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The Application of First Language Reading Models to Second Language Study: A Recent Historical Perspective

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ABSTRACT

This article examines the influence of first language reading models on second language reading theory and research. Second, this essay recommends a sharing and transfer of knowledge between related disciplines, such as first- and second-language reading, to increase our understanding of the reading process, regardless of the target language.

INTRODUCTION

As the theories and methods of second language learning have evolved over the past century, so have models of reading comprehension. However, the extension of first language reading theories and models to the domain of second language and English as a Second Language (ESL) reading study is a relatively new development (Carrell, 1988). Clearly, research focusing on both first- and second-language reading would benefit from a sharing of knowledge between these two disciplines. Therefore, this article describes the recent history of major first language reading models, in light of their application to second language reading study, in the hopes of increasing the sharing of information and knowledge between these sibling disciplines.

FIRST LANGUAGE READING MODELS: THREE TYPES

A reading model “provides an imagined representation of the reading process that not only provokes new ideas about reading but also provides a paradigm against which aspects of the reading process may be tested” (Barnett, 1989, p. 10). In general, most of the first language models of reading comprehension that have been introduced into the second language literature can be placed into one of three main categories: top-down, bottom-up, or interactive. The major distinction between top-down, bottom-up, and interactive groups

of first language reading models is the emphasis placed on text-based and reader-based variables. Text-based variables include items such as vocabulary, syntax, and grammatical structure, whereas reader-based variables involve the reader's background knowledge of the world and texts, cognitive development, strategy use, interest, and purpose in reading (Barnett, 1989).

Early theories of reading considered the reading process to be a passive, bottom-up activity. Reading was viewed as a decoding process where the reader reconstructs meaning from the smallest textual units (Carrell, 1988). Bottom-up skills include discriminating between sounds and letters, recognizing word-order and suprasegmental patterns or structures, and translating individual words (Shrum and Glisan, 1994). This bottom-up vision of the reading process was well suited to the audiolingual method of second language instruction in the 1960s and 1970s, which considered the decoding of sound-symbol relationships as an essential component of the language learning routine.

Whereas bottom-up processes take the form of a text-based decoding activity (Gough, 1972; McKoon and Ratcliff, 1992), top-down processes are reader-driven (Goodman, 1968; Graesser, Singer, and Trabasso, 1994) and concentrate on what the reader brings to the text in terms of world knowledge (Barnett, 1989; Omaggio Hadley, 1979). In a strict top-down model, such as the original psycholinguistic model proposed by Goodman (1968), the reading process is described as a "psycholinguistic guessing game" (p. 126) where the reader reduces his or her dependence upon the text through activities such as predicting and sampling. Specifically, "the reader uses general knowledge of the world or of particular text components to make intelligent guesses about what might come next in the text [and] samples only enough of the text to confirm or reject these guesses" (Barnett, 1989, p. 13).

The third major class of first language reading models, and the most recent, is the interactive model. The interactive view of reading comprehension involves both bottom-up and top-down processing, or an interactive process between the reader and the text (Bernhardt, 1991; Grabe, 1991; Rumelhart, 1977; Swaffar, Arens, and Byrnes, 1991), with different versions of the model assigning varying degrees of importance to the individual top-down and bottom-up components. According to Barnett (1989), the interactive model provides a cyclical view of the reading process where textual information from the text and the reader's mental activities, such as the processing of graphic, syntactic, lexical, semantic, and pragmatic information impact comprehension. In other words, top-down and bottom-up processes complement one another and function interactively in the reading process.

FIRST LANGUAGE MODELS AS APPLIED TO
SECOND LANGUAGE READING

Most second language reading models are patterned after one of the three major models (bottom-up, top-down, and interactive) developed for first language study. For example, Coady (1979) elaborated upon the initial first-language psycholinguistic model put forth by Goodman and proposed a design specifically tailored to second language reading comprehension. In Coady's model the reader's background knowledge interacts with conceptual abilities and processing strategies. For Coady, conceptual ability refers to general intellectual capacity. Processing strategies, on the other hand, include syntactic information (deep and surface), lexical meaning, and contextual meaning (Coady, 1979; Carrell and Eisterhold, 1988). The interaction among background knowledge, conceptual abilities, and process strategies can also be compensatory in that interest and background knowledge can keep a reader interested in material in spite of structural complexity (Coady, 1979). Given the additional linguistic barriers of a second language, the role of interest and background knowledge becomes increasingly important.

Bernhardt's second language constructivist model (1986) is similar to both Goodman's and Coady's psycholinguistic model in that it emphasizes prior knowledge, word recognition, phonemic/graphemic features, syntactic feature recognition, and intratextual perceptions (Davis, 1994). An interesting addition, however, is the element of metacognition (Barnett, 1989; Flavell, 1976; Garner, 1987; Nelson, 1992), or thoughts about one's own cognitive processes. For Bernhardt, metacognition occurs when a reader is thinking about what he or she is reading (1986). In other words, the "reader recognizes words and syntactic features, brings prior knowledge to the text, links the elements together, and thinks about how the reading process is working (metacognition)" (Barnett, 1989, p. 47).

In contrast to interactive visions of the reading process that emphasize top-down processes in comprehension (Bernhardt, 1986; Coady, 1979), Eskey's second language version (1986; 1988) of an interactive model stresses the need for "holding in the bottom" (p. 97). As in any interactive model, Eskey posits a mixture of bottom-up decoding and information provided by top-down analysis. Nevertheless, Eskey states that he is concerned that the promotion of higher-level strategies, such as predicting from context and the activation of schemata, may be too strong. Moreover, Eskey warns that teachers "must not lose sight of the fact that language is a major problem in second language reading, and that even educated guessing at meaning is no substitute for accurate decoding" (1988, p. 97). To illustrate the importance of bottom-up processes in the interactive model, Eskey uses the following sentence pair: Take three stiggles. Stick them in your ear.

Given that nobody knows what a stiggle is, and that there is no context or extra-linguistic information to suggest that them refers to stiggles, it must be the structure of the language — a bottom-up aspect of the text — that allows the reader to make the connection between pronoun and referent.

A PARADIGM SHIFT

Swaffar, Arens, and Byrnes (1991) describe a paradigm shift in second language acquisition that began in the 1970s when the language teaching profession became disenchanted with a limited system of normed language. Instead of the orthodox concern with bottom-up grammatical accuracy, the profession began to stress language creativity and the expression of personal opinions and thoughts. A broader vision of language performance — as the result of the learner's total knowledge, rather than from language ability alone — had begun to emerge. In other words, cognition and communicative interaction proved to be just as important as accuracy.

Practical implications of the increasing importance of the learner in second language acquisition research and theory — as opposed to the material to be learned — can be found in second-language course work that acknowledges general conceptual abilities and background knowledge by stressing macro-understanding, first language ability, and prior knowledge in a particular subject (Swaffar, Arens, and Byrnes, 1991).

The recent stress placed on the role of the learner in second language acquisition studies is most apparent in reading comprehension research. Top-down models, which replaced the dominance of a strictly text-driven view of the reading process, highlighted the reader's use of context and prior knowledge. The subsequent interactive models demonstrated that "text sampling and higher-level decoding and recoding operate simultaneously" (Barnett, 1989, p. 13). In fact, one of the principal components of interactive reading models is the previously acquired knowledge structures, or schemata, and background knowledge that the reader brings to the reading process.

SCHEMA THEORY

An important element in all of the first language top-down and interactive models described earlier is the role of the reader and what he or she brings to the text by way of experience, knowledge, and expectations. The role played by background knowledge in language comprehension can be explained and formalized in a theoretical model called schema theory (Anderson and Pearson, 1988; Rumelhart, 1980; Schank and Abelson, 1977). Anderson and Pearson (1988) describe schemata as abstract knowledge structures that represent relationships among component parts. Proponents of schema

theory (Rumelhart, 1980; Carrell and Eisterhold, 1988) maintain that an oral or written text does not have any meaning in and of itself. Instead, a text gives direction to readers and listeners concerning how they should retrieve and construct meaning from their own previously acquired knowledge. The store of information, or the previously acquired knowledge of a reader or listener, is called his or her background knowledge.

Although schema has played an important role in reading and listening comprehension theory from the late 1960s to the 1980s, it is not a recent discovery. For example, while researching recall of geometric designs, Wulf (1922), a Gestalt psychologist, described his results by stating that "in addition to, or even instead of, purely visual data there were also general types or schemata in terms of which the subject constructed his responses" (p. 141). Later, in a 1932 work entitled *Remembering*, Bartlett described the term schema as "an active organization of past reactions or past experience" (p. 201).

Rumelhart (1977) describes a schema as an abstract representation of a general concept for an object, event, or situation. Indeed, most people possess an abstract representation for the concept *car*. However, this representation can be altered by additional information concerning the car such as rustbucket or elegant. According to Schank and Abelson (1977) a schema can represent a situation or a series of events such as doing laundry or going to the movies. In this case, the term "script" refers to the "predetermined, stereotyped sequence of actions that defines a well known situation" (p. 41).

According to schema theory, there needs to be a union between the text and the reader's background knowledge in order for comprehension to occur. Specifically, "every input is mapped against some existing schema and all aspects of that schema must be compatible with the input information" (Carrell and Eisterhold, 1988, p. 76). This process of matching incoming information to previously acquired knowledge structures also involves a set of both bottom-up and top-down processes. Top-down processing takes place as the reader makes inferences based on schemata and scans the input for information to match the partially satisfied, higher order schemata. Similarly, bottom-up processing "is evoked by the incoming data; the features of the data enter the system through the best fitting, bottom-level schemata" (p. 76).

To illustrate the effects of schemata, background knowledge, and simultaneous bottom-up and top-down processing, Carrell and Eisterhold (1988) offer the following example: "The policeman held up his hand and stopped the car" (p. 77). While there are many possible schemata related to this sentence, a reader is likely to make the following assumptions while attempting to comprehend this short passage: the car has a driver, the policeman signals for the driver to stop, the driver applies his brakes and stops the car. However, given different background knowledge, different interactions between specific

top-down and bottom-up processes, and the activation of a different schema, interpretation of this text would be very different. For example, imagine that the car has no driver and the man is Superman. In the Superman schema, the holding up of the hand is no longer considered to be a signal to a driver to stop the car, but it is likely to be interpreted as a physical stopping of a driverless car by Superman's hand. If a reader encounters an inconsistency between bottom-up information gained from the text and top-down predictions, a new schemata must be activated and a new interpretation will arise, as in the car stopping examples above (Carrell and Eisterhold, 1988). The selection of a particular form of a schema out of many is referred to as instantiation.

THE BACKGROUND AND CULTURE BARRIER

In addition to bottom-up linguistic difficulties, such as being unfamiliar with a particular word or grammatical structure, there may be several top-down reasons why a reader may be unable to comprehend a given text. For example, the reader may not have the relevant content schema available to access; the reader may have the appropriate schema but is unable to access it due to insufficient clues in the text; or the reader may have used an incorrect schema to "mis"comprehend the text (Rumelhart, 1977; 1980). A major reason for the inability of second language readers to access the correct content schema is the fact that they often lack the appropriate schema and the specific cultural background knowledge necessary for comprehension.

Alderson and Urquhart (1988) designed a study to examine the effects of an ESL student's background discipline — his or her top-down knowledge of a particular academic field — on reading comprehension. They hypothesized that a student of engineering would perform better on an engineering text than would a student of economics, even if the general level of ESL proficiency was the same for both students. Alderson and Urquhart proposed that "if readers bring their background knowledge to the comprehension process, and this knowledge is bound to vary from reader to reader, then there can be no single text-bound comprehension, but rather a host of comprehensions" (p. 169). Alderson and Urquhart examined four groups of students from different academic disciplines who had just completed the same English Study Skills. All students were then given five reading texts matched in terms of linguistic complexity, sentence length, and word length in syllables. Two of the texts were on engineering topics, two were related to economic development and finance, and one text was designed to be general. Results of a reading comprehension test supported the original hypothesis that "students from a particular discipline would perform better on tests based on texts taken from their own subject discipline than would students from

other disciplines. That is, there appears to be an advantage to taking a test on a reading text in a familiar content area" (p. 174). In a similar study, Levine and Haus (1985) found that English-speaking students who were interested in baseball were able to answer questions about a Spanish baseball article significantly better than English-speaking students who knew little about the topic.

In a 1987 study, Markham and Latham found that top-down cultural knowledge affected participants' comprehension. This study involved sixty-five university-level ESL students, of which twenty were Christian, sixteen were Moslem, and twenty-eight claimed to have no knowledge of either religion. Markham and Latham found that the Christian students outperformed all other students on an oral exam while testing a passage related to Christian prayer. Similarly, the Moslem students outperformed the other students on a passage related to Islamic prayer. Finally, both the Moslem and the Christian participants produced higher scores than religion-neutral students in terms of total recall scores for both passages.

In light of numerous studies demonstrating the positive effect of relevant cultural information on reading comprehension (Alderson and Urquhart, 1985; Levine and Haus, 1985; Markham and Latham, 1987) many researchers and methodologists have concluded that "cultural content may and must be taught" (Barnett, 1989, p. 45). Cultural content can be taught through illustrations, titles, and pre-reading activities such as discussion, vocabulary work, and brainstorming. According to Barnett (1989) pre-reading activities help students comprehend reading passages by involving the student in the text, eliciting or providing appropriate background knowledge, and activating necessary schemata.

Omaggio Hadley (1979) studied the effect of teaching context-specific information, in the form of visual advanced organizers, on reading comprehension of French passages by English speaking students. Omaggio Hadley acknowledges that second language learners are "often faced with input material... that is by nature unfamiliar, difficult, and therefore unpredictable because of the learners' lack of familiarity with the linguistic code" (p. 139). Furthermore, she hypothesizes that the provision of "additional [top-down] contextual information in the form of visuals should make the comprehension task easier by providing an organizational scheme for the passage as a whole (e.g., appropriate background knowledge or schemata would be activated" p. 140).

By providing an organizational scheme for an L2 reading passage, Omaggio Hadley is in essence teaching contextual information and cultural content (Barnett, 1989; Markham and Latham, 1987; Omaggio Hadley, 1979) and allowing students to "activate appropriate background knowledge or schema" (Omaggio Hadley, p. 140).

SCHEMATA AND BACKGROUND KNOWLEDGE VERSUS CONTEXT; WHAT IS THE DIFFERENCE?

Simply because a passage, a story, or even a grammatical exercise has a context does not necessarily imply that the reader, listener, or student is able to comprehend the context supplied. For instance, in the aforementioned 1987 study by Markham and Latham, every participant was exposed to the same two stories, and therefore was supplied with the same contextual information. Researchers in this study found that what permitted some students to perform better than others on a comprehension and recall task was not the context, which was equal for all participants, but rather the personal information, or the background knowledge, brought to the text by certain readers. For example, the Moslem readers in this study knew more about the passage dealing with Islamic prayer practices than did the readers professing a Christian heritage.

In addition, prereading and prelistening activities, which have been shown to facilitate reading and listening comprehension (Phillips, 1984; Shrum and Glisan, 1994), do not alter or add to the context of a reading or listening text. Rather, prereading and prelistening activities allow the reader and listener to build and/or retrieve appropriate schemata from memory to aid in the comprehension of a text (Omaggio Hadley, 1979; Phillips, 1984). According to Phillips (1984), prereading and preparation activities help the reader develop skills in anticipation and prediction for the reading of graphic material.

Although very similar, context is the circumstance, environment, and setting created by the author of a text or an exercise, whereas background knowledge is the circumstance, environment, and setting brought to the text or task by the student.

CONCLUSION

This article has reviewed the three types of first-language reading models that have had the greatest impact on second language research and methodology. Although the inchoate first language models have been adjusted to account for second language variables such as target language (Eskey, 1988), their impact in second language reading research can not be denied. Clearly, the second language teaching profession's recent emphasis on the learner, rather than on normed language, welcomes the transfer of top-down and interactive models of the reading process from the realm of first-language research. Similarly, schema theory, which originated in the cognitive sciences and flourished among first language reading researchers, is proving beneficial to the second language reading teacher and researcher by accounting for additional cross-language cultural variables.

The sharing and transfer of knowledge among related disciplines — cognitive science to first-language reading, and first-language reading to second-language reading — must be strengthened and varied in direction of flow. As first-language models of reading have influenced second-language reading theory and research, so might an understanding of how these models are being employed in other disciplines enrich the first-language researcher and teacher.

An important relationship exists between first- and second-language research and needs to be explored by both parties. Indeed, first language reading researchers and theorists may want to consider the implications that their research will have within the realm of second language reading. Similarly, second language researchers may want to review, and perhaps replicate, first language reading studies. Finally, and most important, because we all strive for a common goal, the improved reading comprehension of students of all ages and in all target languages, collaborative projects investigating both first- and second-language reading, and involving researchers from each field, must be undertaken.

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