple basic phonological micro-skill is an extremely important predictor of reading skill (Stahl & Murray, 1994; Calfee, Lindamood, & Lindamood, 1973; Adams 1990; Fpw;er & Scarborough, 1993).

3.6 The Importance of Grammatical Knowledge

In this study, there were two tests of grammatical knowledge, listening grammar, and reading grammar. Only one of these tasks, reading grammar, showed a significant relationship to SLR comprehension. The procedure for listening grammar required individuals to understand and process orally presented items and then

respond to grammatical questions concerning these items. Although the correctness of the grammatical response determined an individual's score, insufficient oral skill inevitably interfered with success at this activity. So, for the L2 subjects in this study, the listening grammar component functioned more like a listening test than a grammar test. Because of this, it is on the basis of the reading grammar assessment that grammatical knowledge is included in the model of SLR comprehension.

The results of this study, showing the relationship of reading grammar to a model of SLR comprehension, demonstrates empirical evidence for the contribution of explicit grammatical skill (Table 9). Many FLR studies assume that linguistic competence bears a relationship to reading ability, but grammatical knowledge in L1 children is implicit, and is notoriously difficult to test. Although there are a few studies which demonstrate the relationship of syntactic awareness to reading ability (Carr, 1981; Tunmer & Hoover, 1992; Chall, 1983; Levy & Carr, 1990; Celce-Murcia & McIntosh, 1979; Fowler & Scarborough, 1993), no study shows the relationship of explicit grammatical knowledge. However, in the case of SLR, particularly adult SLR, the situation is different, and hence, the model is also different. This study empirically demonstrates the contribution of explicit L2 grammatical knowledge to a model of SLR comprehension.

3.7 L2 Reading Strategies

There were five different L2 reading strategies involved in this study. Four of the strategies were components of the reading comprehension segment of the Stanford

Diagnostic Reading Test: initial understanding (INITIAL: initial understanding of directly stated ideas and relationships), interpretation (INTERP: inferences, predictions, conclusions), critical analysis (ANALYSIS: evaluation) , and process strategies (PROCESS: recognizing and identifying text structures and types of text). There was also a test for scanning (SDRTSCAN), which was a separate component of The Stanford Diagnostic Reading Test, and is totally independent of the reading comprehension section.

All of the four strategies which were components of The Stanford Diagnostic Reading Test, contributed to reading comprehension (Table11). However, because the reading strategies are top-down skills and because the SLR model in this study is constructed from bottom-up skills, the data from the reading strategies were not included in the SLR model presented here.

The decision to interpret the reading strategies as separate from the model was corroborated by the results of the factor analysis (Table 5,6,7), which show them to be a separate factor from the L2 component sub-skills. The results of this factor analysis provides strong evidence that the strategies are part of the reading comprehension processes, and should not be evaluated as components which build a foundation for this process.

It was not surprising that all of the strategies were significantly related to SLR comprehension, as they were all included within the comprehension component of The Stanford Diagnostic Reading Test. However, this study also investigated the relationship of the component sub-skills to the four reading comprehension strategies.

Although is assumed that various kinds of texts and various reading goals demand different strategies (Harris & Sipay, 1990; Murcia-Celce & McIntosh. 1979), there are no studies to determine what kinds of sub-skills are necessary to perform these strategies. To investigate this question, regression analyses were conducted to learn what skills showed a significant relationship to the five reading strategies in this study. The results of these regression analyses, in which each of the strategies was used as a dependent variable. showed that the same skills that demonstrated a relationship to SLR comprehension had a comparable relationship to the different reading strategies. These results suggest that, although reading strategies may demand different skills at other levels of reading, at least for individuals who read at the level of this study, the same skills which are significantly related to SLR comprehension are also significantly related to the different reading strategies. It is likely that, at this level of reading, it is word knowledge that drives the successful application of the various strategies, just as word knowledge drives SLR comprehension. Only the separate strategy of scanning (which will be discussed in the following paragraphs). demonstrated a different pattern.

The results showing the relationship of scanning to reading comprehension are somewhat different from that of the four reading strategies. Scanning shared 13% of the variance of SDRTCOMP, the criterion measure for this study (Table 9). However. scanning did not have a significant relationship to SDRTPERC (Table 10), the measure of SLR comprehension which represents the percentage of correct answers on the same reading comprehension test. This was unusual, as all of the other

independent variables showed a similar relationship to SDRTCOMP and SDRTPERC (Table 9,10).

The results also show that scanning is really a very different activity from the other reading strategies. In another set of regression analyses, using scanning as the dependent variable and the other tasks in this study as independent variables, none of the tasks that were significantly correlated with SLR comprehension showed a relationship to scanning (Table 12). This can be explained by the nature of what actually happens in the process of scanning . Scanning demands a quick perusal of a text with the purpose of finding a specific answer to a factual question. It is only necessary to understand the gist of the question, and to locate a single portion of corresponding information in the text. A scanning task can frequently be accomplished simply by matching words in the question to the relevant words in the answer. It is not necessary to decode every word, and it is possible to scan a text without knowing the meaning of many of the included words. Because of this, neither decoding skills, word knowledge skills, nor grammatical skills show a relationship to this strategy. It is particularly striking to observe that lexical knowledge, which plays such a strong role in SLR comprehension, appears to have virtually no relationship to scanning skill.

3.8 The Contribution of Spanish Knowledge

Although the main focus of this study was to determine the L2 components of a SLR model, there was also an exploratory investigation of the nature of the L1

contribution. On the basis of this exploratory investigation, the data suggests that L1 grammatical skill does not directly contribute to the model of SLR comprehension. However, there is evidence of the transfer of L1 reading comprehension skill. The data in Table 9 show that Spanish reading comprehension makes an important contribution to the model of SLR comprehension. These results confirm the claims of L1 literacy theories (Hoffman, 1991; Hammers & Blanc, 1989; Cummins, 1981; Cummins, 1984a; Cummins, 1984b; Cummins, 1986; Cummins, 1987; Cummins, 1991; Lucas, Henze, & Donato (1990); Spener, 1988; Ovando; 1990; Solomone; 1981). and suggest that the transfer of skills from the L1 to the L2 are an important factor in SLR comprehension. However, as this study shows, this transfer of skill comes from L1 reading and not L1 grammar.

3.9 The Indirect Contribution of Word Attack and Spanish Grammar

Two tasks in this study did not make a direct contribution to the model of SLR comprehension. However, they may still be considered important component skills because of their indirect contribution. Word attack did not share any of the variance of SDRTCOMP. However, it shared 34% of the variance of word identification, and also shared 50% of the variance of the other lexically based micro-skills which had a significant relationship to SDRTCOMP (Table 13).The indirect relationship of word attack, via the relationship to the other sub-skills has already been discussed in section 3.1.3.

Spanish grammar also did not share any of the variance of SDRTCOMP. However, it shared 10% of the variance of Spanish reading comprehension, and Spanish reading comprehension shared 12% of the variance of SDRTCOMP (Table 9. 13).

The relationship of grammatical knowledge to reading comprehension appears to be similar in both languages. In this study, Spanish grammar shared 10% of the variance of Spanish reading comprehension, and English grammar shared 10% of the variance of English reading comprehension. It is pretty clear from these results that grammatical knowledge of a language is related to reading comprehension in that language.

In many of discussions related to The Language Wars, it is assumed that L1 linguistic competence is a very important factor in L2 academic achievement (Hoffman, 1991; Hammers & Blanc, 1989; Cummins, 1984a; Cummins, 1984b; Cummins, 1891; Cummins, 1987; Cummins, 1991). The implications of these assumptions, is that L1 grammatical knowledge is closely related to L2 academic processes, and specifically to SLR. However, from the evidence of this study, it appears that the nature of the L1 influence is somewhat different. L1 grammatical competence is a factor in the academic skill of reading comprehension in the native language, but not in the academic skill of reading comprehension in the L2. The area of transfer is instead, from the academic skill of L1 reading comprehension to the academic skill of L2 reading comprehension.

4. The Criterion Measure for SLR Comprehension Skill

4.1 Reading Ability and Reading Comprehension

Both the definition of reading ability and the selection of an appropriate test to measure reading comprehension are controversial problems which are not easily defined nor agreed upon (Harris & Sipay, 1990). Reading is a complex cognitive activity, requiring the interaction of many kinds of skills. It begins with the relatively mechanical processes (sometimes called bottom-up processes) of phonetic awareness. the linking of phonemic sounds to graphic symbols, and the decoding of words (Adams, 1990). As an individual becomes more proficient at these skills, which primarily involve the identification of words, the reader becomes able to bring other kinds of world knowledge and reasoning processes (sometimes called top-down skills) to the written text. Reading comprehension, which occurs at a relatively advanced stage, involves the integration of various top-down processes with bottom-up skills (Adams, 1990; Fowler & Scarborough, 1993, Harris & Sipay, 1990; Murcia-Celce & McIntosh, 1979).

Reading comprehension may be defined as the meaningful interpretation of written language, comprehending, or constructing meaning from text. These terms, however, "meaningful interpretation," "comprehending," "constructing meaning," actually encompass a great variety of cognitive activities, including many different kinds of thinking, imagining, reasoning, evaluating, judging, and problem solving. During these activities, readers bring their personal knowledge, attitudes, and

particular cognitive styles and abilities into a process in which they interact with the words in the text (Harris & Sipay, 1990). In contrast to decoding skill, which is a relatively mechanical process, reading comprehension is a very personal activity.

4.2 Assessment Problems

Since reading comprehension is a complex skill, requiring the integration of many kinds of processes, it is no surprise that there are several different kinds of reading comprehension tests as well as many conflicting theories about which kind of test produces the most accurate information about reading proficiency. However, there is general agreement on the fact that every reading comprehension test has shortcomings, and that no test can give more than a very limited picture of a very complex event (Harris & Sipay, 1990; Tierney, Readence, &Disner, 1995; Greenberg. Ehri, & Perin, 1997).

There are two major categories of reading comprehension tests. Process measure tests, such as cloze, miscue analyses, eye movement, and think aloud assessments, attempt to measure comprehension "on-line", at the same that the individual is reading. Product measure tests, which present various kinds of questions following a text sample, attempt to measure what is comprehended after a passage has been read. Questions from product measure tests can take the form of aided recall (multiple choice questions), unaided recall (open ended questions) and true/false questions (Harris & Sipay, 1990). In this study, the criterion measure for reading comprehension, The Stanford Diagnostic Reading Test, SDRTCOMP, was a product

measure test with multiple choice questions.

Due to the problems inherent in using a formal test to measure the highly complex and personal process of reading comprehension, individual subject scores must always be interpreted with caution. This particular kind of test measures a single reading event, and requires an individual to choose from a limited set of responses to a limited set of questions in a limited amount of time. The demands of the task, that the individual work quickly and remember essential information for only a short period of time, are somewhat artificial and do not really reflect the kind of processes required in normal reading comprehension. Inference questions, which are designed to measure analytic skills, frequently depend upon prior linguistic and cultural experience for their answer. Although well constructed tests attempt to make most items passage dependent (questions which can be answered acceptably by using only textual information), there are always some examples which can be answered by the reader's outside knowledge. Many kinds of circumstances can influence the outcome of the test, and test taking skills may be as important as reading ability in determining the final score.

The fact that this kind of reading comprehension test must be completed within a limited amount of time presents other problems. In addition to reading comprehension proficiency, the score also reflects reading speed as well as the speed of understanding and responding to questions. Individuals who habitually read and think slowly do not score well on these tests. Because of these problems, SLRers, and non-traditional adult students, who tend to read more slowly than FLRers

(Sagalowitz, 1986; Favreau & Segalowitz 1982; 1983; Fowler & Scarborough, 1993; Perfetti & Marron, 1995). do not generally score as well as FLRers on these tests.

4.3 Differences in Results for SDRTCOMP and SDRTPERC

To understand whether slower readers were correctly represented by the reading comprehension scores achieved by the criterion measure of this study, SDRTCOMP, and to understand more precisely how speed affects SLR comprehension performance, two different kinds of reading comprehension scores were calculated from the same test. The first score, SDRTCOMP, which is based upon the test norms, was determined by the number of correct responses in the specified amount of time. The second score, SDRTPERC, was determined by calculating the percentage of correct answers to the number of questions attempted in the same specified amount of time.

In most cases, the pattern of regression results was the same for SDRTCOMP and SDRTPERC, the two measures devised for the criterion measure of reading comprehension (Table 9,10). Although the variance percentages were consistently higher for SDRTPERC, the statistical test for the difference between *r*s, indicated that these differences were not large enough to be significant. However, for two variables, the results were very different for the two reading comprehension measures. Scanning showed a significant relationship to SDRTCOMP but not to SDRTPERC, and spelling, showed a much stronger relationship to SDRTPERC, sharing 9% of the variance of SDRTCOMP, and 26% of the variance of SDRTPERC.

Since one of the major skills required for success at scanning is speed, it was not surprising that scanning showed a strong relationship to SDRTCOMP and showed no relationship to SDRTPERC. However, the explanation for the different results with spelling are more difficult to explain. For FLRers, spelling education is integrated with early reading education. However, for SLRers, spelling skill is rarely taught. Perhaps the good L2 speller is a well-trained student, who has learned to incorporate correct spelling knowledge while accumulating vocabulary. If this is so, the score for SDRTPERC, which reflects reading accuracy, may be particularly representative of an individual with good academic training, but who has neither sufficient L2 experience nor L2 vocabulary to read and comprehend at a rapid speed.

Another explanation may be that SDRTCOMP and SDRTPERC represent different reading styles, and may also represent different kinds of word decoding skills and/or different levels of reading comprehension skill. SDRTCOMP is a measuring system in which only fast efficient readers can score well; SDRTPERC is a measuring system in which slow accurate readers may score as well as fast efficient readers. Because of this, SDRTPERC is more flexible in determining what kind of reader is classified as a skillful reader. However, because of limited capacity arguments presented by language processing theories of reading (Perfetti 1986; 1988; Daneman, Carpenter, & Just, 1982; LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979; Rumelhart & McClelland 1981; Stanovich, 1980), this investigator believes that rapid reading is necessary to process complex information, and, consequently, SDRTCOMP is the better measure to represent a good reader.

5. Subjects

5.1 Differences Between Children and Adults

Models of FLR are generally developed for children, as conventional literacy instruction occurs in the elementary school years (Chall, 1983). The model of SLR developed in this study was based upon data from adult subjects, and applies to adult SLR comprehension. However, the assessments which produced this data were developed for FLRers and used to test micro-skill proficiencies in FLR (Greenberg, Ehri, & Perin, 1997). In interpreting the results from these assessments, it is necessary to be sensitive to possible differences in what these tasks might indicate for adult subjects. And in interpreting the SLR model developed from this study, it is important to point out the kinds of differences that characterize adult readers and child readers.

One important difference is that children learn FLR in school, in an educational program which generally integrates and sequences the skills that are presumed to impart the necessary proficiencies for reading. Consequently, at least with normally developing readers, there is assumed to be a strong integration of the phonological, orthographic, and decoding micro-skills. Moreover, children learn to spell as they learn to read, so spelling becomes a skill which reinforces the integration of this micro-skill knowledge, and, as such, is generally an excellent predictor of L1 reading ability (Ehri, 1989; 1992; Stanovich & West, 1989).

Adults, particularly SLR adults, are not really taught to read in a L2, they just read as they are learning the vocabulary and grammar of the language. The

phonological, orthographic, and decoding micro-skills are presumed to be in place from FLR, and are not actively taught to adult SLR students (Koda, 1994). Also, SLR adults are generally not taught spelling. Consequently, spelling, which is a good predictor of reading ability in L1, is not as consistent a predictor for SLR adults. Also, adult SLR students, use the micro-skills they have attained in the L1, and use them with the strengths, weaknesses, and personal cognitive habits and preferences that they have developed as they matured (Koda, 1988; 1989; 1990). A weakness in one area may very well be compensated for a strength another area (Stanovich, 1981; Stanovich, 1980; Stanovich, 1986; Samuels & Kamil, 1984). One effect of this more personal and less integrated learning process may be that SLR adults read more slowly than FLR children (Sagalowitz, 1986; Favreau & Segalowitz 1982; 1983; Fowler & Scarborough, 1993; Perfetti & Marron, 1995). However, according to language processing theories of reading, slow reading speed may be more than just an inconvenience, and a factor which produces lower scores on reading comprehension tests. Slow reading speed may interfere with cognitive performance, as it prevents the reader from processing the complex information necessary for reading comprehension (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979; Perfetti, 1988; Rayner & Pollatsek, 1994; Fowler & Scarborough, 1993; Shankweiler, et. al., 1992; Perfetti & Hogaboam, 1975; Cunningham, Stanovich, & Wilson, 1990).

Children's skills are more integrated (Greenberg, Ehri, & Perin, 1997). Adults, however, begin the SLR process with a high level of cognitive development, and a clearer idea of the goals and purposes of reading. This should enable them to apply

the sub-skills in a more efficient and productive way, and to apply their own personal strengths and learning strategies to become more effective students. Also, the top-down skills which are necessary for reading comprehension should be in place for many adults, and transferable as soon as the L2 word and grammatical knowledge is sufficient.

Children are tested in many ways and at various stages in the school process. Consequently, they are generally more capable test takers than SLR adults. For children, many of the tasks in this study were similar to customary school tasks and tests. For the adults, however, these tasks were new and challenging, and for some, rather intimidating. Consequently, the results demonstrated by the adult subjects in this study may be somewhat under reflective of the proficiency of the individual in comparison to the results of these tasks when performed by academically normal school children.

5.2 Profiles of Four Subjects

In-depth informal interviews were conducted with several subjects to obtain a picture of some of the characteristics of the individuals who participated in this study. For these interviews, there was a written questionnaire, which was modeled on the language background questionnaire developed by Ricardo Otheguy for the Classroom Literacy Foundation, 2000 (Otheguy, 2000). This questionnaire was followed with an informal conversation with the subject (Appendix G).

Most of the subjects in this study use Spanish, as well as varying amounts of English in their personal and family life. All are committed to learning English, but many find it difficult to find opportunities to use English outside of their ESL classes in school. A few have family situations which demand English, and some have made strong efforts to integrate English into their lives, often by making deliberate efforts to learn English by avoiding work and social environments where Spanish is spoken.

In the next section, short profiles will be provided of four subjects in this study. For the results of this study, and in the discussion of the empirical data, raw scores were used for data analyses. Grade level equivalent scores were not discussed, as many researchers believe that that they are a very inappropriate measure for adults, particularly the population of SLR adults which constitute this study (Greenberg, Ehri, & Perin, 1997). However, in the following subject profiles, grade level equivalent scores will be given, as they make the description somewhat more vivid, and they provide a simple standard for comparing L2 literacy levels. In this study, for the SDRTCOMP, the mean grade level equivalent score was 2.7, with a standard deviation of 1.15. The range for grade level equivalent scores was from 1.6 to 8.6.

For the profiles, the measures for Spanish literacy will be discussed in terms of percentile scores which were developed for the test (The University of Wisconsin Spanish as a Foreign Language Placement Test). In developing a picture of the subjects in the following profiles, it is important to keep in mind that, while the SLR comprehension grade equivalent scores probably under-represent the actual literacy of the subjects, the L1 reading comprehension and L1 grammar percentile scores

undoubtedly over-represent the L1 academic proficiency of the subjects. The Spanish language tests were developed for second language speakers of Spanish and the subjects in this study are native speakers of Spanish. For both the Spanish reading comprehension Spanish grammar tests, the mean percentile score was 51, with a standard deviation of 30.

The purpose of these profiles was to give some informal evidence of the range and combination of L1 and L2 proficiencies that different subjects may display. These subjects are adults, and also non-traditional students. For different individuals, with different experiences and personal learning styles, the influence of L1 knowledge on L2 development appears to have many different patterns.

1) SUBJECT #3

Subject number three came to the United States at age fifteen, and has been here for five years. This subject attended a United States high school for three years. She speaks mainly Spanish socially and at her job, and her oral English is somewhat hesitant. However, her English literacy skills are relatively high, as she achieved a 3.1 grade equivalent level score on SDRTCOMP. On the other hand, because she went to high school in the United States, her Spanish literacy skills are relatively low. She scored at the 14th percentile in Spanish reading comprehension and 45th percentile in Spanish grammar. This individual is an example of a subject with weak L1 literacy and weak L2 oral skills but good L2 academic skills.

2) SUBJECT #52

Subject number fifty-two is twenty years old, the same age as subject number three. However, she came to the United States when she was somewhat older, at age eighteen. Although she has only been here for two years, she uses English quite frequently socially and speaks English quite fluently. Her SDRTCOMP score was higher than many of the subjects in this study, as she scored at the 3.3 grade level. Her Spanish literacy is slightly higher than many, as she scored at the 59th percentile on the reading comprehension test. However, she has obviously forgotten her Spanish grammar, or her L1 educational situation was not very successful, as she scored at only the 6th percentile for grammar. She is an example of a subject who is doing quite well at developing both L2 social and academic skills, in spite of relatively low L1 literacy. This is an example of a subject with weak to average L1 literacy, but with good L2 oral and academic skills.

3) SUBJECT #13

Subject number thirteen arrived in the United States when he was twenty-one. and has been here for twelve years. He speaks Spanish socially, and at home with his wife. However, he uses English with his children. His English oral skills are fluent. but he retains many grammatical inaccuracies. His English academic skills are relatively low, as he scored at the 2.8 grade level on the SDRTCOMP, which is about average for this study. His Spanish skills are also around the mean for this subject group, as he scored at the 59th percentile in comprehension and 53rd in grammar. He is a person with average L1 oral skills, despite living in the United States for twelve years. His L2 literacy skills are weak, and it is a challenge for him to attain a high

level of L2 literacy. This is an example of a subject with average L1 literacy, good L2 oral skills but weak L2 academic skills.

4) SUBJECT # 12

Subject number twelve has a similar profile to subject number thirteen. She arrived in the United States when she was twenty years old and has been here for thirteen years. She attempted to attend school on several occasions, but family obligations always interfered with her efforts. She speaks Spanish exclusively with friends and family, and finds it difficult to find situations to practice her English. Her oral English is hesitant and she lacks confidence. The subject has three children who were born in the United States. She does not maintain close ties in her native country and has made no long trips to her country in the last three years. Her English scores are very low, as she achieved a grade level equivalent score of 2.6 on the SDRTCOMP. Her Spanish scores were both around the 50th percentile. She is an example of a subject that, despite few ties with her native country, maintains a very tight social connection with the Spanish speaking community in the United States. She communicates primarily in Spanish, but her Spanish literacy scores are not particularly strong. Although she is very motivated and focused in her educational goals, building English academic skills presents a formidable challenge. This is an example of a subject with average L1 literacy but weak L2 oral and academic skills.

6. Towards a Model of SLR Comprehension

The model developed from the data in this study enables us to visualize SLR comprehension as a hierarchy of four levels of skills. In this model, micro-skills support increasing more complex and lexically based skills which ultimately support the skill of reading comprehension. The first level consists of the phonological, orthographic, and decoding skills. These skills are all lexically based. The contribution of simple phonological micro-skill is indirect. The second level consists of word knowledge. The third level consists of grammatical knowledge. And the fourth level consists of the transfer of reading comprehension skill from the L1. The contribution of L1 grammatical skill is indirect.

The main differences in the model of SLR and FLR consist of the distinction between the contribution of simple and complex micro-skills, and the transfer of skills from the L1. The SLR model developed in this study also differs from FLR because it gives empirical evidence of the contribution of explicit grammatical knowledge.

The models of FLR and SLR differ in the skills which are most fundamental for language learning. It is not possible to claim with absolute certainty the precise role which basic phonological decoding, represented by the task of word attack, plays in FLR global reading comprehension. However, the FLR literature suggests that its role is more direct and more central than it appears to be in SLR (Stahl & Murray, 1994; Calfee, Lindamood, & Lindamood, 1973; Adams, 1990). Assuming this difference, the main distinction between the models of FLR and SLR are in the very basic phonological skills. The model of FLR is constructed from simple to complex micro-skills while SLR is constructed only from complex micro-skills. The two most

fundamental skills for FLR are basic phonological decoding skill, represented by the task of word attack, and word decoding skill, represented by the task of word identification. For SLR, however, the most fundamental skills are complex phonological awareness, represented by the task of deletion, and word decoding skill, represented by the task of word identification. For the model of SLR, the contribution of basic phonological decoding skill, represented by the task of word attack, is only indirect. Both of the fundamental SLR skills are complex micro-skills, and depend upon experience with the vocabulary of the language.

The model developed from this study answers important questions posed by The Reading Wars as it provides empirical data for a language processing model of SLR. The model of SLR which is developed from the evidence in this study corresponds to a language processing model of FLR, but with a significant difference. the fact that basic phonological skill, represented by word attack does not directly predict SLR comprehension.

The model developed from this study also answers important questions posed by The Language Wars as it provides evidence of the transfer of L1 skills to SLR. The data in this study, specifically the results demonstrating the transfer of skills from Spanish reading comprehension to SLR comprehension, provides evidence of the influence of L1 literacy on the achievement of L2 literacy.

Chapter 9

Conclusion

1. Summary of Results

1.1 Hypotheses Revisited: Predictors of SLR Comprehension

This study was designed by looking at what kinds of skills are presumed to predict FLR and hypothesizing that the same skills would predict SLR comprehension. Using that framework, the hypotheses developed for this study predicted that many kinds of skills—L2 micro-skills, L2 word knowledge, L2 grammatical knowledge, L2 reading strategies, and L1 skills—would contribute to a model of SLR comprehension. The results indicated that, although many of the hypothesized skills did make contributions, there were also some very important differences between the skills that predict FLR and those which predict SLR comprehension.

The three micro-skills (phonological, orthographic, and decoding skill), which are assumed to be the fundamental learning skills for FLR, did not all make strong contributions to the model. Phonological skill made a contribution, but only complex phonological skill. Basic phonological decoding skill made only an indirect contribution. The contribution of orthographic skill was very weak and relatively unimpressive. Word decoding skill made an extremely important contribution. Grammatical knowledge, which is assumed to be a predictor of FLR, was empirically shown to make an important contribution to SLR comprehension. Of the L1 skills, FLR comprehension was a strong predictor of SLR comprehension.

1.2 Differences in the Models of FLR and SLR

The results of this study highlight some differences in the models of FLR and SLR. One important difference is the role of basic phonological decoding skill. It is generally accepted that basic phonological decoding, as represented by word attack, is a fundamental skill for FLR. In the model of SLR, word attack makes important contributions to other more complex phonological, orthographic, and decoding skills, but does not make a direct contribution to the model of SLR comprehension.

A second difference in the models of FLR and SLR is in the contribution of the L1. The results of the data show that the transfer of skills from the L1 occurs at the level of reading comprehension, not at the level of grammatical knowledge. The transfer from L1 grammatical knowledge is indirect.

A third difference is the importance of word, and explicit grammatical knowledge in SLR. It is likely that, for an individual with adequately developed L1 top-down skills, SLR comprehension may directly transfer these complex reading comprehension skills. However, even if an individual possesses basic phonological skills from L1, as well as highly developed top-down reading and analytic skills from FLR experience, this study shows that it would not be possible to utilize these skills until the L2 word and grammatical skills are sufficiently developed.

1.3 The Importance of Micro-Skills

This investigator could find no empirical studies concerning L2 micro-skill proficiencies in SLR adults, and none concerning the effect of micro-skills on global reading comprehension. However, language processing theories of reading assume the necessity of this relationship, claiming that automaticity and speed of bottom-up skills like word recognition are essential to free up limited processing resources for the complex demands of skills such as reading comprehension. (LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979).

The results of this study show that word decoding, represented by the task of word identification is an excellent predictor of SLR comprehension. These results are important because it is the first time in which a link between word identification and SLR comprehension has been established by empirical data, and because they show that the task of word identification can be used as an independent variable in SLR comprehension studies. This study is also important because the relationship it demonstrates between word decoding skill and reading comprehension skill has significant pedagogical implications.

2. Contributions of this Study

The study makes an important contribution to the L2 literature and the reading literature. It is important because it empirically links micro-skill proficiency to global reading comprehension, because it empirically shows how the model of SLR comprehension corresponds to the language processing model of FLR comprehension, because it empirically demonstrates the relationship of explicit L2 grammatical

knowledge to SLRCOMP, and because it provides empirical data illustrating the relationship of FLR comprehension skill to SLR comprehension.

This study is also important in that it shows that certain skills which are not directly related to global SLR comprehension have an important indirect relationship, as they correlate with other skills which have a direct relationship. The two skills which have an indirect relationship are phonological decoding, represented by word attack, and L1 grammar.

The indirect relationship of L1 grammar raises some interesting questions concerning second language acquisition studies. These studies tend to investigate how the L1 grammar influences the acquisition of L2 grammar (Ellis. 1985: White. 1995: Flynn S& O'Neil. 1988; Gass & Schacter, 1989; Cook, 1993). The results of this study imply that some of the relationship of the L1 grammar may be indirect, and that , at least for L2 academic proficiency, there are other L1 skills which may be as important, or even more important than L1 grammar.

3. Pedagogical Implications of this Study

3.1 Pedagogical Implications for The Reading Wars

Reading comprehension is a complex skill which integrates both bottom-up and top-down processes and requires the application of various kinds of reading strategies as well as cognitive and analytical skills. Because reading comprehension demands top-down processes and analytical skills, it is frequently taught by primarily focusing on these kinds of skills. Particularly for SLR adults, world knowledge,

relevant factual information, and cognitive skills may constitute the core of a reading comprehension curriculum. The results of this study imply that it would be more fortuitous to devote a larger proportion of time to word and grammatical knowledge. It is these skills which must be solidly in place before higher level analytic processes can be effective. And without these skills, readers are too slow and inefficient to effectively utilize these complex processes. Moreover, if individuals have top-down skills from the L1, the results from this study indicate that they will easily transfer to the L2 once the word and grammatical level skills have attained a sufficient level of proficiency.

3.2 Pedagogical Implications for The Language Wars

Although the issues central to The Language Wars were only a secondary focus of this study, the resulting data nonetheless suggests some pedagogical implications. The data showing the transfer of L1 reading comprehension skill to SLR comprehension confirms the assumptions that L1 literacy plays an important role in the achievement of L2 literacy (Hoffman, 1991; Hammers & Blanc, 1989; Cummins, 1984a; Cummins, 1984b; Cummins, 1891; Cummins, 1987; Cummins, 1991). In addition, the assurance that L1 literacy skills will eventually transfer to L2 literacy should free instructors to concentrate on the areas of L2 (specifically word and grammatical knowledge), that are necessary to provide a strong L2 foundation to facilitate the transfer of the L1 skills.

The presumption of the importance of L1 literacy has frequently been attributed to the entire population of L2 students. From the data and subject profiles in this study, there is evidence that for certain adult individuals, a strong L1 ability is not as crucial as for others (Chapter 8, section 5.2). There are several subjects in this study that arrived in the United States as young adults, and have poorly developed L1 literacy skills. Some of those individuals, because of their strong commitment to L2 educational attainment, have decided to make English their language of academic skill, and have begun to achieve a reasonable level of L2 skill without the support of a strong L1 literacy. In applying this insight to educational objectives, it might be important to classify L2 students according to their history, and to determine which of them are candidates who would benefit by developing and building on L1 strengths, and which would make better educational progress by concentrating primarily on developing L2 academic skill. The answers to the questions of The Language Wars may very well be different for different individuals.

4. Limitations of this Study

Because this is a correlational study, there are limitations in how the statistical results can be interpreted. Correlations can only suggest connections and trends, but cannot really predict. Moreover, because of the integrated nature of the reading process, many of the component variables in this study were inter-correlated and it was difficult to determine the relative proportions of the contributions of the component variables.

A second limitation is that this study focused primarily on L2 skills. There were no tasks to determine what the relationship might be of the equivalent L1 skills. Because of this limitation, we can only draw very restrained conclusions about the L1 influence in SLR comprehension.

There were also limitations in some of the assessment tasks. The weak contribution of orthographic skill to the model of SLR comprehension may have been a result of the tasks selected to represent that task. Letter pattern recognition was clearly not a valid assessment for this subject group. Spelling, the other task representing orthographic skill, is a L1 school-related skill which may not be as important to L2 decoding and reading proficiency as it appears to be in the L1. The task selected to provide a measure of L1 literacy was also not ideal. The Spanish reading comprehension and grammar test was designed and normed for college students learning Spanish. A test designed to measure literacy for native Spanish speakers may have provided a better picture of the subjects' level of L1 literacy.

Another limitation comes from the problems of testing this subject population. Although the individuals in this study are in college, many of them had been out of school for several years, and most of them come from rather limited educational backgrounds. They are inexperienced, unskilled, and insecure test takers. Their inadequate test-taking skills inevitably affect how they perform at the tasks selected to measure the various component proficiencies. For some individuals, their test scores may under-reflect their actual ability at the task being assessed. Also, because of this problem, certain tasks (which were included in a pilot study) were intimidating and

confusing, and consequently had to be dropped from the design of the experiment.

5. Suggestions for Future Research

This study is correlational, and, consequently, many of the conclusions can only be interpreted as trends or suggestions of patterns. However, many of the conclusions of this study could be more precise if the same study were repeated on a larger subject group. Because multiple regression analyses did not produce clear information about the relative weights of the variances of the significant sub-skills, the data could only show which processes were significant and which were not. However, the data results suggest that certain processes may, indeed, be more significant than other processes. With a larger subject group, it might be possible to show that some sub-component processes are more important, or more fundamental than others.

The case studies of a few subjects imply that individuals with different L1 and L2 histories may have different patterns of L2 achievement. By repeating this study with a larger subject group, it would be possible to divide the subjects into categories based upon their levels of L1 literacy and/or histories. With these sub-categories of subjects, it would be possible to discover whether different SLR subjects, with different linguistic backgrounds have different patterns of L2 achievement, and whether they manifest different patterns of contributing sub-skills to SLR comprehension.

It would also be important to repeat this study both with a different language group and a different socio-economic group. To understand whether the significance of the difference in simple and complex phonological decoding skill is a characteristic of SLR or whether it is a result of transfer from reading in a language with a similar orthographic structure, it would be necessary to repeat the study with subjects from another language group, particularly a language with a different orthographic system. Also, to disentangle which of the results are a consequence of low literacy and limited educational experience and which are strictly related to the SLR process, it would also be instructive to repeat the same study with a group of Spanish L1 subjects who have a higher level of education and literacy.

To overcome the limitations of a correlational study, it is necessary to apply the insights achieved to other research paradigms. Only intervention, comparison, or longitudinal studies can conclusively confirm what the data from this study suggests. A comparison study, where one student group focused on word level and grammatical level knowledge while another group focused on top-down skills, would yield important data. Also, a longitudinal study, could reveal which skills continue to predict good SLR comprehension as an individual becomes a more advanced reader.

The main objective of this study focused on which L2 component reading skills predicted SLR comprehension. The L1 questions posed by this study were only a secondary objective, and only two L1 skills were included in the assessments. This study should be repeated with L1 tasks to assess corresponding micro-skills, word level skills, and grammatical skills. In this way it would be possible to determine the

true importance of these skills in L2, and in what areas they transfer from the L1.

The unclear contribution of orthographic knowledge indicated by the results of this study should be reexamined in another empirical study. Were the tasks selected to assess this skill incorrect? Or does orthographic knowledge play only a secondary role. By supporting phonological and decoding skill? It is necessary to find a better test for L2 orthographic knowledge for this subject group. Only then can it be determined whether the relationship of orthographic knowledge to SLR comprehension is less important than the relationship of phonological knowledge and decoding.

The problem of finding a good reading comprehension assessment, particularly for a non-traditional educational group like SLR adults, is certainly daunting. The differences in results for the two alternate scoring procedures for SDRTCOMP and SDRTPERC. suggest that different conceptions of how to define and measure reading comprehension may well produce different models for the process of SLR comprehension. It would be interesting to design a study to determine what the differences in SDRTCOMP and SDRTPERC results imply about the relationship of various component sub-skills to the process of SLR comprehension.

6. Conclusion

What is most striking about the results of this study, from both a theoretical and pedagogical perspective, is the pervasive importance of word knowledge in all of the L2 contributing skills. It is this difference that distinguishes simple from lexically

based micro-skills, the skills which make direct contributions to the model. It may also be this difference, the necessity for word knowledge to accomplish any of the component processes, which epitomizes what is distinctly different about the process of learning to read in a L2 as compared to learning to read the first time around.

DESCRIPTION OF TASKS

NAME	SKILL	TASK	EXAMPLE
MICRO-SKILLS			
PHONOLOGICAL			
WORD ATTACK	Phonological decoding	Non-word decoding	*dee, ap, bufty, chad*
DELETION	Phonological awareness	Delete segment	*reproduce/pro/reduce;clip/c/lip*
ORTHOGRAPHIC			
LPATT	Letter Pattern Recognition	Select English orthography	*filv/filk;powl/lowp*
SPELLING	Spelling	Spell to dictation	*bed, ship,drive,closet,squirrel*
DECODING			
WORD IDENTIFICATION	Word decoding	Word decoding	*is,you, and,up,chair,certain*
WORD KNOWLEDGE			
VOCABULARY	Vocabulary	Multiple choice synonyms	*leap:turn,slide,stumble, jump*
IRREG WORD READ	Irregular word reading	Irregular word reading	*island, sword, stomach, suede*
GRAMMAR			
GRAMREAD	Reading grammar	Multiple choice test	
GRAMLIST	Listening grammar	Multiple choice test	
READING STRATEGIES			
SCANNING	Scanning	Multiple choice test	
INITIAL, INTERPRET, ANALYSIS, PROCESS		Multiple choice test	
SPANISH SKILLS			
SPANGRAM	Spanish grammar	Multiple choice test	
SPANREAD	Spanish reading comprehension	Multiple choice test	
OUTCOME VARIABLE			
SDRTCOMP	English reading comprehension	Multiple choice test	

TABLE 1

OVERALL RESULTS

TASK	TOTAL No. of ITEMS	MEAN No. CORRECT	STD. DEVIATION	MEAN % CORRECT
MICRO-SKILLS				
PHONOLOGICAL				
WORD ATTACK	45	27.22	8.03	60%
DELETION	40	16.11	6.59	40%
ORTHOGRAPHIC				
LPATT	16	12.23	1.73	76%
SPELLING	20	8.22	3.81	41%
DECODING				
WORD IDENTIFICATION	106	66.22	10.56	62%
WORD KNOWLEDGE				
VOCABULARY	30	14.22	5.29	47%
IRREG WORD READ	50	16.93	7.00	34%
GRAMMAR				
GRAMREAD	30	14.04	4.50	47%
READING STRATEGIES				
SCANNING	30	10.8	5.19	36%
SPANISH SKILLS				
SPANGRAM	38	33.78	7.84	89%
SPANREAD	39	31.69	4.97	81%
OUTCOME VARIABLE				
SDRTCOMP	54	24.44	9.47	45%

TABLE 2

CORRELATION MATRIX

	WATTACK	DELETION	WIDENT	LPATT	SPELL	VOCAB	WREAD	GRAMREAD	SCANNING	SPANGRAM	SPANREAD
SDRTCOMP	.093	.507**	.399**	.280*	.298*	.461**	.488**	.309*	.365**	-.046	.341*
WATTACK		.319*	.581**	.146	.407**	.234	.461**	.407**	-.174	.183	.218
DELETION			.536**	.279*	.475**	.416**	.558**	.510**	.148	.164	.486**
WIDENT				.167	.552**	.375**	.767**	.555**	.004	.301*	.409**
LPATT					.177	.298*	.102	.074	.024	.181	-.053
SPELL						.399**	.649**	.586**	.091	.254	.281*
VOCAB							.525**	.460**	.228	.092	.219
WREAD								.586**	.105	.188	.208
GRAMREAD									.106	.051	.080
SCANNING										.-004	.112
SPANGRAM											.319*

**Significant at 0.01 level
*Signficant at 0.05 level
(2-tailed)

TABLE 3

CORRELATIONS with READING STRATEGIES

	SCANNING	INITIAL	INTERPRETATION	ANALYSIS	PROCESS STRATEGIES
SDRTCOMP	365**	.892**	.946**	.605**	.698**
WATTACK	-.174	.167	.019	-.026	-.162
DELETION	.148	.506**	.441**	.376**	.211
LPATT	.024	.254	.317*	.098	.152
SPELL	.091	.393**	.145	.344*	.047
WIDENT	.004	.423**	.329*	.093	.235
VOCAB	.228	.411**	.352**	.393**	.288*
WREAD	.105	.552**	.322*	.338*	.281*
GRAMLIST	.207	.273*	.183	.148	.201
GRAMREAD	.106	.306*	.212	.236	.176
SDRTSCAN	1.00	.283*	.352**	.419**	.334*
SPANGRAM	.004	.038	-.093	.008	-.027
SPANREAD	.112	.334*	.288	.144	.184

**Significant at 0.01 level
*Significant at 0.05 level
(2-tailed)

TABLE 4

FACTOR ANALYSIS:TOTAL VARIANCE EXPLAINED							
		Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
COMPONENT	NAME	TOTAL	% of VARIANCE	CUMULATIVE %	TOTAL	% of VARIANCE	CUMULATIVE %
1	ENG-BOTUP	5.910	32.832	32.832	4.527	25.148	25.148
2	ENG-READING	2.877	15.984	48.816	3.659	20.330	45.478
3	SPANISH	1.325	7.362	56.178	1.585	8.805	54.283
4	SPEED	1.202	6.677	62.855	1.454	8.079	62.363
5	LPATT	1.101	6.119	68.974	1.190	6.612	68.974

TABLE 5

FACTOR ANALYSIS: ROTATED COMPONENT MATRIX					
	1	2	3	4	5
	ENG-BOTUP	ENG-READING	SPANISH	SPEED	LPATT
WATTACK	0.686				
DELETION	0.594				
LPATT					0.943
SPELL	0.752				
WIDENT	0.812				
SPEED1				0.780	
SDRTVOC	0.527				
WREAD	0.845				
GRAMLIST	0.699				
GRAMREAD	0.819				
SDRTSCAN		0.534			
INITIAL		0.729			
INTERP		0.846			
ANALYSIS		0.606			
PROCESS		0.773			
SDRTCOMP		0.843			
SPANGRAM			0.756		
SPANREAD			0.789		

TABLE 6

FACTOR ANALYSIS: SUMMARY OF FACTORS					
FACTOR	**FACTOR 1**	**FACTOR 2**	**FACTOR 3**	**FACTOR 4**	**FACTOR 5**
NAME	**ENG-BOTUP**	**ENG-READING**	**SPANISH**	**SPEED**	**LPATT**
VARIABLES	WATTACK	SDRTCOMP	SPANGRAM	SPEED	LPATT
	DELETION	SDRTSCAN	SPANREAD		
	SPELL	INITIAL			
	SDRTVOC	INTERP			
	WREAD	ANALYSIS			
	WIDENT	PROCESS			
	GRAMLIST				
	GRAMREAD				
% of VARIANCE	32.832	15.984	7.362	6.677	6.119
CUMULATIVE %	32.832	48.816	56.178	62.855	68.974
RELIABILITY COEFFICIENT					
ALPHA	0.8610	0.6808	0.4472		

TABLE 7

REGRESSION RESULTS of FACTOR ANALYISIS					
INDEPENDENT VARIABLE	REGRESSION RESULTS		ANOVA RESULTS		PERCENT of
	R Square	Adjusted R Square	F	Significance	VARIANCE
DEPENDENT VARIABLE: ENG-READING					
MULTIPLE REGRESSION					
ANREAD and ENG-READI	0.182	0.149	5.658	0.006	15%
INDIVIDUAL SIGNFICANCE					
ENG-BOTUP				0.023	
SPANCOMP				0.188	
DEPENDENT VARIABLE: ENG-READING					
MULTIPLE REGRESSION					
LPATT, SPANREAD, SPEED, ENG-READING, and SPANGRAM					
	0.254	0.167	2.921	0.023	17%
INDIVIDUAL SIGNIFICANCE					
ENG-BOTUP				0.088	
SPANREAD				0.066	
SPANGRAM				0.292	
SPEED				0.701	
LPATT				0.062	

TABLE 8

REGRESSION RESULTS for READING COMPREHENSION (SDRTCOMP)					
DEPENDENT VARIABLE: SDRTCOMP					
	REGRESSION RESULTS		ANOVA RESULTS		PERCENT of
INDEPENDENT VARIABLES					VARIANCE
	R Square	Adjusted R Square	F	Signficance	
MICRO-SKILLS					
PHONOLOGICAL					
WORD ATTACK	0.009	-0.010	0.465	0.498	0%
DELETION	0.257	0.242	17.953	**0.000**	26%
ORTHOGRAPHIC					
LPATT	0.079	0.061	4.355	**0.042**	8%
SPELLING	0.089	0.072	5.184	**0.027**	9%
DECODING					
WORD IDENTIFICATION	0.159	0.143	10.047	**0.003**	16%
WORD KNOWLEDGE					
VOCABULARY	0.212	0.198	14.296	**0.000**	21%
IRREG WORD READ	0.238	0.224	16.581	**0.000**	24%
GRAMMAR					
GRAMREAD	0.095	0.078	5.582	**0.022**	10%
READING STRATEGIES					
SCANNING	0.133	0.117	8.134	**0.006**	13%
SPANISH SKILLS					
SPANGRAM	0.002	-0.017	0.112	0.739	0%
SPANREAD	0.116	0.099	6.845	**0.012**	12%

TABLE 9

REGRESSION RESULTS for ALTERNATE MEASURE OF READING COMPREHENSION (SDRTPERC)

DEPENDENT VARIABLE: SDRTPERC

INDEPENDENT VARIABLES	REGRESSION RESULTS		ANOVA RESULTS		PERCENT of VARIANCE
	R Square	Adjusted R Square	F	Significance	
MICRO-SKILLS					
PHONOLOGICAL					
WORD ATTACK	0.058	0.040	3.250	0.077	6%
DELETION	0.338	0.325	26.532	**0.000**	34%
ORTHOGRAPHIC					
LPATT	0.065	0.046	3.517	0.066	7%
SPELLING	0.257	0.243	18.367	**0.000**	26%
DECODING					
WORD IDENTIFICATION	0.231	0.216	15.902	**0.000**	23%
WORD KNOWLEDGE					
VOCABULARY	0.143	0.127	8.837	**0.004**	14%
IRREG WORD READ	0.309	0.296	23.698	**0.000**	31%
GRAMMAR					
GRAMREAD	0.128	0.112	7.787	**0.007**	13%
READING STRATEGIES					
SCANNING	0.000	-0.019	0.000	0.992	0%
SPANISH SKILLS					
SPANGRAM	0.083	0.065	4.684	**0.035**	8%
SPANREAD	0.187	0.172	11.978	**0.001**	19%

TABLE 10

REGRESSION RESULTS for READING STRATEGIES

INDEPENDENT VARIABLE	REGRESSION RESULTS		ANOVA RESULTS		PERCENT of
	R Square	Adjusted R Square	F	Signficance	VARIANCE
SDRTCOMP as DEPENDENT VARIABLE (Number of correct answers)					
SCANNING	0.133	0.117	8.134	**0.006**	13%
INITIAL UNDERSTANDING	0.795	0.791	201.805	**0.000**	80%
INTERPRETATION	0.894	0.892	438.852	**0.000**	89%
ANALYSIS	0.366	0.354	30.009	**0.000**	37%
PROCESSES STRATEGIES	0.487	0.477	49.318	**0.000**	49%
SDRTPERC as DEPENDENT VARIABLE (Percent of correct answers)					
SCANNING	.000	-0.019	0.000	0.992	0%
INITIAL UNDERSTANDING	0.408	0.397	35.822	**0.000**	41%
INTERPRETATION	0.226	0.211	15.210	**0.000**	23%
ANALYSIS	0.111	0.094	6.497	**0.014**	11%
PROCESSES STRATEGIES	0.067	0.049	3.745	0.058	7%

TABLE 11

REGRESSION RESULTS for SCANNING					
DEPENDENT VARIABLE: SDRTSCAN					
	REGRESSION RESULTS		ANOVA RESULTS		PERCENT of
INDEPENDENT VARIABLES					VARIANCE
	R Square	Adjusted R Square	F	Signficance	
MICRO-SKILLS					
PHONOLOGICAL					
WORD ATTACK	0.030	0.012	1.660	0.203	3%
DELETION	0.022	0.003	1.163	0.286	2%
ORTHOGRAPHIC					
SPELLING	0.008	-0.010	0.444	0.508	1%
DECODING					
WORD IDENTIFICATION	0.000	-0.019	0.001	0.978	0%
WORD KNOWLEDGE					
VOCABULARY	0.052	0.034	2.912	0.094	5%
IRREG WORD READ	0.011	-0.008	0.592	0.445	1%
GRAMMAR					
GRAMREAD	0.011	-0.007	0.608	0.439	1%
SPANISH SKILLS					
SPANGRAM	0.002	-0.017	0.112	0.739	0%
SPANREAD	0.013	-0.006	0.662	0.420	1%

TABLE 12

INDIRECT CONTRIBUTIONS to MODEL of SLR COMPREHENSION					
DEPENDENT VARIABLE: WIDENT					
INDEPENDENT VARIABLE	**REGRESSION RESULTS**		**ANOVA RESULTS**		**PERCENT of**
	R Square	**Adjusted R Square**	**F**	**Significance**	**VARIANCE**
INDIVIDUAL REGRESSIONS					
WATTACK	0.338	0.325	27.044	**0.000**	34%
DELETION	0.287	0.273	20.918	**0.000**	29%
SPELL	0.305	0.292	23.277	**0.000**	31%
MULTIPLE REGRESSION-WATTACK, DELETION, and SPELL					
	0.525	0.497	18.443	**0.000**	50
DEPENDENT VARIABLE: SPANREAD					
INDEPENDENT VARIABLE	**REGRESSION RESULTS**		**ANOVA RESULTS**		**PERCENT of**
	R Square	**Adjusted R Square**	**F**	**Significance**	**VARIANCE**
SPANGRAM	0.101	0.084	5.871	**0.019**	10%

TABLE 13

Appendix A: Word Attack (Non-word Decoding) (Woodcock, WRMT-R, Form H, Revised, 1987)

1. dee
2. ap
3. ift
4. raff
5. bim
6. nan
7. un
8. fay
9. gat
10. roo
11. oss
12. pog
13. poe
14. weat
15. plip
16. dud's
17. shab
18. whie
19. vunhip
20. nigh
21. bufty
22. sy
23. straced
24. chad
25. than't
26. tadding
27. twem
28. laip
29. adjex
30. gouch
31. yeng
32. zirdn't
33. gaked
34. knoink
35. cigbet
36. mancingful
37. wrey
38. bafmotbem
39. translibodge
40. monglustamer
41. vauge
42. gnouthe
43. quiles
44. cyr
45. pnomoch

Appendix B: Deletion (Rosner & Simon, 1971)

a. cow(boy)

b. (tooth)brush

1. birth(day)

2. (car)pet

3. bel(t)

4. (m)an

5. (b)lock

6. to(ne)

7. (s)our

8. (p)ray

9. stea(k)

10. (l)end

11. (s)mile

12. plea(se)

13. (g)ate

14.(c)lip

15. ti(me)

16. (sc)old

17. (b)reak

18. ro(de)

19. (w)ill

20. (t)rail

21. (sh)rug

22. g(l)ow

23. cr(e)ate

24. (st)rain

25. s(m)ell

26. Es(ki)mo

27. de(s)k

28. Ger(ma)ny

29. st(r)eam

30. auto(mo)bile

31. re(pro)duce

32. s(m)ack

33. phi(lo)sophy

34. s(k)in

35. lo(ca)tion

36. cont(in)ent

37. s(w)ing

38. car(pen)ter

39. c(l)utter

40. off(er)ing

Appendix C: Letter Pattern Recognition (Siegal et. al, 1998)

1. filv	filk	9. jofy	fojy
2. tolz	tolb	10. cnif	crif
3. powl	lowp	11. bnad	blad
4. fant	tanf	12. hift	hifl
5. miln	milg	13. gwup	gnup
6. togd	togn	14. nitl	nilt
7. wolg	wolt	15. clid	cdil
8. moke	moje	16. vism	visn

Appendix D: Spelling Inventory (Orthographic Task) (Bear & Barone, 1989)

1. bed. On our bed we have sheets, blankets, and pillows. bed.

2. ship. A ship is like a boat. ship.

3. drive. We drive our cars to work. drive.

4. bump. There are bumps in the road when it isn't flat. bump.

5. when. When is your birthday? when.

6. train. A train is like a subway. It goes very fast. train.

7. closet. We hand our coats in the closet. closet.

8. chase. Sometimes, dogs like to chase cats. chase.

9. float. Some people like to float in the swimming pool or in the ocean. float.

10. beaches. People go to the beaches to swim and sun bathe on hot summer days. beaches.

11. preparing. The mother is preparing food for dinner. preparing.

12. popping. As kernels of corn become popcorn, they make popping sounds. popping.

13. cattle. Cattle are groups of cows. We can see them on a farm. cattle.

14. caught. The baseball player caught the ball. caught.

15. inspection. At an inspection, a person checks to see if everything is all right. inspection.

16. puncture. A puncture is a hole. Sometimes there is a puncture in a tire. puncture.

17. cellar. A cellar is like the basement of a house. Some people keep wine in the cellar. cellar.

18. pleasure. Pleasure means happiness. When the child smiles, it gives her mother pleasure. pleasure.

19. squirrel. A squirrel is a little animal with a big tail. We saw a squirrel run up the tree. squirrel.

20. fortunate. Fortunate means lucky. She was fortunate because she had a very cheap apartment. fortunate.

Appendix E: Word Identification (Woodcock, WRMT-R, Form G, Revised, 1987)

1. is	17. little	33. table
2. you	18. bed	34. work
3. and	19. milk	35. stove
4. up	20. car	36. ground
5. cat	21. swim	37. airplane
6. stop	22. fast	38. chair
7. come	23. down	39. because
8. jump	24. rug	40. beautiful
9. help	25. with	41. slowly
10. book	26. find	42. watch
11. play	27. said	43. early
12. sun	28. night	44. heavy
13. blue	29. sleep	45. already
14. two	30. after	46. laugh
15. no	31. woman	47. hurry
16. boy	32. summer	48. largest

49. expert
50. evening
51. passage
52. receive
53. human
54. calendar
55. human
56. twilight
57. certain
58. dwarf
59. furnace
60. amazement
61. torpedo
62. vehicle
63. departure
64. yardage
65. urgent
66. mechanic
67. wounded
68. zenith
69. petroleum
70. stigma
71. spectacular
72. cologne
73. miser
74. hysterical
75. pedestrian
76. yacht
77. mathematician
78. almanac
79. relativity
80. instigator
81. prognosis
82. judicious
83. causation
84. vernacular
85. alkali
86. philanthropist
87. naïve
88. inordinate
89. carnivorous
90. artesian
91 quintessence
92. heterogeneous
93. cygnet
94. expostulate
95. tableau
96. zymolysis
97. tuberculous
98. surreptitious
99. internecine
100. taupe
101. quadruped
102. epistrophe

103. dossier

104. picayune

105. oenology

106. zeitgeist

Appendix F: Irregular Word Reading (Adams & Huggins, 1985)

ocean	blind	recipe
iron	wounded	pine
island	calf	deny
break	sweat	vague
busy	sword	tomb
sugar	anchor	drought
touch	echo	trough
none	guitar	depot
heights	veins	bough
whom	chorus	bouquet
tongue	scent	aisle
lose	deaf	ache
prove	mechanic	yacht
rhythm	dough	chauffeur
truth	rely	ukelele
stomach	ninth	suede
	react	fiance

Appendix G: Questionnaire (Derived from Otheguy, 2000)

GENERAL
1.Name
2. Sex
3. Age
4. Place of Birth
5. Age of first arrival in US
6. How many years in US
7. Have you visited your country for more than a week in the last 3 years?
    a. How many times?
    b. How many weeks each time?

WORK AND SCHOOL
8. Present occupation
9. Last occupation in country of origin
10. Highest grade attended in school in country of origin
11. School in US
    a. How many years in HS?
    b. Other colleges or programs—How many years?

FAMILY
12. Who do you live with?

SPOUSE OR COMPANION
13. Does spouse speak to you in Spanish?
Always Often Seldom Never
14. In English?
Always Often Seldom Never

CHILD
15. Does child speak to you in Spanish?
Always Often Seldom Never
16. In English?
Always Often Seldom Never

CHILDREN
17. Do children speak to each other in Spanish?
Always Often Seldom Never

18. In English?
Always Often Seldom Never

FRIENDS
19. Do you speak to your best friend in Spanish?
Always Often Seldom Never
20. In English?
Always Often Seldom Never

SOCIAL
21. Do you watch TV in Spanish?
Always Often Seldom Never
22. In English?
Always Often Seldom Never

23. Do you listen to the radio in Spanish?
Always Often Seldom Never
24. In English?
Always Often Seldom Never

25. Do you speak on the phone in Spanish?
Always Often Seldom Never
26. In English?
Always Often Seldom Never

27. Do you speak in Spanish at your job?
Always Often Seldom Never
28. In English?
Always Often Seldom Never

29. When you go shopping in your neighborhood, do you speak in Spanish with the store owners and employees?
Always Often Seldom Never
30. In English?
Always Often Seldom Never

31. Do you go to church or temple? How often? Do you speak in Spanish with the minister or priest and with the other people?
Always Often Seldom Never

32. In English?
Always Often Seldom Never

READING AND WRITING
33. Is there any one in your home who knows how to read and write Spanish?
Very well Well Only a little Very little
34. In English?
Very well Well, Only a little Very little

35. Is there anyone at home who reads and writes frequently?
a. What does this person read for?
Pleasure Work Study Communication with family
b. What does this person read?
Books Magazines Comics Fotonovelas Bible
c. In what language does that person read?
Spanish only English Both Another language

36. Do you read?
Frequently Sometimes Almost never Never
a. For what purpose do you read?
Pleasure Work Study Communication with family
b. What do you read?
Books Magazines Comics Fotonovelas Bible
c. In what language do you read?
Spanish only English Both Another language

37. Do you write?
a. For what purpose do you write?
Pleasure Work Study Communication with family
b. What do you write?
Letters Notes to family members Lists to remember things Receipes Schoolwork
c. In what language do you write?
Spanish only English Both Another language

38. Do you subscribe to any magazine or newspaper
a. Titles?
b. In what language are most of them?

Spanish English Both

39. How many magazines or newspapers are there in the house today?
Less than 50 Less than 20 Less than 10
a. Titles?
b. In what language are most of them?
Spanish English Both

40. How many books are there in the house today?
Less than 50 Less than 20 Less than 10
a. Titles?
b. In what language are most of them?
Spanish English Both

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