An Inquiry into Reading Comprehension Strategies through Think-aloud Protocols

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Asking comprehension questions might reveal how much readers have understood of a given text, but such a measure is hardly sufficient to determine how the readers have actually processed the text in their minds. For the purpose of obtaining direct insight into how EFL readers search for meaning and what kinds of reading comprehension strategies they possess and utilize during the act of reading, the author collected think-aloud protocols of 43 Japanese university students recorded on cassette tapes and examined the data, using the broad categories of top-down processing and bottom-up processing with accompanying sub-categories. This article reports the method of classifying the data, analyzes the characteristics of strategies used by the subjects, and investigates the relationship between strategy use and reading comprehension ability shown in the results of semester examinations. Finally, it considers the implications of this data for teaching reading to Japanese university students.

　EFLの読み手が、意味をとろうとして、どのように苦闘しているか、また、どのような読解ストラテジーを有し、それを役立てているかを考察するには、理解度を問う質問をするだけでは不十分である。理解度を問う質問は、読み手が与えられたテクストをどれくらい理解したかは明らかにするであろうが、実際に読み手が心の中で、どのようにテクストを処理したかを教えてはくれない。筆者は、43名の日本人大学生の発話思考法によるプロトコルをカセット・テープに録音して収集し、トップ・ダウン処理とボトム・アップ処理という広い範疇と、その下位範疇を使ってそれらのデータを分析した。本稿は、分類の方法を報告し、被験者の使用したストラテジーの特徴を分析し、ストラテジー使用と期末試験に現われた読解能力との関係を考察する。最後に、その結果をもとに、日本人大学生への読解指導法を検討する。

Reading comprehension in a foreign language can be much more complicated than in one's native language. In the case of reading in one's native language, lower-level processes such as recognizing individual words and grasping syntactic structures are mostly automatic (Grabe, 1988; McLeod & Mclaughlin, 1986), whereas reading in a

foreign language, especially when the reader is at the beginning or intermediate level, can be considered a highly complex and sometimes roundabout problem-solving activity, in which all pieces of information, from knowledge of vocabulary and grammar to knowledge of the topic, must be brought into play. Therefore, in addressing pedagogical issues related to the effect of teaching reading to EFL students, it is of vital importance to have insight into complicated mental processes.

Interactive models, which essentially regard reading as an interaction between top-down and bottom-up processes (Carrell, Devine & Eskey, 1988; Grabe, 1991), provide theoretical guidelines for teaching ESL/EFL reading. However, there is no guarantee that such models, primarily developed in psycholinguistic research, are valid for all individuals or all learner groups. Even if they have some universal validity, there remains the question of how much or to what degree students rely on either top-down or bottom-up processing. As Anderson (1991) points out, "increased attention is being given to an examination of individual learner differences during the second language acquisition process" (p. 460). In this light, teachers are expected to have a clearer perspective of what individual students are doing while engaging in reading activities. For some Japanese university students, it is highly likely that reading English is still a process of "laborious deciphering" (Rivers, 1981, p. 268), or what Newmark calls "painful cryptoanalytic decoding" (in Krashen, 1987, p. 128) as a result of repeated grammar-translation practice in high school. It is also probable that other students transfer comprehension strategies from reading in the native language to reading in a foreign language. This article probes the mental processes of Japanese EFL readers.

Think-aloud Protocols

Teachers obtain knowledge of students' reading comprehension processes by various means: in-class observations, questionnaires, interviews and specially-designed tests. However, it is usually difficult to get detailed information about why students feel frustrated, what kinds of problems they encounter, and how they solve these. One reliable way to gain insight into such mental activities is by examining think-aloud protocols, a version of introspective reports in which readers state their thoughts, ideas, questions, and behaviors while reading text. Recently, think-aloud protocols have become widely recognized as a method of researching the mental processes of language learners (Barnett, 1989; Casanave, 1988; Cohen, 1990, 1994; Cohen & Hosenfeld, 1981; Davies, 1995; O'Mally & Chamot, 1990; Oxford & Crookall, 1989), and empirical

studies using this method have been conducted to investigate compre-
hension strategies used by second language readers (c.f. Anderson, 1991;
Block, 1986, 1992; Hosenfeld, 1977; Sarig, 1987; Matsubara, 1991).

Obviously there are certain limitations to such a data collection method.
First, it is virtually impossible for readers to articulate everything that is
going on in their minds. There must be a number of thoughts, ideas, and
questions which occur but are left unsaid. Therefore, reports must be
considered only as a part of readers' mental activity. Second, since the
think-aloud task requires readers to read, think and speak simultaneously,
the task may interrupt the flow of thinking, and as a result, what is re-
ported is an accumulation of isolated thoughts and ideas.

Still, this data collection method has a remarkable advantage: it can
provide a more direct view of readers' mental processes than other
research methods. Because the task requires readers to respond imme-
diately, the protocols are likely to contain fleetingly occurring strate-
gies which are not identified in retrospective reports. Because responses
are generated automatically, without self-analysis, they can reveal readers'
problems and weaknesses. As long as readers engage in the task ac-
tively and willingly, think-aloud protocols can be a reliable tool for
understanding their mental processes.

This article is based on think-aloud protocols by Japanese univer-
sity students in a class taught by the author. The data were elicited with
the aim of perceiving the reading comprehension strategies attempted,
either successfully or unsuccessfully, and recognizing their strengths
and weaknesses.

Design of the Study

Research questions: 1) What kinds of comprehension strategies do Japa-
nese university students utilize when they process text written in En-
glish? 2) How can comprehension strategies used by the students be
categorized? In general, comprehension strategies are divided into two
categories: top-down and bottom-up strategies. What sub-categories
appropriately describe and classify students' strategies? 3) What is the
relationship between strategy use and reading comprehension ability? It
is generally assumed that good reading is marked by the use of top-
down strategies. Can this tendency be identified?

Subjects: The subjects were 43 Japanese first-year students majoring in
education (28 males and 15 females) enrolled in a required English class
as a part of general studies at a national university.

Materials: Two passages were chosen. One is "The Dust Bowl" from a low-intermediate ESL reader entitled *From the Beginning: A First Reader in American History* (Bailey, 1990), and the other is "Early Autumn" by Langston Hughes, a story from a textbook entitled *Short Short Stories* (Takahashi, 1990). The first passage, which belongs to the informative discourse type, describes how American farmers during the Great Depression sought to escape a prolonged drought by moving to California. This passage was selected because the subjects had intensively read essays about the Great Depression in preceding class periods. The second passage, in the literary-aesthetic discourse type, is a bittersweet story of a man and woman named Bill and Mary, who meet by chance in downtown New York one day in early autumn many years after they had parted. This passage was selected as class members had expressed interest in reading a love story in response to a questionnaire.

Both passages were determined to be written at a basic 2000 word level, but include some words outside that level The first passage contains 442 words and has a Fry (1977) readability of seventh grade. The second passage contains 443 words and has a Fry readability of fourth grade. It was presumed from the students' daily performance with this level of reading materials that they would be able to read both of the passages with relative ease.

Procedure: During a regular class period, the subjects each sat at a language laboratory booth with a blank cassette tape in each tape recorder. Then they were given the passages with directions written in Japanese telling them to read the texts and make comments, in either English or Japanese, every time they came to the end of a sentence. (See Appendix for an English translation of the directions.) After subjects read the directions, a sample of a think-aloud task recorded by a student in a pilot study was played. It demonstrated many different kinds of reading comprehension strategies. It was explained to the students that the tape had been played not to encourage them to imitate the sample but to show what a think-aloud task would be like. All subjects appeared to understand the directions. The tape recorders were then started and subjects began the task. Tapes were not stopped until subjects had completed the task.

Results

Overview of the protocols: The subjects approach to the task varied widely. First, the use of time differed. Some subjects frequently took a long pause after reading a sentence, which indicates that they were ponder-

ing something but were not able to articulate it, while other students tried to read through the text quickly, suddenly stopping at a certain point to make comments on several different portions of the text. The average time spent in completing the task was approximately 25 minutes. The fastest subject spent 10 minutes, the slowest spent 45. Also, some subjects were quite relaxed and responsive, but others responded diffidently if not reluctantly. Furthermore, some were emotionally involved in the content, while others were not.

Categorization of strategies: Recent studies based on observations of second language readers have offered a number of taxonomies for analyzing reading comprehension strategies. Hosenfeld, Arnold, Kirchofer, Laciura & Wilson (1981) list 20 effective reading strategies found in self-reports of American high school students in reading English and French. Sarig (in Cohen, 1990) reports approximately 130 different strategies used by a group of 10 high school students in reading L1 Hebrew and L2 English, and classifies them into four strategy types: supporting, paraphrasing, establishing coherence in text, and supervising strategy use. Adapting the framework of these four basic types, Anderson (1991) lists 47 strategies, including test-taking strategies, used for classifying the data obtained from the think-aloud protocols of 28 Spanish-speaking university-level ESL students. For analyzing the think-aloud protocols of six ESL and three L1 English university-level students enrolled in remedial reading courses, Block (1986) uses a list of 10 general comprehension strategies and five local linguistic ones. The general comprehension strategies are: anticipating content, recognizing text structure, integrating information, questioning information in the text, interpreting the text, using background knowledge and associations, commenting on behavior or process, monitoring comprehension, correcting behavior, and reacting to the text. The local linguistic strategies are: paraphrasing, rereading, raising questions about the meaning of a clause or sentence, raising questions about the meaning of a word, and solving vocabulary problem. Integrating various research findings, Grabe (1993) provides a list of 60 potential reading strategies under six basic types: strategies for improved comprehension, strategies for main idea comprehension, consciousness-raising strategies, monitoring strategies, strategies for repairing miscomprehension, and transfer of strategies to other readings or tasks.

How subjects' responses should be categorized is a difficult question. While a large number of categories are necessary to describe responses precisely, the perspective may be lost if the responses are

classified into too many detailed categories. In this study, Block's categorization system (1986) was used as a starting point. The protocols of 10 students chosen at random were carefully examined according to these 15 strategies. Following this, modifications and simplifications were made so that the taxonomy would reflect the characteristics of the strategy use of our subjects and reflect the focus of this study. After this procedure, the following list was drawn. (Examples from this study, most of which are translations from Japanese, are given in quotations.)

Top-down Strategies

A: Anticipate content: The reader predicts what will occur in succeeding portions of the text. "I don't think the farmers' hope will be realized." "Probably Mary will regret this."

B: Question content: The reader raises questions as to various aspects of the content such as the veracity of information or the reason for certain behavior by the characters. "Is it true that there was no rainfall at all in the year?" "Why did Mary understand what Bill was going to say?"

C: Use general or background knowledge: The reader refers to general or background knowledge to clarify, confirm or interpret the content. "I know a lot of people suffered at the time of the Great Depression." "Fifth Avenue . . . it is [in] a central part of New York."

D: React to the text: The reader reacts emotionally to the text. "What a pity! Small children had to walk such a long way!" "I'm awfully sorry for Mary."

E: Interpret the text: the reader makes an inference about the author's intention or characters' behaviors or feelings, or tries to explain the reasons behind what is explicitly stated. "They were all called Okies. This means people in California weren't interested in where they were from." "It seems that falling leaves symbolize Mary's feelings."

F: Integrate information: The reader relates new information to previously stated information. "Oh, this connects with that." This sometimes leads to the modification or confirmation of questions or hypotheses formed while reading a previous portion of the text. "Now I understand what the Dust Bowl is."

Bottom-up Strategies

G. Translate: The reader translates a clause or a sentence into Japanese to aid or confirm understanding. Where the translation was done cor-

rectly, it was classified as G+, and where it was done incorrectly, G-.

H. Paraphrase: The reader paraphrases a clause, a sentence, or a certain chunk of information to aid or confirm understanding, or to clarify the idea. Most paraphrases were made in Japanese, but there were some in English. Where the paraphrase can be considered accurate, it was classified as H+, and where inaccurate, H-.

I. Use grammatical knowledge: The reader uses grammatical knowledge in an attempt to understand and tries to identify the grammatical function of a word or phrase ("Is this *blow* a verb or a noun?"), to grasp the syntactic structure of a sentence ("What is the subject of this sentence?" or "This *that* is used as a relative pronoun."), or to examine the anaphoric relation of a pronoun ("This *they* means the farmers above."). Where the grammatical analysis is correct or appropriate, it is classified as I+, and where it is incorrect or inappropriate, or the reader is simply wondering ("Is this *falling* a gerund or a participle?"), as I-.

J. Question the meaning of a word: The reader wonders about the meaning of an unknown or unfamiliar word and in some cases tries to make a guess, using the context, knowledge of word formations or other word solving behavior. If the guess was reasonably accurate ("I don't know the word *impulsively*, but it seems to be similar to *suddenly*."), it was classified as J+, and if it is a bad guess, or when the reader was simply asking ("What does this word mean?"), J-.

After this list of categories was established, all the protocols were examined in detail and were coded accordingly. Basically, one response after reading one sentence was regarded as the use of one strategy. When a long response contained several different kinds of strategies, each one was counted as the use of one strategy. The overall results are shown in Table 1.

Discussion

Frequency of each strategy: First, attention should be drawn to the question of what kinds of strategies were frequently used and what kinds were rarely used. Table 2 displays total and average strategy use by subjects.

A noticeable general tendency was that bottom-up strategies were used much more frequently than top-down strategies. This clearly shows that for most of the subjects lower-level processes were far from automatic and that they were struggling to decode linguistic clues.

Table 1: Overall Results

Student Exam		Top-down Strategies						Bottom-up Strategies							
No.	score	A	B	C	D	E	F	G+	G-	H+	H-	I+	I-	J+	J-
1.	96	0	3	3	0	5	4	5	0	16	0	2	2	2	5
2.	94	0	0	0	1	1	3	4	1	6	0	0	2	1	0
3.	91	4	9	3	10	5	0	0	0	2	0	3	4	2	7
4.	90	0	0	0	0	0	0	39	3	10	0	0	0	0	0
5.	90	0	2	0	0	0	0	37	2	3	3	0	1	0	1
6.	87	0	7	2	4	5	5	8	4	0	1	1	2	2	5
7.	86	0	1	0	1	2	0	8	2	9	2	1	0	0	1
8.	84	0	3	2	5	7	9	4	1	7	0	0	1	1	1
9.	84	1	6	0	5	7	5	1	0	3	0	0	1	1	1
10.	84	2	8	6	11	8	3	13	2	8	0	1	1	3	7
11.	84	0	4	3	2	1	3	15	3	10	1	3	2	2	3
12.	83	1	12	5	9	9	6	3	0	1	0	2	0	0	0
13.	83	1	2	0	10	5	4	2	0	3	0	1	3	0	4
14.	83	0	2	1	2	4	1	34	10	8	3	3	1	1	3
15.	82	0	5	1	0	3	3	1	0	2	0	1	5	1	4
16.	82	0	3	0	6	2	5	8	2	1	0	2	3	3	4
17.	82	0	4	7	8	5	6	4	1	7	1	0	1	2	6
18.	81	0	1	0	2	0	0	2	0	1	0	1	1	0	9
19	81	0	1	0	5	0	0	3	1	3	0	1	1	0	5
20.	80	0	0	0	2	0	1	3	1	5	1	0	0	0	5
21.	79	2	5	1	4	4	2	12	2	11	2	2	1	2	5
22.	79	0	3	0	9	2	3	3	0	0	0	0	4	3	12
23.	79	0	0	0	8	1	3	10	3	7	1	2	5	3	6
24.	79	0	0	0	1	1	1	32	3	9	2	0	1	1	1
25.	78	0	0	1	5	2	4	1	1	0	0	0	1	2	5
26.	77	0	1	0	1	0	0	29	3	3	0	0	1	0	6
27.	76	0	4	0	1	0	1	7	2	2	0	1	1	1	3
28.	75	0	5	0	7	2	1	1	2	1	1	1	3	1	6
29.	74	0	7	0	4	3	2	12	3	2	0	0	0	0	6
30.	74	1	6	0	9	8	3	3	1	10	2	0	0	0	2
31.	73	0	0	0	1	1	1	20	4	3	1	3	1	3	8
32.	73	0	5	7	13	8	8	6	2	13	2	1	5	4	9
33.	72	0	0	0	2	1	3	22	3	5	2	2	3	3	11
34.	72	0	0	0	0	0	1	12	2	0	3	0	0	0	1
35.	72	1	2	1	2	0	3	26	4	0	0	3	1	2	6
36.	70	0	1	0	0	3	6	4	2	7	4	0	0	1	5
37.	66	0	0	0	0	0	0	3	2	2	0	0	5	0	9
38	66	0	0	1	0	0	0	14	7	2	1	0	0	0	1
39.	62	0	0	0	4	1	2	3	1	2	1	0	2	1	14
40.	61	1	0	2	1	0	0	4	2	3	1	0	6	3	21
41.	60	0	0	0	0	2	0	6	4	2	12	0	10	0	0
42.	55	0	0	0	2	1	1	6	4	3	2	0	0	0	8
43.	55	0	0	1	1	8	7	17	6	8	4	0	3	0	7

Note: The exam score is the average of two semester examinations.

Top-Down Strategies: A = Anticipate content; B = question content; C = Use background knowledge; D = Reach to text; E = Interpret rtext; F = Integrate information
Bottom Up Strategies (+ = Effective; - = Ineffective): G = Translate; H = Paraphrase; I = Use grammatical knowledge; J = Question meaning of a word

Table 2: Total and Average Use of Each Strategy

		Total use	Average
1.	G (Translate)	543 (G+ = 447, G- = 96)	12.6
2.	J (Question meaning of a word)	274 (J+ = 51, J- = 223)	6.4
3.	H (Paraphrase)	253 (H+ = 200, H- = 53)	5.9
4.	D (React to text)	158	3.7
5.	I (Use grammatical knowledge)	121 (I+ = 37, I- = 84)	2.8
6.	E (Interpret text)	117	2.7
7.	B (Question content)	112	2.6
8.	F (Integrate information)	110	2.6
9.	C (Use background knowledge)	47	1.1
10.	A (Anticipate content)	14	0.3

It is not surprising that by far the most frequently used strategy was translation when we consider that grammar-translation is still the most widely used teaching method in Japanese public schools. The data indicate that the students tend to depend on their L1 to comprehend or help comprehend text written in English. This strategy was used by all the subjects, with one exception, but how it was used varied widely. Three basic patterns can be identified. One group occasionally made use of translation to confirm the meaning of some part of the passages. The second group of students used it constantly, but utilized other strategies as well. The third group either translated from the beginning, whether successful or unsuccessful, or began to read with attention to different aspects but came to concentrate only on translation. The idea that reading a foreign language means translating seems to be deeply rooted in many of the subjects.

Assuming that grammar-translation practice in high school greatly influences the way students process English text, we may wonder why the grammatical knowledge strategy was less frequently used than translation. Most students used this strategy a few times, though none of them used it to the point of paying exclusive attention to the grammatical function of each word or to the syntactic structure of each sentence. This may only mean that most students attempted to comprehend the text without much concern for grammatical forms. In a sense, such a manner of processing text can be considered "natural," because, as Rivers states, "perception of spoken or written message is primarily dependent on apprehension of semantic meaning ... with recourse to knowledge of syntax only when the meaning is not clear" (1981, p. 267). One may argue that articulating grammatical rules is a special

metalinguistic ability and that there must be students who actually made frequent use of their grammatical knowledge but could not describe what they were doing. However, such an argument poses the very complicated question of "How is conscious knowledge of grammar different from implicit knowledge of grammar?", which lies outside the scope of this article. Judging from the fact that the number of I- is more than twice that of I+, it can safely be said that few subjects were able to make full use of their grammatical knowledge for comprehension, regardless of the grammatical knowledge they possessed.

How can the data on the use of top-down strategies be interpreted? Apparently we can't say that most students processed the text efficiently in the top-down processing mode, but it should be noted that top-down strategies were employed to a considerable degree. The fact that such strategies as reacting to the text, interpreting the text, questioning content, and integrating information were used fairly consistently suggests that many students actively approached the text. This finding may support the hypothesis of the "universality" of the reading process represented in Goodman's often-quoted assertion that "the reading process will be much the same for all languages" (1973, p. 27; in Devine 1988, p. 261). Since there is little doubt that the subjects are literate in their L1 and it is unlikely that many of them received systematic training in high-level reading skills in previous English courses, it is reasonable to assume that their first language skills were transferred to the foreign language context.

However, it should be noted that the strategy of using background knowledge was used far less frequently than other top-down strategies. Contrary to my expectation that the background knowledge of the Great Depression given in preceding lessons would provide background aid, only a few students related to the text with this knowledge. Though recent research in schema theory emphasizes the importance of background knowledge in reading comprehension (Carrell & Eistherhold, 1983; Coady, 1979; Rumelhart, 1984; Spiro, 1980), our data suggest that it is not easy for most students to utilize it. Carrell (1983) reports a study which shows that intermediate and even advanced ESL readers tend to be linguistically bound to text and do not make the necessary connections between the text and the appropriate information. It may not be surprising that our subjects did not actively use background knowledge.

Relationship between strategy use and reading comprehension ability: Table 1 lists the students in a descending scale according to average score on two reading comprehension examinations given at the end of

each semester. The following discussion is developed on the assumption that the results of these examinations reflect their reading comprehension abilities.

It is not difficult to identify some clear relationships between strategy use and reading comprehension ability. One is that as the score goes down so does the frequency of top-down strategies. In order to obtain the numerical data, all the subjects were divided into three groups according to rank by scores. The total number of top-down and bottom-up strategies used by each group was counted, and the average strategy use was calculated. Table 3 shows the results.

Table 3: Total and Average Use
of Top-Down and Bottom-Up Strategy Types by Group

	Group size	Range of scores	Top-down strategies	Avg.	Bottom-up strategies	Avg.
High-scoring group	(14)	96 - 83	255	18.2	387	27.6
Middle-scoring group	(14)	82 - 75	155	11.1	332	23.7
Low-scoring group	(15)	74 - 55	148	9.9	472	31.5

These figures show that students ranked in the high-scoring group employed top-down strategies much more frequently than others, and that middle-scoring students used them slightly more often than low-scorers, whereas the use of bottom-up strategies follows no such pattern. There are a few exceptions like students #4 and #5 in the high-scoring group, who used virtually no top-down strategies, and Student #31 in the low-scoring group, who made consistent use of top-down strategies. However, the frequent users of top-down strategies are concentrated in the high-scoring group, while the lowest seven barely used top-down strategies: their average was only 5 times.

Table 4 shows the percentage use of top-down and bottom-up strategies in each group. These figures also reveal that the use of top-down strategies is related to reading comprehension ability.

In addition, it seems worthwhile to examine closely one of the bottom-up strategies: the strategy of raising questions about the meaning of a word. Since "reading difficulties are often traceable to deficits at the level of word recognition" (Adams, 1980, p. 14), it is important to see how the subjects struggled at this level. The relationship is clear. As the exam score goes down, the more frequently use of this strategy is observed. This indicates that low-scoring students were struggling more at the level of word-by-word decoding. It should be noted that the fre-

Table 4: Percentage Use of
Top-Down and Bottom-Up Strategy Types by Group

	Top-down	/	Bottom-up
High-scoring group	39.7	/	60.3
Middle-scoring group	31.8	/	68.2
Low-scoring group	23.9	/	76.1

Table 5: Total Number and Average of Strategy 'J' Use by Group

	'J'		'J+'		'J-'	
Groups by exam scores	No.	Avg.	No.	Avg.	No.	Avg.
High-scoring	53	3.8	15	1.1	38	2.7
Middle-scoring	96	6.9	19	1.4	77	5.5
Low-scoring	125	8.3	17	1.1	108	7.2

quency of J+ was low in all groups. Though the importance of the ability to guess the meaning of unknown words is often emphasized in EFL pedagogy, the data suggest that it is a difficult skill. Despite the high frequency of attempts, students in the low-scoring group rarely succeeded, supporting the view that "time spent on close decoding is, more often than not, reading time misspent" (Devine, 1988, p. 264).

Conclusions and Implications for Pedagogy

The findings in this study can be summarized as follows: 1) The approach to the text varied from individual to individual, but the students as a whole used a wide range of top-down and bottom-up comprehension strategies; 2) The majority used bottom-up strategies more frequently than top-down strategies, largely with recourse to translation, and 3) There is a clear relationship between reading comprehension examination scores and strategy use: the higher the scores, the more frequent the use of top-down strategies. Students in the low-scoring group have a strong tendency to be concerned with decoding words.

Our first conclusion is that many students possess strategic resources not only in the bottom-up processing mode but also in the top-down processing mode. This is encouraging for teachers, because it implies the potential for improvement from training in higher-level strategies.

Though the immediate effect of direct strategy instruction remains questionable (Barnett, 1988a; Duffy, 1993), teachers are certainly responsible for encouraging students to learn how to process text more efficiently in the top-down mode. Teachers can do this through various activities, such as predicting content from headings, utilizing information in pictures, maps and charts, analyzing the basic structure of text, and skimming for specific information. Considering the infrequent use of background knowledge as a strategy here, it may be necessary to help students call up their knowledge. Several organized methods and approaches have been elaborated for this purpose, among which are "Extending Concepts through Language Activities," "Directed Reading-Thinking Activity," and the "Experience-Text-Relationship Method" (c.f. Barnitz, 1985, pp. 20-22). For students who rely exclusively on bottom-up strategies, special attention is necessary so that they will view reading from a new angle and take a more global approach. Certainly this is not easy, but it is possible if teachers make use of techniques such as nonsense texts or texts including anomalous words and sentences (Carrell, 1988).

From the second finding, we can conclude that the nature of reading problems is largely linguistic, and that students need to develop a stronger foundation of basic linguistic skills. However, great care must be taken in applying this finding to pedagogical directives. If teachers focus attention on specific aspects of language, such as lexicon and syntax, with aim of developing basic linguistic skills and place undue emphasis on vocabulary exercises and grammar drills isolated from meaning, the lesson may reinforce a word-by-word processing style and discourage the integration of skills in the interactive reading process. It should be kept in mind that over-reliance on translation and other lower-level strategies is probably a result of repeated practice of these strategies required in previous English courses. To address this problem, teachers can utilize rapid word or phrase recognition exercises and exercises for reading in meaningful word groups (Eskey & Grabe, 1988). These exercises help both solidify students' linguistic foundation and reduce reliance on translation.

Similarly, we have to consider carefully the pedagogical implications of the third finding. Although this supports the view that good reading is marked by use of top-down strategies, it does not mean that instruction should always be focused on the development of top-down strategies. It is important to note that over-reliance on top-down strategies sometimes leads to wild guesses about a text's content. If teachers blindly emphasize the utilization of background knowledge in a begin-

ning-level class, students may simply begin to view decoding tasks as laborious and so avoid them, thereby developing not a "knowledge-based" but a "knowledge-biased" (Carrell, 1988, p. 108) comprehension style. "For second language readers, especially," as Eskey and Grabe maintains, "*both* top-down and bottom-up skills and strategies must be developed, and developed *conjointly* [italics added], since both contribute directly to the successful comprehension of text" (1988, p. 227). Thus, it is important for teachers to take a balanced approach in consideration of each student's abilities.

Finally, I would like to stress the benefits of think-aloud protocols as a means for getting to know students. According to Block (1986), think-alouds can be an important tool for learners to recognize their own comprehension problems. It is hoped that this was the case with our students as well, but here I would like to emphasize that it was a fruitful experience for me to listen with concentration to students for a sustained length of time. I became far more sensitized to the various comprehension problems they faced and gained insights into the problems and weaknesses of individual students and the kind of help that can be effective for them. Furthermore, I was able to share the sudden moments of "click of comprehension" many students experienced after going through some frustration. In short, I recognized anew the value of classroom-based research.

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Appendix

*The following is an English translation of the directions. Directions were written
in Japanese to ensure that there would be no misunderstanding.*

Let's Think Aloud

As this is not a test for evaluation but just a kind of experiment to find out
your problems, strengths and weaknesses for more effective instruction in our
reading class, please relax and do it.

When you read text in English, the process is far from simple. Consciously
or unconsciously, various things are going on in your mind. When you come to
an unknown word, you may guess the meaning from the word formation or the
context. When you don't understand a sentence, you may have to read it again
or analyze the grammatical structure of the sentence. Even if you don't under-
stand a certain portion of the text for sure, you can pass some judgement on
what it is about, using your common sense or background knowledge. When
you can't make sense of the author's intention, you may sometimes just go
ahead and gradually come to understand as you go on. Also, you may agree or
disagree with the opinion of the author, or you may be surprised at or angry
about the content. In ordinary comprehension tests, only the result—what or
how much you have understood—is measured, but in this experiment, the pro-
cess—how you attempt to understand—is focused upon.

Read "The Dust Bowl" and "Early Autumn" and each time you read a sen-
tence, state immediately whatever occurs in your mind as straightforwardly as
possible, as if you were just talking to yourself. Your statement can be anything
about the text such as a question regarding the content, vocabulary, grammar,
your own feeling or opinion, or your knowledge about the content, etc. You
don't have to explain or analyze your thoughts. When you don't have anything
special to say, a brief comment such as "OK" or "I understand" is all right, but
remember it is important to try to respond as actively, straightforwardly and
automatically as possible. You may respond either in English or in Japanese.