

Research Issues

Diagnosing Individual Second Language Reading Problems Through the Use of Think Aloud Protocol Analysis¹

by Michael Dordick, Ohio State University ²

Introduction

Many ESL students experience serious difficulties comprehending texts. Unfortunately, because reading is a private, individual activity, such problems may go undetected for too long. At the graduate student level, being unable to quickly assimilate texts could result in ultimate academic failure, while in lower academic levels, reading problems could seriously impair students' progress in other subjects. Often pre-admission language proficiency tests do not provide information specifically related to reading comprehension. Even when reading comprehension tests are administered, serious doubt as to their validity have been raised, while the nature of the data, being very general, is of little use in helping students overcome reading comprehension problems.

Typical reading comprehension tests are based on the premise that reading skills are identifiable, discrete, and measurable. They have been used extensively for several decades in both native and nonnative speakers contexts. Yet many scholars have questioned the construct validity of such tests (Alderson, 1995; Bernhardt, 1999; Farr, Pritchard & Smitten, 1990; Pearson & Valencia, 1987; Riley & Lee, 1996; Sternberg, 1991); the face validity (Bernhardt, 1991; Grotjahn, 1995; and Wolf, 1993) and the negative backwash they have created (Westhoff, 1991).

Alderson (1995) raises the following issues:

Reading skills may not exist as discrete units of constructs in the reading process. It is not clear what specific reading skill a particular question addresses.

¹This is a refereed article

²This author can be reached at: dordick.1@osu.edu

There is little evidence to support a hierarchy of reading skills; and a correct answer does not necessarily result from the use of the purported skill.

Consequently, he calls for a more "empirical approach to the investigation and application of models and theories of reading" (p. 59). Although Buck, Tatsuoka and Kostin (1997) attempt to refute Alderson's criticisms by providing a rigorous method for determining the discrete skills which a reading assessment instrument test, they admit that their "attribute list of skills are basically exploratory... (p. 431) and that they "coded test items... and made inferences about the abilities needed to perform those"(p. 436). They do not specify upon which current reading models such inferences are drawn. There is no empirical basis for the extensive list of specific types of "knowledge" and "abilities" which they compiled as the basis of their rule-space analysis.

Other scholars present an alternative: computer-adaptive testing (CAT) (Young, Shermis, Brutton, & Perkins, 1996) with its practical advantages and exclusive ability to determine next questions on the basis of previous questions answers. Yet CAT is restricted even further by the need for unidimensionality of items and homogeneity of testee populations (Perkins, 1998). This weakens both the validity and reliability of the test.

Even if the issues of validity and reliability were not operative, standard multiple choice reading comprehension tests are not fine tuned enough to identify specific problems with reading comprehension (Aweiss, 1993). Bernhardt (1991) suggests that reading assessment instruments need to provide more detailed information regarding the reading process of an individual reader. While she recommends recall analysis for the purpose of assessment, this primarily gives us a quantitative measure of the product of reading. Even when refined by the use of written summary protocols (Riley & Lee, 1996), the results of such assessments only tell us what content subjects have understood. A much more focused method to diagnose specific problems with reading comprehension is needed which can provide easily accessible data useful for the purpose of solving comprehension problems. Rather than assess skills, whose very existence is dubious, a surer route is to investigate strategies, proven to exist through empirical studies.

Using think aloud protocols, much knowledge of reading strategies has already been compiled. Studies have usually focused on comparing what poor and good readers do. For example, Pressley & McCormick (1995) examined the strategies that university professors use, while Pressley & Afflerbach (1995) reviewed some 65 contemporary studies of first language reading which employed think aloud protocol analysis in their methodology, and through data analysis, identified the components of their "constructively responsive reading", a model of good reading strategies based entirely upon empirical data.

Other studies have compiled taxonomies of reading strategies or compared good and poor readers' strategies, such as Block (1986; 1991); Chamot & Kupper (1989); Cavour

(1996); Dai (1989); Ellinger (1985); Feng & Mokhtari, 1998; O'Malley & Chamot (1990); O'Malley, Chamot, Stewner-Manzanares, Kupper, & Russo, (1985); Oxford (1990) and Young (1991) (see Fitzgerald, 1995 for an overview). There has been a wealth of knowledge produced with regard to the use of reading strategies, and now we are ready to apply this knowledge to our pedagogical repertory.

Many scholars are now recommending that reading strategies be considered as a pedagogical tool in the L2 context when dealing with comprehension problems (Chamot, 1990; Feng & Mokhtari, 1998; Jimenez, Garcia, and Pearson, 1994; 1996; Wright, 1997). Accordingly, studies have endeavored to determine the pedagogical effect of the teaching of reading strategies (Brown & Pallinesar, 1984; Carrell, 1985; Carrell, Pharis, & Liberto, 1989; Song, 1998; and Zicheng, 1992). Most of these studies have found that teaching strategies brings modest, but favorable results (Song, 1998; Wright, 1997).

Perhaps the reason why results have been only modest is because only general assessments are made of the subjects' reading comprehension, so experimental groups are not necessarily taught the particular strategies each individual of the group needs. For most studies which have shown the effect of strategy training, subjects are given a pretest and post-test consisting of a standard, skills-based reading comprehension test. These tests are of little use in determining the specific weaknesses in an individual's reading process. In some cases, subjects are diagnosed to be weak in certain skills, while they are taught strategies which may not effectively address their needs. Anderson (1991), examining 3 case studies, found that his subjects all used very similar strategies, yet their reading comprehension varied greatly. He concluded that how one uses a particular strategy also must determine success in reading. Aweiss (1993) calls for a cognitive approach to reading assessment which sheds light on the individual's constructive reading process to replace the standard comprehension tests, while Kamhi-Stein (1998) suggests an approach which enables us to set up a reading program "tailored to meet the actual needs of L2 readers" (p. 611).

Only a few studies have used such an approach to diagnosing reading comprehension problems in the L2 context. Kamhi-Stein (1998) examined the reading strategies of three L1 Spanish college ESL students through think aloud protocol analysis, while Meyers (1989) and Culum (1998) used this methodology with children in the L1 context. It is proposed that through the informed use of in-depth interviews and think aloud protocol methodology, a more functional and individual profile of the reading process can be obtained, one that can be directly interpreted and used in the teaching of specific reading strategies for the solving of comprehension problems. Rather than trying to match strategies to skills, strategy use is diagnosed and the same is prescribed. The purpose of this paper is to provide a rationale for the use of think aloud protocol in second language reading pedagogy by reviewing pertinent scholarship and providing examples of how this methodology may be used to diagnose individual readers' specific problems in such a way that solutions in the form of strategy training intervention are readily accessible.

An Overview of the Use of Think Aloud Protocol Methodology.

Think aloud protocol analysis is one of the most effective means we have of investigating hidden, cognitive processes. It has recently been used in reading research as a means of exploring the thoughts of subjects as they perform a reading task in order to learn more about the processes they are undergoing. Van Someren, Barnard, & Sandberg (1994) consider that "in many cases, the think aloud method is a unique source of information on cognitive processes" (p. xi). They explain that while research has generally focused on products as a means of inferring processes, one can use think alouds in order to approach the root of processes and avoid having to speculate as to why certain products occur. While this methodology has been used in one form or another since ancient times by scholars (Pressley & Afflerbach, 1995), in the last century it has been specifically used most extensively in the area of educational psychology, especially in relation to problem-solving tasks (Ericsson & Simon, 1993), and more recently, in research into the reading process.

Afflerbach & Johnson (1984) suggest several advantages of think aloud methodology, among which are: It is the most direct way to investigate cognitive processes, allowing access to high level cognitive processes which otherwise are hidden, and by recording and transcribing the actual words spoken, it provides a permanent, historical record of the cognitive process being investigated (p. 308).

Theoretical foundations

Researchers who use this method should ground their methodology in a theoretical framework that supports the notion that thoughts are, indeed, accessible and can be verbalized in such a manner as to be useful in describing hidden processes. Think aloud protocol research, therefore, is grounded in recent models of information processing which seek to describe human cognition (van Someren, Barnard, & Sandberg, 1994).

Van Someren, Barnard, & Sandberg (1994) divide cognitive processes into three global steps: First, information passes through a screen provided by our sensory apparatus. Input then goes to short-term, or working memory store, which in turns has several feedback loops, and finally, into long-term memory with loops designed to keep it in storage, and yet other loops for its retrieval (pp. 20-21).

According to Ericsson & Simon (1993), there are several possible levels of processes that take place between the actual cognitive act and the reporting of it. For example, in doing a non-verbal task like swimming, actions may be mentally verbally coded in order to remember actions for future use. This is relatively easy, since it does not require verbalization of the process. However, when actions are explained to another person, as to a researcher, then an additional level of processing is involved, as the subject is required to use explicit language for communication. Some tasks about which we are little used to talking may be especially difficult to verbalize. In such cases, subjects may need to be taught specialized vocabulary (Van Someren, Barnard, & Sandberg, 1994).

Another layer of complexity is added if the subject is asked to verbalize only a certain part of a process. In such cases, a "scanning or filtering process" (Ericsson & Simon, 1994, p. 18) must take place, as the subject is required to discriminate among different parts of the process, focusing only on selected ones. Finally, another layer of complexity accrues if subjects are asked to provide reasons why they do things, or explain their thoughts. Other scholars, however, do not recognize the distinction between direct and indirect data insofar as they consider all data to be indirect (Olson, Duffy & Mack, 1984).

The effect of interruptions while performing a task has been studied by Ericsson and Kintsch (1995) with respect to the operation of long term working memory. While their review of literature on interruptions found that such have an unpredictable effect on recall, their own research suggested that skilled performers of a task can overcome problems of interference by two means: "recency" and "elaborative encoding" (p. 219). This provides further support to the argument that thinking aloud should not significantly affect the operation of a reading task.

Different moments for think aloud

One of the key issues in applying this methodology is to decide at what point in the task should subjects report their thoughts. Briefly, the main options are before the task elicitation, usually in the form of an interview; during the task (concurrent); after the task (retrospective); or a combination of the above.

For retrospective reports, the shorter the duration between the doing of the task and the reporting of it, the more reliable one might expect the information to be, due to memory limitations. Van Someren, Barnard, & Sandberg point out, however, that post-hoc reporting may suffer from certain shortcomings: The subjects may forget much of what they have done; as a result of this, they might attempt to fill in gaps in their memory by speculating on the processes that might have taken place; and subjects may naturally try to tidy up what they have done and make the process appear more methodical and structured than it in fact was. On the other hand, the advantage of retrospective reporting is that subjects may calmly reflect on the task without the added burden of performing it.

Concurrent think aloud reporting avoids the pitfalls which retrospection may entail, but, as discussed above, inherently adds levels of processing to the original task under scrutiny. A paradox exists, then, for the researcher, as the more one gains in detail and richness of data, the more interference there is with the task being performed. Somehow, one must strike a happy medium in which sufficient detail is obtained, while at the same time, not significantly interfering with the process of the task performance.

Training for subjects

Most researchers recommend that some pre-task training be given to subjects in order to ensure the elicitation of rich data. This may be done by first practicing on a task similar to the experimental one, such as using a practice text in the case of reading research (Afflerbach & Johnson, 1984), or by familiarizing subjects with vocabulary they might use to describe their processes (Cohen & Hosenfeld, 1981). Another way to prepare subjects for think aloud verbalization is through modeling, either by the researcher, or by using a recording of another subject. Finally, the researcher may want to sensitize subjects by asking them to contemplate their processes well in advance of engaging in the actual experimental tasks. Any combination of the above, of course, may be used.

In addition to pre-task training, researchers might find it necessary to prompt subjects during the task performance by reminding them to report their thoughts. If subjects become engrossed in the text and forget to continue with their protocol, the researcher must intervene by saying, for example, "please, tell me what you are thinking"; "please, think aloud"; "keep talking", etc. (Ericsson & Simon, 1993, p. 256).

Other considerations

Afflerbach & Johnson (1984) and Pressley & Afflerbach (1995) recommend using relatively difficult texts for reading research experiments using think aloud methodology. Since many components of the reading process are automatic, it is unlikely that such processes will be reported. One way to invoke subjects to increase their consciousness is to ask them to read texts which are difficult for them.

Given the complexity of the think aloud task, using one's native language may be expected to lessen the cognitive load considerably, especially for subjects who are less fluent in L2. One might also expect protocols to be richer in detail if subjects are allowed to use their native language. In Lee's (1986) study comparing the results of recalling a text in L1 and L2, it was found that more details and accuracy were achieved when subjects recalled the material in their native language. Bernhardt (1991) also recommends the use of L1 for recall protocols.

Just as think aloud protocol methodology has been successfully employed in the research of the reading comprehension process, so can it be applied to the diagnosis of reading problems. First, using think aloud methodology, the expert must analyze the process by which ESL readers get meaning from texts, identify strategies they use and lack, and note the problem-solving tactics they employ. Secondly, on the basis of research which has identified good and bad reading strategies, detect strengths and weaknesses in their process, finally recommending strategic solutions to their problems.

Data for This Study

Data for this study was obtained from transcripts and tapes collected in a previous

study examining the use of mental translation in L2 reading. For the sake of brevity, and keeping with the purpose of this article, I selected portions of the data from only 4 subjects who had difficulty understanding the experimental texts. These subjects were chosen as they each presented unique reading styles and difficulties. Table 1 contains pertinent information regarding these subjects.

The main experimental text used in this study, entitled *Customs vary with culture* (Wegmann and Knezevic, 1990), was taken from a high intermediate level ESL textbook. This text was pretested and found to contain enough problem expressions so as to provide ample challenge to the subjects (see Appendix 1 for the full experimental texts). Subjects were pre-sensitized to the issue of reading strategies by being asked to consider their strategies over a week period prior to their first appointment, and through discussing their strategies in preliminary interviews. A brief training session was then held in which the researcher modeled the think aloud technique for about 10 minutes by reading a text similar to each subject's experimental texts. The subjects then practiced using the same text. If they paused for a long time, they were prompted to express what they were thinking, or how they were getting the meaning from the text. All interviews and think aloud protocols were taped while notes were simultaneously taken. In order to facilitate the think aloud process, subjects performed the protocols in their first language. The tapes were transcribed, and the notes taken at interviews were consolidated. The data was studied in a recursive fashion until distinctive tendencies could be identified in each subject's reading style. The author's interpretations of the data were marked by square brackets to distinguish them from the actual words of the subject.

Table 1
Information of subjects

pseudonym	gender	academic level	major	native country
Jose	m	MA	ag econ	Mexico
Maria	f	BA	optometry	Prto Rico
Constantino	m	Law	law	Colombia
Laura	f	junior	education	Colombia

The subjects

Maria and Constantino belong to a small contingent of Colombian students who came to the United States to study Intensive English at an ELI for one semester. They have completed undergraduate degrees. In accordance with their scores on the TOEFL

(400-450 range), they were enrolled in high intermediate to low advanced level classes. Laura, a junior from Puerto Rico, is on a one-year exchange program, and Jose is a Mexican doctoral student studying at Oklahoma State University.

The following key has been used in the presentation of data:

passages or individual words from the experimental text are written in courier font: many American customs

comments made by the subjects (in Spanish) are written in normal font in italics: ... *no entiendo...*

translations made by subjects will be written in the same manner as their comments, but two sizes smaller: *muchas costumbres americanas*

English translations of their comments will be written in square brackets with normal font: [I don't understand].

long pauses of over 5 seconds are indicated by three commas: ,,,

for the sake of brevity, longer passages of the original Spanish comments are truncated, indicated by ***

Laura

Laura, a psychology junior exchange student from Puerto Rico, expressed dissatisfaction with her reading ability in the interviews, stating that she often ran into unfamiliar words which set her off-course, and she had trouble piecing together the meaning of individual sentences into a whole. While performing the think aloud exercises, she often stated:

No entiendo. No entiendo, así que voy a volver a leer la oración. [I don't understand. I don't understand, so I'm going to reread the sentence].

The following excerpt illustrates the way in which Laura would continually reread the problematic passages:

the constant restless *releo la oración. la frase* [I'll reread the sentence] the constant restless motion of Americans may be startling at first. The constant restless restless motion of Americans may be startling at first. *No entiendo la oración *** de varias palabras ...* [I don't understand the sentence so I'll continue with the next to see if I get the idea. I don't understand the meaning of several words...]

In fact, after reading a little further on, she again reread the problematic sentence:

People in the flat middle west think nothing of driving seventy-five to a hundred miles just to have dinner with a friend; they go to a far-off city for an evening of theater or music or even a movie. *Esto sería un ejemplo, pero ,, , no entiendo* [This must be an example, but ... I don't understand] the constant restless restless motion of Americans,,, *no entiendo ,, , es un ejemplo sobre las millas que conducen pero no entiendo* [I don't understand ,, , it's an example about the miles that they drive, but I don't understand].

As she continued ahead in the passage, she had difficulty connecting the ideas:

Countless young people select a college thousands of miles away from their families just to see another part of the country. Barely in their teens, they go off in droves to see what lies beyond,,, *Está dando un ejemplo,,, pero aun no entiendo cual es la idea de la oración* [they're

giving an example,, but I still don't get the main idea of the sentence] The constant restless motion of Americans may be startling *no entiendo* startling [I don't understand startling *así que *** este ejemplo* [so I don't understand what it says even though I understand the example that talks about the distance people drive simply to go to the movies or visit a friend,,but I understand the meaning of the example,, but I don't know why they mention this example] The constant restless motion of Americans may be startling *no entiendo* . Barely in their teens, they go off in droves to see what lies beyond. *Estoy observando *** no entiendo*. [I'm noticing the paragraph that I just read and the first one that says that it's going to talk about, that it talks about the impact of culture and the second paragraph an American, and the third gives an example from the Middle East ,, or West ,, but really here I don't understand].

As can be seen in the above excerpt, multifold long pauses indicate that Laura was not readily able to articulate her reading process. The difficulty she had expressing herself may be rooted in the very fact that her metacognitive skills are weak: If she cannot focus on her reading strategies, how can she report on them? She also frequently reread phrases and sentences, causing her reading rate to slow down, thereby putting too heavy a burden on short-term working memory which impeded her ability to keep the main ideas of the paragraph in mind. In addition, unfamiliar vocabulary seemed to shake her confidence and she was lacking in strategies to deal with these problematic words. The data indicated that she was unable to formulate macropropositions (Kintsch and van Dijk, 1978; van Dijk & Kintsch, 1983), as in this case, she could not relate the example to a main idea. Obviously, simply rereading difficult passages is not the answer, but rather, Laura needs to be shown how to use more effective strategies for getting the meaning of unfamiliar words and focusing on main ideas first. For example, instead of laboriously rereading entire sentences, one could teach Laura to focus on macropropositions and looking for cohesive devices that indicate how these are related to one another and how micropropositions are joined to them. Work on semantic mapping, as recommended in Carrell, Pharis, & Liberto (1989) could prove particularly useful. Also, Laura needs to be encouraged to increase her reading rate in order to make optimal use of working memory, avoiding over use of rereading.

Jose

Jose, a 31-year old Mexican doctoral student majoring in agricultural economy at Oklahoma State University, affirmed that he took courses in this, his first semester, which required the least amount of reading because he felt very insecure with English texts. He testified that his approach to reading was one of thorough translation which he learned in his native country when teachers assigned English texts. In fact, he and his peers would divide texts up among themselves, contributing with a written translation of their respective parts. The protocol data confirmed this: Every proposition was accurately translated and put into coherent sentences by taking chunks of the text and converting them to Spanish. Often several attempts were made before the correct relationship between ideas was finally discovered, as Jose continually regressed in the text to test his Spanish ver-

sion against the original English text. Needless to say, great skill and persistence was required in order to produce such a precise Spanish text. Unfortunately, the process was very slow. It took Jose 45 minutes for his first 350 word experimental passage.

The excerpt used for this study was the abstract of a journal article entitled *Economic gains...* (Hearne, and Easter, 1997). Jose read one chunk at a time, then translated it before moving on to the next phrase. If he was unable to translate a portion, he would read on to look for clues, then go back and reread the phrase and attempt to translate it again. His comments in the protocols confirmed this:

*Otra vez *** mucho sentido* [Again I have to read the whole sentence because I found a word that doesn't make much sense].

The following passage is typical of the overall strategy he applied to all of the experimental texts:

the value of water-use rights to urban water-supply companies was estimated using the avoided cost of an alternative investment in a water-storage reservoir. ... *estoy traduciendo, dice* [I'm translating. it says: *el valor de los derechos y el uso de agua para las compañías que ofrecen el agua para usos urbanos el estimado el costo ,, de una inversión alternativa en un almacenamiento de agua. Bueno aqui hay algunas palabras *** la oracion.* [Ok, there are here a few words that I don't understand so I didn't translate them, but later I think I'll be able to get the sense of the whole sentence. For example, I don't understand water-storage reservoir]. The analysis demonstrated that the market transfer of water-use rights does produce substantial economic gains-from-trade in both the Elqui and Limari valleys...*traduzco:* [I am translating:] *el análisis demostró que las transferencias del mercado de los derechos del uso de agua producen ganancias substanciales del comercio en ambos valles...* these economic gains produce rents for both buyers and sellers. but buyers, especially farmers growing profitable crops .. *no entiendo, entonces sigo* [I don't understand, so I'll go on] who buy water-use rights and individuals buying water-use rights for potable water supply, receive higher rents than sellers.... ... *bueno, no entiendo completamente, esta parte dice...*[well, I don't completely understand this part says] *pero los vendedores especialmente los productores de los cultivos mas rentables quienes compran los derechos del uso de agua... a ver no entiendo, *** vendedores...*[I don't understand, so I'll go on because I need to see what it says further on in order to understand this part about the sellers.]

Jose, after reading ahead and increasing his knowledge of the textual context, would then go back to the incompletely translated passages and invariably provide accurate translations for the problematic parts. While the process he demonstrated is extremely demanding, it brought him good results insofar as he was able to understand and recall the entire passage almost flawlessly.

Needless to say, while this technique may have faithfully served Jose in his native country for the isolated occasions in which he was required to read English texts, it is unlikely that it will continue to be effective for him as a graduate student in this country. Very shortly he will need to take courses requiring extensive reading. The above data reveals a unique and serious problem which would not have been identified through nor-

mal reading assessment tools. Jose's reading style is a potential time bomb. Now is the opportune time, before embarking upon extensive reading assignments, for a teacher to intervene and prepare Jose by teaching him a much wider gammit of effective strategies.

Maria

Maria, having completed a BSc in optometry in Colombia, her native country, was studying Intensive English. She expressed difficulty with reading, saying that she looks for *palabras claves* [key words], tries to use the context when in difficulty and often translating. Nevertheless:

A veces, por mas que traduce uno, no me da el sentido. [Sometimes, in spite of all my trying to translate, it doesn't make sense].

The following examples illustrate these points:

In the sentence *what a dull world it would be if this were not true!*, Maria did not know the meaning of dull. She attempted to translate the sentence, and made this comment:

*y que seria del mundo si esto no fuera verdad? Mas o menos *** entendí.* [What a world it would be if this were not so. More or less I'm translating because I didn't understand it.]

Notice that she simply left out the problem word dull, and translated the sentence as if it were not there. This gives the sentence an acceptable meaning within the context, but unfortunately, not the exact one intended.

Further in the text, she came upon another sentence with several words she was unfamiliar with:

*En la segunda parte *** de los cortes de cabello.* [in the second part, there are many words I don't understand. It talks about the American life style, hair styles]. *some foreign women may be startled at having their hair cut and styled by men. o sea que quieren cortarse el cabello y usarlo como los hombres.* [That is, they want to cut their hair in the style that men use.]

Here, it would seem that Maria jumped to conclusions about the meaning of the sentence as soon as she recognized some of the key words. She did not seem to notice the function word *by*, or she would have realized that her interpretation was not accurate. Perhaps background knowledge of the world suggests this as a likely meaning, but unfortunately, not the intended meaning if one pays close attention to the function of words in the sentence.

Finally, Maria took a typical meaning of *lies*, namely as a plural noun, in the following passage:

Barely in their teens, they go off in droves to see what lies beyond. No lo entiendo. Tal vez que hay muchas mentiras atrás de todo esto. [I don't understand. Maybe there are a lot of lies behind all of this.]

She interpreted *lies* as a noun, and what as a determiner, a possible combination syntactically speaking, but unlikely in the overall grammatical context of this sentence. Recognizing that her interpretation might not have been correct, she then tried to translate this sentence, word by word, to see if she could get a better grasp of the meaning:

Barely *no la conozco*, in their *si conozco* teens, *puede referirse a jóvenes* they go off *ellos go sé que es ir pero con* off *no sé que significa* in droves *no puede ser del verbo de manejar porque lleva "s"* to see what lies beyond *para ver que mentiras hay ahí*. [Barely I don't know this word, in their I do know this one teens, it may refer to young people they go off they go I know it means *to go*, but off I don't know what this means in droves it can't be the verb *to drive* because of the s].

In the above translation, Maria treats each word as if independent and isolated, and not as connected elements in a proposition, or sentence. Her comment on the "s" of droves as indicating that the word cannot be a verb is useful, since she correctly understands that droves is not a verb. However, the presence of the preposition "in" in the expression in droves would have provided a much better clue to the function of the word droves, since it would tell her that the expression is an adverbial and thus cannot be a sentence-level verb. Perhaps she overlooked the word in, thinking it was a small word, and thereby insignificant.

In short, we have seen that Maria focuses on individual word meanings, gets bewildered when she does not recognize many words, and fails to focus on enough syntactic clues or to interpret such cues correctly. Translating individual words does little to help, because she is not able to put the words together to form a relevant proposition. Clearly, Maria could benefit from learning better bottom-up strategies whereby she is better able to look for and apply grammatical cues, including noticing and applying function words, word order, and grammatical affixes in order to construct a correct grammatical unit before applying her background knowledge.

Constantino

Constantino is a Colombian law graduate who is interested in pursuing international environmental law, and therefore wishes to improve his English skills. The data indicated that he is unable to see the forest for the trees: When confronted with unfamiliar words, he dwells on them, seeking to find a translation, and often speculating as to their meaning by making hypotheses with little supporting contextual evidence. He also slows down so as to lose the plot line of the text. Rather than search for the main idea, he loses himself in details. The following passage shows how Constantino often gets bogged down:

People in the flat Middle West think nothing of driving seventy-five to a hundred miles just to have dinner with a friend; just to have dinner *una comida con un amigo*, *Entonces no se *** especuloso es*, [then I don't know if, eh, if it refers to driving - it's only speculation - or if it's a special occasion or an appointment with someone - speculating -] ... Countless young people select a college thousands of miles away from their families just to see another part of the country. *Sé que habla *** unos jóvenes...* [I know it is talking about young people who are doing some activity, a collection, or beside a quantity like thousands are going to see another part of the country, no, well I am trying to think about the relation this has with the previous part that I just read and I feel lost because I had

speculated about some people who were in a certain situation like a meal and now it's talking about young people.]

Constantino cannot relate the two ideas because he never focused on the main idea of this paragraph. While he makes hypotheses, he does so before examining the text carefully. He is not sure what the idea of the first sentence is, namely driving, having an appointment, having dinner, or a special occasion. Without a clear idea of the topic sentence of the paragraph, he cannot relate the following sentences in a coherent fashion. He checks his original hypothesis and finds it is not helpful in providing cohesion. While it is good to make and check hypotheses, it is necessary to first form hypotheses on the basis of sufficient textual clues. Here, Constantino lacked a thorough reading and analysis of the first few sentences. Also, he did not carry the main ideas of the previous paragraphs into this one. Doing so might have helped him to determine the main idea of this paragraph better.

The next passage reveals how Constantino stumbles due to a false cognate (*familiar* in English, and *familiar* in Spanish, while spelled identically, have very different meanings) and how he again fails to examine the text close enough before jumping to conclusions about the meaning.

If Americans crudely try to help you with something that has long been totally familiar to you, if they comment on your good English when you have spoken it all your life, *Aquí me detengo ... el texto*. [Here I stop because I just remembered something that has happened to me when they talk about good English. I just remembered a situation, daily situation in which when one sits down to talk to some Americans one feels that there is a rejection that comes from a negative culture because obviously I don't pronounce well in English and I don't speak it well, so a linguistic distance is established between a good and bad English, I mention this experience because it helps me to understand the text.] Constantino applies personal experience and background knowledge, normally considered an excellent strategy. But again, he uses this before exhausting bottom-up resources in interpreting the text. He failed to read the text carefully enough to realize the context in which your good English is used. Before delving into details, he needs to establish the main ideas of sentences and paragraphs.

For the phrase containing: something that has long been totally familiar to you, Constantino assumed familiar had the same meaning as in Spanish, namely a blood relation. This tainted his interpretation of the sentence, causing him further confusion. Finally, he offered valuable testimony regarding how he approaches texts: *lo que estoy haciendo *** solicitaría ayuda...* [What I'm doing is taking the words and trying to define them in a basic way, putting the meaning together. Then I read the words as I meet them and I get the meaning of them. This part brings me to understand that in family situations one would ask for help ...]

This sheds further light on a problematic aspect of Constantino's reading style. At the sentence level, by focusing on primitive meanings of content words, his attention is

distracted from the important task of sufficiently analyzing the grammatical relationships and making and holding main ideas. Not only are primitive meanings of words necessary, but the syntactic clues, such as the form of such words, word order, and function words associated with content words, need to be carefully examined in order to achieve coherence among these words. Instead, he uses speculation and background knowledge to try to make a coherent text of the basic meanings. His difficulty making coherent sentences slows down his reading further, which further confounds his attempts to find a context in which to create meaning.

This is a case in which many good strategies are used, such as making and testing hypotheses, applying background information, relating to previous text, yet such strategies are of little avail because Constantino fails to make coherent sentences and cannot carry main ideas or a mental summary of the text. Teacher intervention could be very helpful in making Constantino aware of these weaknesses while reinforcing his bottom-up strategies.

Discussion

In summary, Maria and Constantino tend to make frequent hypotheses regarding the meaning of propositions based on their background and world knowledge of the topic. This approach, however, is not always successful, since their guesses are not entirely accurate due to their lack of understanding of key words, or, in the case where they are familiar with the words, due to their inability to put word meanings together in a coherent, grammatical fashion. This excessive dependence on background knowledge is what West & Stanovich (1978), Perfetti (1985) and Block (1986) found in their observations of poor readers' strategies. Stanovich considered this use of top-down strategies as compensatory, making up for a lack of ability to process the text accurately from a bottom-up perspective. In the case of Maria and Enrique, it was observed that lack of knowledge of vocabulary and their inability to process important syntactic clues led to problems in comprehension, and this, in turn, led to the use of compensatory strategies. Unfortunately, top-down strategies did not entirely compensate for weak bottom-up strategies insofar as they did not lead to the correct textual interpretation.

Laura, on the other hand, needs to strengthen her metacognitive strategies and learn a wider variety of meaning constructing strategies, rather than relying on repeated rereadings of the text which are of little avail and only slow down the process. Jose's reading style consists of methodically translating the text one chunk at a time. Like Laura, he needs to be weaned from this method until he can use an array of good strategies.

Conclusion

Subjects in this study often encountered difficulties understanding sentences due to their unfamiliarity with individual words or their inability to make coherent propositions of words whose meanings they were familiar with. Perhaps their grammatical com-

petency was also insufficient at times to enable them to correctly interpret syntactic relationships. The role of language proficiency is an important issue in the comprehension of texts in L2. Cummins' (1979) threshold hypothesis and Carrell's (1991) language ceiling hypothesis state that reading comprehension depends upon having a certain and crucial level of language proficiency. Nevertheless, with TOEFL scores, near or above 500, one cannot only attribute the above subjects' reading problems to lack of language proficiency. With the evidence from the think aloud protocols, many of the problems subjects experienced constructing meaning were probably due to their inadequate strategic approaches.

Clarke's (1980) short circuit hypothesis states that lack of language proficiency will inhibit the ability of readers to use their higher-level processes, such as hypothesis making. Also, Baker & Brown (1984) found that when readers encounter a triggering event (that is, when their comprehension is blocked by the presence of an unfamiliar word or phrase, or by the inability to obtain the main idea, readers seek alternate strategies to solve the problem. In the case of readers of L2 texts, such triggering events may occur more frequently than in the reading of L1 texts (Jimenez, Garcia, & Pearson, 1994) and cause even greater anxiety (Cavour, 1996) due to lack of confidence resulting from lack of language proficiency in L2. McLeod and McLaughlin (1986) observed that when readers encountered unfamiliar vocabulary in their reading of L2 texts, they did not use both grammatical and semantic clues efficiently. These findings were confirmed by the protocol data used in this study.

The subjects of this study revealed very distinct reading styles demonstrating individual strengths and weaknesses. This leads one to suspect that readers have very particular reading styles, at least when dealing with L2 texts. The specific nuances of their reading styles can readily be detected through in-depth, qualitative analysis of think aloud protocols. Such methodology yields abundantly rich data on individual reading styles, exposing not only comprehension problems but also revealing the very roots of them, leading one to an invaluable diagnosis of individual problems associated with strategy use. It is hoped that more teachers will become increasingly conversant with this method of diagnosing adult ESL students' reading problems.

References

- Afflerbach, P. & Johnson, P. (1984). Research methodology on the use of verbal report in reading research. *Journal of Reading Behavior*, 16, 307-321.
- Alderson, C. (1993). Assessment of reading in a foreign language. *Odense Working Papers in Language and Communication*, 5, 45-63.
- Aweiss (1993). Reading comprehension measures: The recall protocol revisited. in W.N. Hatfield (Ed.), *Visions and reality in foreign language teaching. Where we are, where we are going*. Lincolnwood, IL: National Textbook Company.
- Baker, L. & Brown, A.L. (1984). Metacognitive skills and reading. In P.D. Pearson, R. Barr, M. Kamil, & P. Mosenthal (Eds.), *Handbook of reading research* (pp. 353-394). New York: Longman.
- Bernhardt, E.R. (1991). *Reading development in a second language: Theoretical, empiri-*

- cal, and classroom perspectives. Norwood, NJ: Ablex.
- Block, E. L. (1986). The comprehension strategies of second language readers. TESOL Quarterly, 20, 463-491.
- Block, E.L. (1992). See how they read: Comprehension monitoring of L1 and L2 readers. TESOL Quarterly, 26, 319-343.
- Brown, A. & Palincsar, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. Cognition and Instruction, 1, 117-175.
- Buck, G., Tatsuoka, K. & Kostin, I. (1997). The subskills of reading: Rule-space analysis of a multiple-choice test of second language reading comprehension. Language Learning 47, 423-466.
- Carrell, P.L. (1985). Facilitating ESL reading by teaching text structure. TESOL Quarterly, 19, 727-752.
- Carrell, P.L. (1991). Second language reading: Reading ability or language proficiency. Applied Linguistics, 12, 159-173.
- Carrell, P.L., Pharis, B.C., & Liberto, J.C. (1989). Metacognitive strategy training for ESL reading. TESOL Quarterly 23, 647-678.
- Cavour, I.J. (1996). Case studies of the strategies of four bilingual proficient readers in both their native and second languages. Unpublished doctoral dissertation, University of New York at Buffalo.
- Chamot, A. (1990). Learning strategy instruction in the foreign language classroom: Reading. (ERIC Document Reproduction Service No. ED 343 438)
- Chamot, A.U. & Kupper, L. (1989). Learning strategies in foreign language instruction. Foreign Language Annals, 22, 13-24.
- Clarke, M.A. (1980). The short-circuit hypothesis of ESL reading - or when language competence interferes with reading performance. Modern Language Journal, 64, 203-209.
- Cohen, A.D. & Hosenfeld, C. (1981). Some uses of mentalistic data in second language research. Language Learning, 31, 285-313.
- Culum, L. (1998). Encouraging the reluctant reader: Using a think-aloud protocol to discover strategies for reading success. (ERIC Document Reproduction Service No.ED 420 837)
- Dai, J. (1989). Metacognitive strategy use: A comparative study of Chinese graduate students reading English as a second language at universities in the United States. Unpublished doctoral dissertation, Oklahoma State University, Stillwater.
- Ellinger, R.J. (1985). An analysis of reading strategies used by a high and low proficiency group of students learning English as a second language. Unpublished master's thesis, Oklahoma State University, Stillwater.
- Ericsson, K.A. & Kintsch, W. (1995). Long term working memory. Psychological Review, 102, 211-245.
- Ericsson, K.A., & Simon, H.A. (1993) Protocol Analysis. Verbal report as data. Cambridge, Massachusetts: Bradford Book.
- Farr, R., Pritchard, R., & Smitten, B. (1990). A description of what happens when an examinee takes a multiple-choice reading comprehension test. Journal of Educational Measurement, 27, 209-226.
- Feng, X. & Mokhtari, K. (1998). Reading easy and difficult texts in English and Chinese:

- Strategy use by native speakers of Chinese. Asian Journal of English Language Teaching, 8, 19-40.
- Fitzgerald, J. (1995). English-as-a-second-language learners' cognitive reading processes: A review of research in the United States. Review of Educational Research, 65, 145-190.
- Grotjahn, R. (1995). Zweitsprachliches Leseverstehen: Grundlagen und Probleme der Evaluation. Die Neuren Sprachen 94, 533-555.
- Jimenez, R.T., García, G.E., & Pearson, P.D. (1994). The metacognitive strategies of Latino/a students who read Spanish and English (Tech. Rep.No. 601). Champaign, IL: University of Illinois at Urbana-Champaign, Center for the Study of Reading.
- Jimenez, R.T., García, G.E., & Pearson, P.D. (1994). The metacognitive strategies of Latino/a students who read Spanish and English (Tech. Rep. No. 601). Champaign, IL: University of Illinois at Urbana-Champaign, Center for the Study of Reading.
- Jimenez, R.T., García, G.E., & Pearson, P.D. (1996). The reading strategies of bilingual Latina/o students who are successful English readers: Opportunities and obstacles. Reading Research Quarterly, 31, 90-112.
- Kamhi-Stein, L.D. (1998). Profiles of underprepared second-language readers. Journal of Adolescent and Adult Literacy, 41, 610-619.
- McLeod, B. and McLaughlin, B. (1986). Restructuring or automaticity? Reading in a second language. Language Learning, 36, 109-123.
- Meyers, J. (1989). Think-aloud protocol analysis of reading comprehension tactics used by students with reading problems. (ERIC Document Reproduction Service No. ED 309 397)
- O'Malley, J.M., & Chamot, A.U. (1990). Learning strategies in second language acquisition. New York: Cambridge University Press.
- O'Malley, J.M., Chamot, A.U., Stewner-Manzanares, G., Kupper, L, & Russo, R.P. (1985). Learning strategies used by beginning and intermediate ESL students. Language Learning, 35, 21-46.
- Olson, G.M., Duffy, S.A., & Mack, R.L. (1984). Thinking-out-loud as a method for studying real-time comprehension processes. In D.E.Kieras & M.A. Just (Eds.), New methods in reading comprehension research (pp. 253-286). Hillsdale, NJ: Lawrence Erlbaum.
- Oxford, R. (1990). Language learning strategies: What every teacher should know. New York: Newbury House/Harper & Row.
- Pearson, P.D. & Valencia, S. (1987). Assessment, accountability and professional prerogative. In J.E. Readence & R.S. Baldwin (Eds.), Research in literacy: Merging perspectives (pp. 3-16). Rochester, NY: National Reading Conference.
- Perfetti, C.A. (1985). Reading ability. New York: Oxford University Press.
- Perkins, K. (1998). Assessing reading. Annual Review of Applied Linguistics, 18, 208-218.
- Pressley, M. & Afflerbach, P. (1995). Verbal protocols of reading: The nature of constructively responsive reading. Hillsdale, NJ: Lawrence Elbaum.
- Pressley, M & McCormick, C.B. (1995). Advanced educational psychology for educators, researchers, and policymakers. NY: Harper Collins College Publishers.
- Riley, G.L. & Lee, J.F. (1996). A comparison of recall and summary protocols as measures of second language reading comprehension. Language Testing, 13, 173-189.

- Song, M. (1998). Teaching reading strategies in an ongoing EFL university reading classroom. Asian Journal of English Language Teaching, 8, 41-54.
- Sternberg, R.J. (1991). Are we reading too much into reading comprehension tests? Journal of Reading, 34, 540-545.
- van Someren, M.W., Barnard, Y.F. & Sandberg, J.A. (1994). The think aloud method: A practical guide to modelling cognitive processes. London: Academic Press.
- West, R.F. & Stanovich, K.E. (1978). Automatic contextual facilitation in readers of three ages. Child Development, 49, 717-727.
- Westhoff, G.J. (1991). Gründe, MC-Tests für Leseverstehen durch geeignete Messinstrumente zu ersetzen. In A. Wolff, K.D. Justen, & H. Klingel (Eds.), Didaktik der Wissenschaftspropädeutik und der Sprachvermittlung. (pp. 307-314). Regensburg, Germany: Fachverband Deutsch als Fremdsprache.
- Wolf, D.F. (1993). Issues in reading comprehension assessment: Implications for the development of research instruments and classroom tests. Foreign Language Annals, 26, 322-331.
- Wright, L. (1997). Enhancing ESL reading through reader strategy training. Prospect, 12 (3), 15-28.
- Young, D.J. (1991). Reading strategies and texts: A research study on the question of native and non-native reading strategies and authentic versus edited texts. (ERIC Document Reproduction Service No. ED 338 035)
- Young, R., Shermis, M.D., Brutton, S.R., & Perkins, K. (1996). From conventional to computer-adaptive testing of ESL reading comprehension. System 24, 23-40.
- Zhicheng, Z. (1992). The effects of teaching reading strategies on improving reading comprehension for ESL learners. (ERIC Document Reproduction Service No. ED 356 643)

APPENDIX 1

Experimental reading texts

Customs vary with culture

Wegmann, B. & Knezevic, M.P. (1990). Mosaic 1 (2nd edition) New York: McGraw-Hill.

Many American customs will surprise you; the same thing happens to us when we visit another country. People living in varied cultures handle many small daily things differently. What a dull world it would be if this were not true!

Some differences are minor, and one soon becomes accustomed to them. At first, for example, some foreign women may be startled at having their hair cut and styled by men. Visitors may be amazed to see men wearing wigs. People may find the transitory quality of much American life odd - the fact, for example, that one can rent art by the week or the entire furnishings of an apartment, from sofa and beds to the last spoon, on less than eight hours' notice. "Packaged" living is part of today's American scene.

The constant restless motion of Americans may be startling at first. People in the

flat Middle West think nothing of driving seventy-five to a hundred miles just to have dinner with a friend; they go to a far-off city for an evening of theater or music or even a movie. Countless young people select a college thousands of miles away from their families "just to see another part of the country." Barely in their teens, they go off in droves to see what lies beyond.

You may come upon Americans who lack knowledge about your country. If so, be patient with them. Unfortunately, we do not teach enough about other cultures, customs, or even geography in our schools; we have always been so insulated by oceans that we are not readily exposed to different cultures and other ways of doing things. If Americans crudely try to help you with something that has long been totally familiar to you if they comment on your good English when you have spoken it all your life, if they confuse your country with another thousands of miles away, be patient.

The economic and financial gains from water markets in Chile

Hearne, R.R. & Easter, K.W. (1997). The economic and financial gains from water markets in Chile. Agricultural Economics, 15, 187-199.

Abstract

Chile is one of the few countries that has encouraged the use of markets in water resource management. In order to assess the impact of water markets and transactions costs in Chile, four river valleys, the Maipo, Elqui, Limari, and the Arzapa were selected as case studies. Transactions from the Elqui and Limari valleys, during the years 1986 to 1993, were analyzed to determine the gains-from-trade from market transfers.

In the economic and financial analysis of water markets, crop budgets were used to estimate the value of water in agricultural production. The value of water-use rights to urban water-supply companies was estimated using the avoided cost of an alternative investment in a water-storage reservoir. The analysis demonstrated that the market transfer of water-use rights does produce substantial economic gains-from-trade in both the Elqui and Limari Valleys. These economic gains produce rents for both buyers and sellers. But buyers, especially farmers growing profitable crops who buy water-use rights and individuals buying water-use rights for potable water supply, receive higher rents than sellers. Large table-grape producers in the Limari Valley and individuals buying water for human consumption in the Elqui Valley received the highest rents. In the Elqui Valley net gains-from-trade per share were within the range of recent transfer prices of US \$1000. In the Limari Valley, gains-from-trade per share are 3.4 times the recent price of US \$3000 for a share of water from the Cogoti Reservoir.