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ABSTRACT

Recent cognitive research concerned with training of word recognition skills and vocabulary skills in English monolinguals has implications for second language learning theory and the teaching of English reading skills to native Spanish speakers. Researchers in reading development, cognitive psychology, and second language proficiency assessment have found that good readers master the fluent recognition of all the codes making up a written text. Second language training for word analysis skills might focus on improving recognition of letter units forming words, the syntactic functions of words, and the meanings referred to by words, in both a top-down and bottom-up fashion. The situation is made more complex by the likely transfer of skills from the native to second language. Specific techniques for training automatic word recognition in English that can be adapted for use with native Spanish speakers include Frederiksen's "Speed" and "Ski-Jump" games, which use both the top-down and bottom-up approaches. Activities to strengthen vocabulary skills can be developed based on the considerable cognitive research currently under way, especially Sternberg, Powell, and Kaye's three-phase instructional system focusing in turn on morphological cues for meaning, inference of unfamiliar words through morphological cues, and integration of skills for analyzing morphological structure and meaning. (MSE)

Cognitive and Linguistic Factors Affecting Training of English Reading Skills Among Native Spanish Speakers

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Introduction

For whatever reasons, there has been relatively little cross-fertilization between the fields of second language learning and modern cognitive psychology. In a recent paper published in Language Learning, Barry McLaughlin, Tammi Rossman, and Beverly McLeod (1983) argued quite cogently that the study of language learning from an information psychology perspective can both advance second language learning/acquisition theory, and as well have practical implications for second language teaching. In this paper I will discuss some recent cognitive research concerned with training of word recognition skills and with the training of vocabulary skills in English monolinguals. The ideas guiding this research appear to have implications for second language learning theory and the teaching of English reading skills to second language learners. The purpose of the paper is to explore this possibility in the context of native Spanish speakers.

A written text, e.g., a newspaper article, embodies numerous types and layers of coded information. For example, there are letter symbols, letters combined into morphemic units making up words, individual words, syntactic units within sentences, sentences, discourse units, etc. Becoming a good reader in either a first or second language requires that a person develop facility to recognize all of these types of codes, their appropriate integration into higher level units, and the functions of these codes in conveying meaning. Psycholinguists and cognitive psychologists have devoted a good deal of research towards identifying the information processing procedures which people utilize in understanding these codes of written language, (see Henderson 1982; Clark and Clark, 1977; and de Beaugrande, 1980 for reviews of relevant research). Researchers in reading development, cognitive psychology and second language proficiency assessment have found

that good readers master the fluent recognition of all the codes mentioned that make up a printed text. Even good readers can make mistakes in decoding, though.

The Goodman's (1977), for example, have found that young children who are good readers, make mistakes or miscues in oral reading which suggest that they are primarily attending to the ideas and the organization of ideas in a text. On the other hand, poor readers make miscues which indicates their difficulty in the decoding of individual words and an inability to use the semantic context of sentences in a text to guide their recognition of individual words. John Frederiksen (1982), a cognitive psychologist, suggests that we might overview the reading process in terms of three categories of information processing as shown in Figure 1.

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Figure 1 goes here

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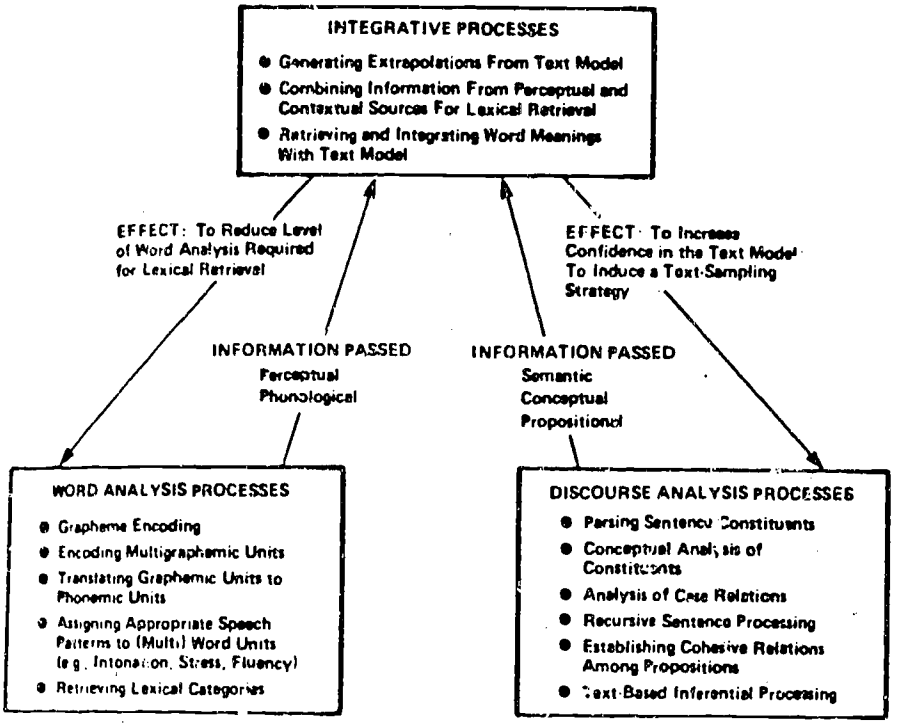
Frederiksen's approach has value because it helps segregate the kinds of information processing of codes and development of meaning at various levels which occur in reading. The approach is useful because it is sensitive to the fact that there are both top-down, discourse oriented reading strategies and bottom-up, word recognition strategies which are used in comprehending the linguistic information in a text. According to the model, the ongoing process of reading is guided by what are termed integrative processes. These processes govern or manage how a reader integrates recognition of individual words (word analysis processes) with synthesis of text meaning (discourse analysis processes).

Figure 1

Categories of Reading Processes and the Nature of Their Interactions



McLaughlin, Rossman, and McLeod (1983) in their paper on cognitive information processing and second language learning point out that there are two basic modes in which humans organize their processing of language information: automatic processing and controlled processing. These processes have implications for training of second language reading skills in each of the three categories of processing mentioned by Frederiksen. In automatic processing during reading, for example, persons quickly and efficiently analyze the various codes making up words, syntactic units and meaning units signalled by the language composing a text based on well-learned linguistic decoding strategies. Activation of these well-learned strategies for processing language requires very little attentional control on the part of the reader. Only under unusual circumstances would automatic processing become the focus of conscious attention. In contrast, persons who rely on controlled processing during reading extend a great deal of special effort in analyzing the types and levels of information codes presented in a text. For example, they might try to deliberately pronounce the syllables in a word they are reading in order to evaluate whether they recognize a word by its pronounced sound. A fluent reader might, on the other hand, automatically associate the spelling of a word with its meaning in the context of information in the surrounding sentence. In controlled processing, persons need to engage in deliberate, often step-by-step, problem solving and cognitive monitoring activity in order to check and evaluate whether the strategies used in decoding text information are operating accurately and in coordination with each other. It should be obvious that as second language learning and second language acquisition progresses, reading (and other language skills) change from requiring primarily controlled processing to

requiring primarily automatic processing. The following quote from McLaughlin, et al. (1983) citing Cummins, overviews these issues from a language proficiency and second language learning point of view:

> Cummins (1981) has suggested that the development of linguistic skills be conceptualized as a continuum, with some skills requiring more and some less active cognitive involvement. Those tasks for which the linguistic tools have become largely automatized (mastered) require little cognitive involvement for appropriate performance. Those tasks where this is not the case require a greater cognitive involvement. In reading, word decoding skills are the first that require cognitive involvement. As the learner progresses, a degree of automaticity is achieved with respect to word decoding, and this process can be short-circuited as the learner engages in the process of sampling from the text to confirm predictions.

To carry this point a little further, in light of Figure 1, consider the notion that in reading individuals have a limited amount of attention to devote to word analysis processes, discourse analysis processes and integrative processes. Second language learners need to develop a good set of generalized word recognition strategies that are over-learned and automatic, so that attentional and memory resources are more freely allocatable to the discourse meaning centered facets of the reading processes. Thus, from this point of view there is an obvious hierarchy in the development of reading skills. In order for a reader to concentrate on reading for meaning, he or she must be highly skilled and automatic in the decoding of words and in accessing the meanings of words. Note, however, that as shown in Figure 1, for the fluent reader, integrative processes can create expectations about what words might next occur in a text based on comprehension of ideas previously conveyed at the sentence and discourse level of a text. This latter possibility suggests that being efficient at recognizing words based on their orthographic and graphemic characteristics is a necessary, but not

sufficient condition for becoming a good reader. If we focus on training word analysis skills in second language learners we thus are faced with concern for improving recognition of letter units forming words, the syntactic functions of words and the meanings referred to by words, in both a bottom-up and top-down fashion. The bottom-up approach to training would attempt to automate reader's skill in recognizing words and word meanings starting with the letter codes that are perceived. The top-down approach to training would attempt to automate reader's skill by using knowledge of what has already been understood in a text to set up expectations about the meaning of sentences and words that are yet to be read.

Thinking about these issues in a second language context is truly complex because of the likelihood that strategies for reading in a first language such as Spanish can be expected to affect strategies for learning how to read in a second language such as English. As second language acquisition researchers have reminded us, the process of acquiring a second language appears to undergo an evolution in the individual. With two languages as similar as Spanish and English, initial skills in using English as the second language may depend heavily on knowledge of structures in the first language, Spanish (Hakuta, 1982). As skill in the English language increases, ability to use the new language system achieves more and more autonomy from the first language, Spanish. It is also important to note, however, that total autonomy may never be necessary nor desirable, since there do exist some important commonalities in the structure of Spanish and English, and since there are common processing strategies for reading either Spanish or English. (For a discussion of relevant similarities and differences in the word structure and grammar of Spanish and English, see Stockwell, Bowen and Martin, 1965.) Yet

another complication is the fact that social language contact phenomena between Spanish and English as occurs in the U.S. can lead to a further relationship between spoken and written varieties of Spanish and English.

Training of Word Recognition Skills in English

In this section of the paper I will mention two English word recognition training activities devised by John Frederiksen (Frederiksen et al., 1982). Their purpose is to help train automatic skills in word recognition. These activities are implemented in the form of computer games.

The first of these computer games, called Speed, adopts a totally bottom-up approach to training; it helps train readers in detecting letter clusters occurring in words. In this task, a target letter cluster such as "ler" appears above a window that consecutively shows a set of words such as "butler," "filter," "burglar," etc. The task faced by the trainee is to press one of two response keys indicating whether "ler" occurs in a word or not. Words are flasked on the screen only for a very brief period of time and this period of time is variable, from 3/4 of a second to one-half of a second or less. Whenever a trainee makes a correct judgment the pace at which words are presented is speeded up. When a trainee makes a mistake, error lights appear and words are presented at a slower rate. The speed or word presentation is flasked on a speedometer shown on the screen. The goal of the trainee is to raise the speedometer to the highest word speed possible.

It seems clear that the Speed training game could be adapted for training the English word recognition skills of second language learners whose first language is Spanish. The English letter clusters which are trained might be chosen, based on a number of criteria. For example, they might be chosen so

that they correspond systematically to letter clusters or syllables which (a) occur with slightly different spelling in English versus in Spanish, or (b) are letter combinations found in English words but not in Spanish words.

Another computerized word recognition training program devised by Frederiksen is known as Ski-Jump. This training program features a top-down approach to detecting word meaning. In this game a trainee reads a sentence which has a word missing near the end. After studying the incomplete sentence, the trainee is shown a candidate word which may or may not complete the sentence in question. The candidate word is presented in several flashes on the screen. The first time the word is shown it appears for only a brief instant (10 milliseconds) before being replaced by a white masking pattern. The candidate word is then shown again, this time for a slightly longer time period before being replaced by the white masking pattern. On each successive exposure the time that the candidate word is visible is lengthened, and thus the word becomes easier to perceive as cycles of exposure proceed. The task of the trainee is to press one of two response keys as quickly as possible, indicating whether the candidate word completes or does not complete a sentence. Trainees speed up in their performance of this task as they learn to use the surrounding meaning of an incomplete sentence to help in setting up expectations of what the missing word might be like. After making a correct decision, the trainee is shown an animation of a ski jump. The length of the ski jump is inversely proportional to the time the trainee took in correctly responding to the word recognition task. A longer ski jump results when a trainee responds more quickly in the word recognition task. As a trainee improves in performance, he or she is graduated to steeper ski slopes. These steeper ski slopes are associated with shorter maximum exposure times for words in the sentence completion task.

Just as with the Speed word recognition training game, it would appear possible to adapt the Ski-Jump word recognition training game so that it would be of special value to English learners from a Spanish language background. As an example, both English and Spanish add the suffix "s" or "es" to form plural nouns. However, there are many exceptions in English to this rule, as shown, for example, by differences between singular nouns such as "man," "child," and "ox," and their plural forms "men," "children," and "oxen." It would be possible to devise incomplete Ski-Jump sentences which would need to be completed by irregular plural forms in English, and thus to train automatic recognition of these forms in second language learners.

It seems obvious that the Ski-Jump game might be adapted to train a large range of English word recognition skills, though it is not possible in this paper to discuss other applications. Instead, attention will now be turned to describe other word recognition training research emanating from cognitive psychology that emphasizes training of vocabulary skills. In this way I can give you a broader appreciation of the variety of cognitive approaches that could be utilized in training second language skills in reading.

Training of Vocabulary Skills in English

At present there is a good deal of cognitive research underway, designed to train vocabulary reading skills in English. As an example, Sternberg, Powell and Kaye (1983) are working on design of an instructional system for building vocabulary skills. According to these investigators, training of vocabulary skills might focus on three phases of training. First, training programs would teach trainees morphological cues determining the meaning of words and how different words share meaning because of commonalities in their

morphological structure. A second training phase would train skills in inferring the meaning of unfamiliar words based on their (target) morphological cues, in cases where these unfamiliar words occur within the context of full sentences within a passage. Trainees would be guided through a series of exercises designed to analyze unfamiliar word meaning based on the surrounding meaning of other words and sentences. A third phase of vocabulary training would integrate the sorts of skills taught in the first two phases. In this third phase, trainees would develop skills requiring switching back and forth as necessary between analyzing the morphological structure of words and the meaning that words should have in the context of the meaning of surrounding sentences.

The important implications of Sternberg, Powell and Kaye's work for second language teaching is that it is designed to train an integrated system of skills for learning new vocabulary rather than just the teaching of definitions of isolated words. If the Sternberg, Powell and Kaye training regimen is successful, persons will learn not only new words, but how to learn new words. This philosophy towards vocabulary development is very different from traditional approaches to second language teaching which stress rote learning of new word definitions or dictionary look-up of new words while reading.

There are some interesting implications in Sternberg, Powell and Kaye's training techniques for teaching of English vocabulary skills to native Spanish speakers. First, there is a great deal of overlap between English and Spanish inflectional and derivational morphology, owing to the influence of Latin on Spanish and the influence of Latin and French on English. This is illustrated by the following examples taken from Stockwell, Bowen and Martin (1965).

Spanish	English
ab-normal	ab-normal
[illegible]	ad-mit
ante-cedente	ante-cedent
person-aje	person-age
abund-ancia	abund-ance
advers-ario	advers-ary
monu-mento	monu-ment
cere-monia	cere-mony
ora-dor	ora-tor

Thus, in some instances, development of English vocabulary skills might be enhanced by training of morphological pattern matching between known Spanish words and unfamiliar English words. This sort of pattern matching occurs naturally in learning to read English among Spanish speakers, but the strategy might be taught systematically using the techniques suggested by Sternberg, Powell and Kaye.

There are limitations to this Spanish-English morphological pattern matching strategy for learning new English vocabulary because it does not hold for all words. For example, the Spanish words "lectura," meaning "reading," or "sanidad," meaning "health," do not have an English equivalent in the words "lecturing" or "sanity." Thus in developing the vocabulary building techniques of Sternberg, Powell and Kaye for Spanish origin English learners, it would prove essential to teach exceptions in similarities of vocabulary across the two languages. Stockwell, Bowen, and Martin (1965) cite a number of other contrasts in Spanish and English word morphology which deserve attention in the training of English vocabulary skills to persons whose first language is Spanish.

The important thing to note is that adaptation of English-language based techniques for training of reading skills requires that systematic attention be placed to similarities and contrasts between the structure of English and Spanish and to how these similarities and contrasts might influence the training of reading skills from a cognitive psychology point of view.

Final Comments

The purpose of this paper has been to explore ideas on how second language training of reading skills might benefit from current cognitive research. Any one of the several approaches to training mentioned here deserves more careful consideration in how it might be made applicable to second language teaching circumstances. Hopefully, some of you might be able to undertake this exploration more systematically than has been possible here. My goal here has been to provoke your interest in cognitive training research which could be made relevant to second language learning.

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