Top-Level Text Structure in Reading L1 and FL Expository Prose

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This study examines the use of text structure by Japanese college-level students in reading expository prose in their native language and in a foreign language, English. The top-level text structure as well as the content units of the students' recall protocols were analyzed to see how they use text structure strategy, and how much of the textual information they understand and remember. Most of the students possessed the structure strategy and utilized it in L1 reading, but more than half of them could not use it in FL reading. The use of structure strategy and its effects on comprehension and recall in different languages are discussed, and suggestions for FL reading are offered.

母国語と外国語の説明文読解におけるテキスト構造活用について

　この研究の目的は、日本人大学生が説明文を読むときそのテキスト構造をどのように活用するのか母国語と外国語（英語）で調べることである。被験者に説明文を読んだ後再生してもらい、その中にあるテキスト構造と内容単位を分析し、どのようにテキスト構造を活用するのか、それによりどの程度テキストにある情報を理解し記憶しているのかを調べた。ほとんどの学生は母国語においてはテキスト構造を活用できたが、外国語では半数以上ができなかった。異なる言語で読む際のテキスト構造の活用と、理解と記憶におよぼす影響について考察し、外国語の読解指導への提案を行う。

1. Introduction

With the development of schema theory in reading, more attention has been paid to the reading process than the product. The schema theoretic view explains reading as the interaction of the writer and the reader. The use of the structure in text plays a significant role in communication between the author and the reader; in reading expository text in particular, skilled readers use a more effective strategy of text structure to understand and retain more textual ideas than less skilled readers (Meyer 1985, 1987; Meyer, Brandt, & Bluth, 1980; van Dijk & Kintsch 1983, 1985).

Meyer et al. (1980) examined the reading process of ninth-grade students and their use of top-level text structure—the overall logical relationship—to organize the text as a whole, for instance problem/solution, cause/effect, comparison, description, and collection. They suggested that the ability to employ the organizational structure of text may develop with age and schooling. As for adult native readers of English, they reported more than 50% of junior college students, 80% of college undergraduates and 80-100% of graduate students and college graduates used the same type of top-level text structure as the authors had used in writing when they read and recalled well-organized passages; those students who employed the strategy of text structure understood better and remembered more than those who did not. Taylor (1980) also reported that 82% of adult English readers used the text's top-level structure.

Text organization is a culturally variable structure and some rhetorical patterns frequently used in English are not familiar to readers of other languages. In ESL, Carrell (1984) reported only 26% of the intermediate ESL readers taking an intensive English program at university recognized and utilized the text structure in their recall. She suggested that ESL students might not possess the appropriate knowledge of English text organization. However, in that experiment, the students read and recalled in English; therefore, their insufficient language ability might have caused an inappropriate use of the structure strategy. If they had read the passages in their native languages, would they have used the strategy as effectively as native readers of English?

In the study of text structure strategy, most research has been conducted into first language reading and/or in second language reading (ESL). No research has been done in the use of text structure by the same reader reading different languages. This study will investigate the following research questions:

1. How do adult Japanese readers, especially college-level students, identify and utilize the structure of text in reading their native language (Japanese), and in reading a foreign language (English)?
2. Are there any differences in the use of text structure and recall between first language reading and foreign language reading?

2. Method

2.1 Subjects

A sample of 50 college undergraduates (Aoyama Gakuin, international politics & economics majors) and 50 junior college students (Keisen Jogakuen,
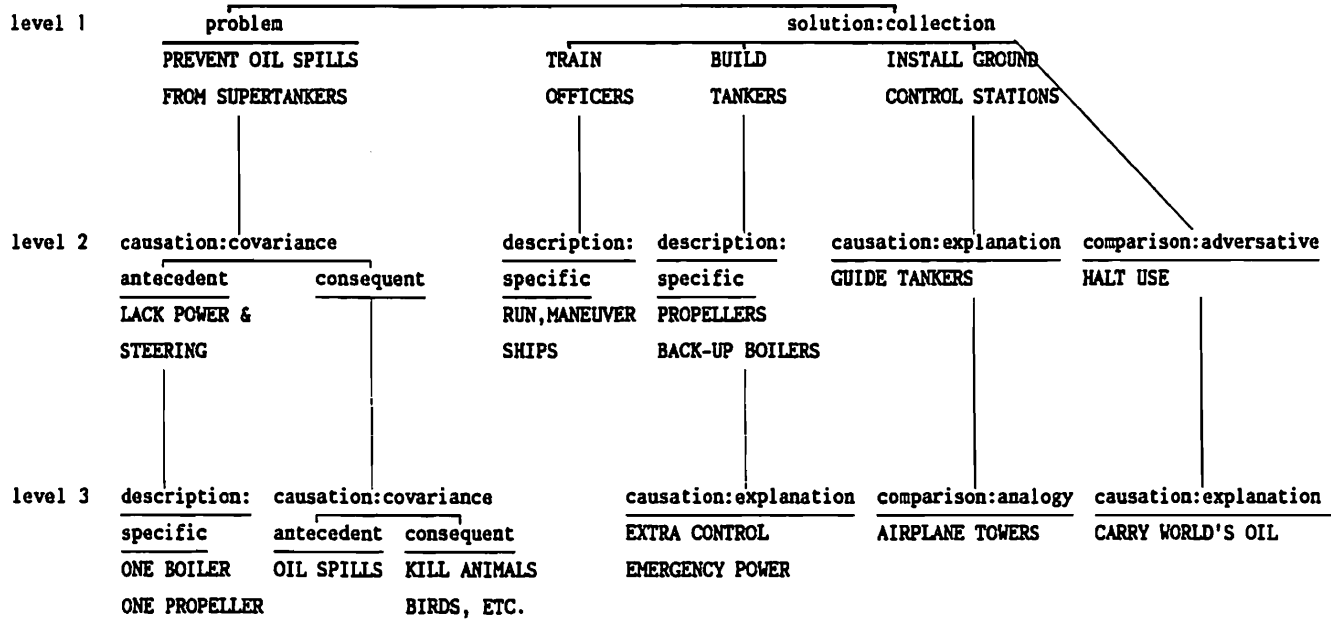
English majors) were tested for the study; they were all first year students, and most had been educated in Japan. Their educational background was basically the one that most Japanese college-level students have.

All the subjects took a mock TOEFL test (Stricherz & Ogasawara, 1990) of structure, written expression, vocabulary, and reading comprehension (max = 100). The test results were as follows: college undergraduates, mean = 70.08, SD = 13.94, range 46-96; junior college students, mean = 49.58, SD = 8.66, range 29-71. The t-test, two-tailed mean comparison, showed the difference of the mean scores between the two groups was significant: $t = 8.74$, $p < .01$. Among the subjects, 6 college undergraduates and 4 junior college students had TOEFL scores: college undergraduates, mean = 551, range 510-603, junior college students, mean = 418, range 393-478. The test results of the students with TOEFL scores and those of the rest in each group were compared. In both groups, the variances for the test scores of the students with TOEFL scores and the rest were equal: $F = 1.11$, $p < .05$ for college under-graduates, and $F = 1.02$, $p < .05$ for junior college students. Furthermore, the t-test showed there were no significant differences of the means between the students with TOEFL scores and the rest in both groups: $t = 0.17$, $p < .05$ for college undergraduates and $t = 0.43$, $p < .05$ for junior college students. Therefore, the English proficiency level was considered to be high interme-diate (510-603 in TOEFL) for college undergraduates and low intermediate (393-478 in TOEFL) for junior college students. Since their English proficiency was different, the results of the experiment of the two groups were analyzed separately. Among the undergraduates, 10% of the subjects had even attended school abroad, but there were no significant differences in the results between those who had been educated entirely in Japan and those with some schooling abroad.
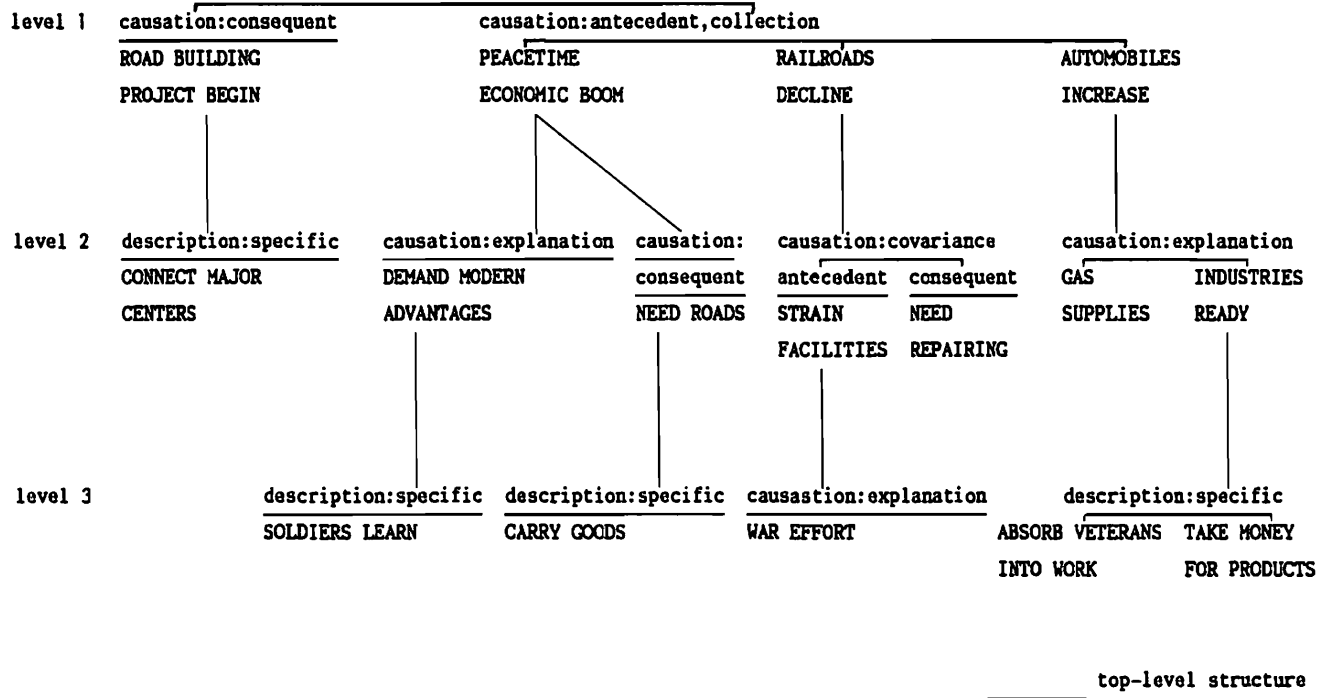
2.2 Materials

Two well-organized passages of expository text originally written in English were used for this study. The passage about "Supertankers" was taken from the study of Meyer et al. (1980), and the passage "Highways" was taken from an ESL composition textbook by Johnston and Zukowski/Faust (1986). These two passages were almost the same length: 155 and 156 words respectively. By Fry's (1968) index of readability, the supertanker passage was at the 10th grade level, and the highway passage was at the 12th grade level. The text structure and the content for each passage (Figures 1 & 2) were identified by the prose analysis system developed by Meyer (1985). In Meyer's content structure system, the logical connections among ideas in the

Figure 1
Content Structure: "Supertankers"

level 1   problem   solution:collection

PREVENT OIL SPILLS   TRAIN   BUILD   INSTALL GROUND
FROM SUPERTANKERS   OFFICERS   TANKERS   CONTROL STATIONS

level 2   causation:covariance   description: description: causation:explanation comparison:adversative

antecedent   consequent   specific   specific   GUIDE TANKERS   HALT USE

LACK POWER &   RUN,MANEUVER PROPELLERS
STEERING   SHIPS   BACK-UP BOILERS

level 3   description: causation:covariance   causation:explanation comparison:analogy causation:explanation

specific   antecedent consequent   EXTRA CONTROL   AIRPLANE TOWERS CARRY WORLD'S OIL

ONE BOILER   OIL SPILLS KILL ANIMALS   EMERGENCY POWER
ONE PROPELLER   BIRDS, ETC.

_____ top-level structure

Figure 2
Content Structure: "Highways"

Top-Level Text Structure in Reading

level 1

causation:consequent causation:antecedent,collection

| ROAD BUILDING PROJECT BEGIN | PEACETIME ECONOMIC BOOM | RAILROADS DECLINE | AUTOMOBILES INCREASE |

level 2

description:specific — CONNECT MAJOR CENTERS

causation:explanation — DEMAND MODERN ADVANTAGES

causation: consequent — NEED ROADS

causation:covariance — antecedent STRAIN FACILITIES / consequent NEED REPAIRING

causation:explanation — GAS SUPPLIES / INDUSTRIES READY

level 3

description:specific — SOLDIERS LEARN

description:specific — CARRY GOODS

causastion:explanation — WAR EFFORT

description:specific — ABSORB VETERANS INTO WORK / TAKE MONEY FOR PRODUCTS

_____ top-level structure

text are specified in a hierarchy, and each content unit and each rhetorical relationship can be separately scored.

In this experiment, two passages with different top-level structures were used because some students may prefer one type of structure to others. The top-level structure of the supertanker passage was problem/solution, and that of the highway passage was cause/effect, structural patterns which are frequently used in English essays. The two passages were very similar in the number of content units at each hierarchical level. The transitions of the two passages, however, were slightly different. In the supertanker passage, the words that showed the text structure were clearly identified; for example, "the problem," "the solution," "first," "second," and "third" were used. On the contrary, the highway passage had only a moderate number of transitional words, none of which, however, was deleted. Therefore, the small differences on the surface-level cues seemed not to have a great effect on the students' reading comprehension.

For the Japanese reading, translated versions of the two passages were used, and the same number of students in each group read the passages both in English and Japanese.

2.3 Procedure

The study was conducted during the first regular English period of the first semester. Each student read both passages: one version in Japanese and the other in English. After reading a passage in Japanese and placing it out of sight, the students wrote down all they could recall from it. Then they read the other passage in English and wrote down their recall in Japanese.

The students were given five minutes to read the English passage and two and a quarter minutes to read the Japanese passage. Since average Japanese students read 100 English words per minute (Ando, 1979), and average Japanese adults read 600 Japanese characters per minute (Kindaichi et al., 1988), most of the subjects read the passages about three times.

2.4 Scoring

First, the top-level structure of each recall protocol was analyzed to determine whether or not the student employed the text structure strategy. If the students' protocols had the same text structure as the author had used, they identified and utilized it in their reading and recalling. Referring to the scoring systems of Meyer et al. (1980) and Richgels et al. (1987), top-level structures were determined as follows: If a protocol was recognized in two clusters of ideas with the words of "problem and solution," or similar words to identify

the text's structure such as "question and answer" or "trouble and solution," it was assigned to a problem/solution structure; if a protocol was identified in two clusters of ideas with the words "cause and effect," or with similar words such as "reason and outcome" or "background and result," it was assigned to a cause/effect top-level structure.

Second, the contents of the recall protocols were also scored using Meyer's content structure system (Figures 1 & 2). Protocols were analyzed to examine how many content units were recalled at each level of the text structure. For instance, the supertanker passage had four content units: "prevent oil spills from supertankers," "train officers," "build tankers," and "install ground control stations." If a protocol mentioned these four superordinate content units, the reader got four points for content units at level 1. Subordinate content units at levels 2 and 3 were separately scored with the same system.

The use of top-level structure and content units of each recall protocol were analyzed and scored by two independent scorers. The inter-rater reliability was .84.

3. Results

As shown in Table 1, in reading Japanese, 42 (84%) out of 50 students in the high intermediate English proficiency group and 37 (74%) out of 50 in the low intermediate English proficiency group used the same top-level structure as the original passages. On the other hand, in reading English, 25 (50%) of the first group and 1 (2%) of the second utilized the same top-level structure as the author. In the high English proficiency group, 42% of the students utilized the text's top-level structure consistently both in reading Japanese and English, and 42% employed it in Japanese but not in English; 8% of the students used the structure strategy in English but not in Japanese, and 8% did

Table 1
Student Use of Top-Level Structure

	High intermediate (n = 50)		Low intermediate (n = 50)	
	Use	Not	Use	Not
English	25	25	1	49
Japanese	42	8	37	13
	$\chi^2 = 13.07$		$\chi^2 = 5.50$	
$p < .05$				

not utilize it either in Japanese or English. In the low English proficiency group, however, only 2% made use of the text's top-level structure in English but not in Japanese, although 74% of them employed it in Japanese but not in English, and 24% did not use it either in English or Japanese. Chi square analyses were used to determine whether or not there were differences in the use of the text's top-level structure between reading in English and Japanese.

Table 2 presents the mean recall scores of content units obtained by the students who used or did not use the text's top-level structure at each hierarchical structure level of the passages in English and Japanese. In the high intermediate English group, the t-test showed the students who recognized and utilized the text's top-level structure recalled significantly more major message units in English: $t = 5.12$, $p < .01$ at level 1, and $t = 2.45$, $p < .05$ at level 3. No significant difference was observed at level 2. In Japanese,

Table 2
Mean Scores of Content Units at Each Level
of the Text Structure

		High intermediate				Low intermediate			
		n	Use	n	Not	n	Use	n	Not
Level 1									
English	Mean	25	2.88	25	1.52	1	1.00	49	0.51
	SD		0.93		0.91		0.00		0.58
Japanese	Mean	42	3.48	8	2.75	37	2.73	13	1.23
	SD		0.71		1.39		0.96		0.60
Level 2									
English	Mean	25	1.16	25	1.24	1	0.00	49	0.12
	SD		0.85		1.13		0.00		0.33
Japanese	Mean	42	2.62	8	3.00	37	2.30	13	1.08
	SD		1.60				1.18		1.26
Level 3									
English	Mean	25	2.28	25	1.32	1	2.00	49	0.90
	SD		1.17		1.52		0.00		1.21
Japanese	Mean	42	2.24	8	2.50	37	2.27	13	1.23
	SD		1.36		1.07		1.17		1.24

Max = 4 (Level 1), 7 (Level 2), 6 (Level 3)

however, there was no significant difference between the users and non-users of the structure strategy. On the other hand, in the low intermediate English proficiency group, the differences between users and non-users were recognized in reading Japanese at all levels: $t = 5.18, p < .01$ at level 1, $t = 3.09, p < .01$ at level 2, and $t = 2.66, p < .05$ at level 3.

The users of the text's top-level structure and the non-users in both proficiency groups recalled significantly more message units in Japanese than in English at higher levels. Even the students who had high intermediate English proficiency and used the text's top-level structure recalled better in Japanese than in English: $t = 2.93, p < .01$ at level 1, and $t = 5.22, p < .01$ at level 2. These students, however, recalled as many or more major units in English at level 1 than the rest of the students recalled in Japanese; this means that even in English they recalled the important points as successfully as the other students did in Japanese. For example, they recalled as many units at level 1 as the users of the structure strategy in the low intermediate English proficiency group did in Japanese: $t = 0.60, p < 0.56$.
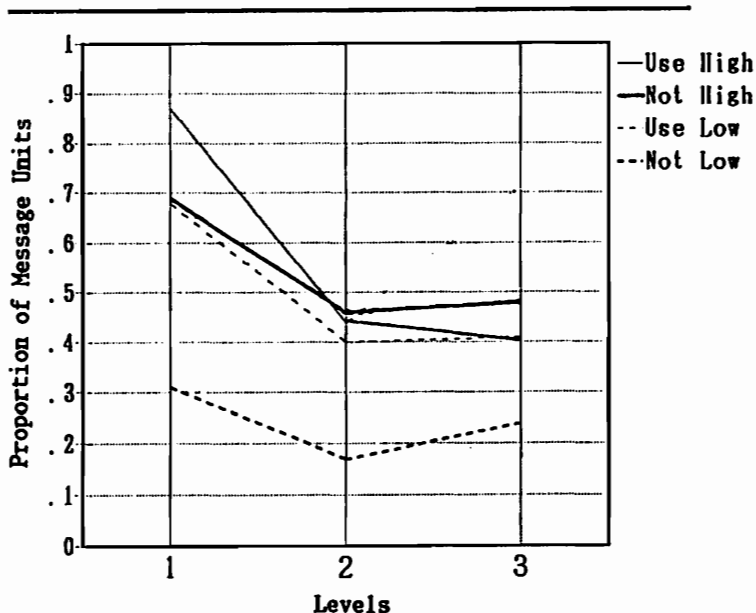
Figures 3 and 4, which show the proportions of message units obtained by the students who used or did not use the text's top-level structure at each level

Figure 3

Proportion of message units at each level of the text structure in English
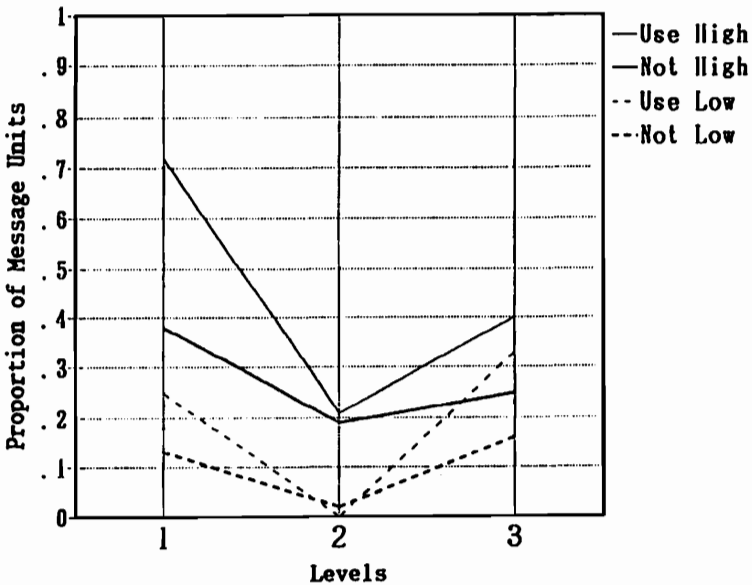
Figure 4

Proportion of message units at each

level of the text structure in Japanese

in English and Japanese, depict these results. The readers, especially the structure strategy users in the high intermediate English proficiency group, recalled the important units at the highest level very well. In English as well as in Japanese, the differences between the users of the structure strategy and the non-users tended to be great at the higher levels. Another important point is that the patterns of the four group units of the subjects were very similar in English and Japanese, in fact paralleling each other.

4. Discussion

Two important findings related to the use of the top-level structure in reading L1 and FL resulted from this study. First, in reading L1, 79% of the Japanese college-level students (84% in the high intermediate English proficiency group and 74% in the low intermediate group) utilized the text's top-level structure; this result was compatible with the research results of L1 readers of English by Meyer et al. (1980) and Taylor (1980). In reading FL, however, 50% of the students at the high intermediate level and only 2% at the low intermediate level employed the text structure strategy. In Carrell's

(1984) experiment on intermediate ESL readers, about one-fourth of them utilized the text's structure. To explain the great difference between L1 and L2 readers, Carrell (1984) mentioned that most ESL students "may not possess the appropriate formal schema, particularly if they come from a non-English background" (p. 465). In Carrell's experiment, however, the students read and recalled only in L2, and so they may have appeared not to have the text structure strategy. In the present experiment, the students read both in L1 and L2 and recalled in L1 free from language problems while recalling, and the results showed that 84% of the high intermediate students and 74% of the low intermediate students possessed and used the structure strategy in reading L1. Fifty per cent of high proficiency users did use the structure strategy in L2 reading as well, but low intermediate students did not.

Japanese expository prose does not have the same text structure as English, and it is often said that text organization is not so emphasized in Japanese essays as in English essays. Japanese expository prose has many different patterns. One of the traditional Japanese patterns for expository text is "*ki-sho-ten-ketsu*": it consists of four parts—*ki* (starting), *sho* (developing), *ten* (turning to a subtheme) and *ketsu* (concluding). However, the organization patterns frequently used in English—such as collection, description, problem/solution, cause/effect, and comparison/contrast—are also used in Japanese patterns, and elementary school children learn about these basic organization types in written Japanese language.

Kishi (1989) reported Japanese elementary school children (grades 1-6) gradually gain the knowledge of text structure and learn how to use it with the development of age and schooling: They develop the structure strategy throughout the period of elementary school. Watai (1989) also reported that Japanese elementary school children in lower grades often used the structure of collection, while children in higher grades came to use problem/solution and cause/effect more effectively.

Also in this study, the majority of the Japanese students at college-level appeared to possess a well-developed structure strategy and used it when reading expository text in Japanese. Skilled Japanese readers follow the idea of an essay and communicate with the writer utilizing the rhetorical structure of text in first language reading. In foreign language reading, however, many readers, especially most students without sufficient L2 proficiency, failed to use the strategy they commonly rely on in reading in L1. If students do not use the structure strategy in reading L2/FL, it does not necessarily mean that they do not have the strategy in reading L1. Teachers should be very careful in

judging students' reading activities in L1 only from their L2/FL reading performance.

The other important finding was that the ability to use the text's top-level structure seems to be an important strategy for comprehending and remembering information in the text in reading FL as well as in reading L1. Meyer (1985) suggested that poor comprehenders wrote their recall protocols like a list or a collection of non-related descriptions about the topic, while good comprehenders organized recall with its logical relationships. In this study, most recall protocols written by the students who did not use the structure strategy in reading FL were in a list format with pieces of minor information at lower levels of text; they missed the main ideas of the essay. The inappropriate use of the structure strategy appeared to affect readers more seriously in reading L2 than in reading L1.

Furthermore, according to Figures 3 and 4, the users of the structure strategy and the non-users in the different FL proficiency groups showed very similar patterns in the proportion of message units at each level in L1 and L2. The results in L2 reading of the students who employed the structure strategy were the most similar to those of the users of the structure strategy in L1 reading. If skilled readers in L1 have sufficient proficiency in L2, they may use the same strategy in reading L1 and L2, and hence the process of skilled reading seems to be quite similar in reading different languages. This contention is supported by the findings of Block (1986) that "strategy use is not tied to specific features" and "the knowledge of the reading process" is applied to other languages (p. 485). Other findings in second language reading research based on the psycholinguistic model of reading have indicated that some reading strategies can be transferred from L1 to L2, and that the process of reading is universal (Coady, 1979; Cummins, 1980; Goodman, 1967; Hudson, 1982).

It is now generally accepted that language proficiency and reading ability critically interact, but teaching discrete-point grammar and vocabulary show little or no correlation with development in L2 reading (Devine 1988). L2/FL reading should not be considered only as a language problem and should not be separated from L1 reading in reading classrooms. Many students usually do not look carefully at their own reading activities either in L1 or L2/FL. They may use strategies unconsciously, or they may fail to use such strategies without noticing the fact. Teachers can help students by sensitizing them to strategy use. As for use of structure strategy, teaching the structure of a text is not sufficient for L2/FL readers; students must find out how and why they

fail to transfer the structure strategy from native language reading to L2 reading, and how they use the structure in texts when reading and remembering information from texts written in second/foreign languages. By relating the reading process in L1 to that in L2/FL, students may become more aware of how to solve their reading problems. Teachers should encourage students to create the meaning of text through discovering the process of reading, both in their native language and in other languages.

5. Conclusion

In most classroom situations, as well as in reading classes, a students'needs to understand what an author says. The reader is usually required to gain as much information as possible and retain the main ideas of the text; this type of reading is important and necessary for students in intermediate and advanced reading classes. To obtain information from written materials, the identification and use of structure in text is a necessary component of comprehension and recall reading in L2/FL, as well as in L1. The use of text's top-level structure by skilled readers appears to be similar in reading different languages. In addition to the study of use of text structure, further research is needed to examine other strategies at different processing levels of reading performance in L1 and L2/FL. The relationship between L1 and L2/FL reading has partially been explained, and more research is called for to further reveal the process. In Japan, research in the process of reading by children and adults in L1 has mainly been conducted by developmental psychologists, while L2/FL reading research has been done by EFL/ESL teachers. Cooperation between psychologists and language teachers can better bridge native language reading and second/foreign language reading.

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Appendix A

Passages in English Version

Supertankers

A problem of vital concern is the prevention of oil spills from supertankers. A wrecked supertanker spills oil in the ocean; this oil kills animals, birds, and microscopic plant life. Most wrecks result from the lack of power and steering equipment to handle emergency situations, such as storms. Supertankers have only one boiler to provide power and one propeller to drive the ship. The solution to the problem is not to immediately halt the use of tankers on the ocean since about 80 percent of the world's oil supply is carried by supertankers. First, officers of supertankers must get top training in how to run and maneuver their ships. Second, tankers should be built with several propellers for extra control and backup boilers for emergency power. Third, ground control stations should be installed at places where supertankers come close to shore. These stations would act like airplane control towers, guiding tankers along busy shipping lanes and through dangerous channels.

Highways

During the postwar administration of President D. D. Eisenhower, a road building project that would change the U.S. was begun. It was an ambitious program of highways to connect all major population centers throughout the forty-eight contiguous states. The peacetime economic boom had left the country badly in need of roads to carry goods between cities and into rural areas, for the returned soldiers demanded the modern advantages that they had learned about away from home. Furthermore, at this same time, the railroads were entering a period of decline. The war effort had strained their facilities, so that tracks, cars, engines and stations badly needed expensive repairs. Simultaneously, the number of automobiles was increasing, for there were plentiful supplies of gasoline, and the automobile industry was both ready to absorb returning veterans into the work force and willing to take their money for finished products. The conditions were ripe for the incredibly complex undertaking of the interstate highway system.

Appendix B
Passages in Japanese Version

"スーパータンカー"

極めて重大な問題の1つに、巨大タンカーからの石油の流出防止がある。座礁したタンカーから海に流れだした石油によって、動物、鳥、微生物は死んでしまう。たいていの座礁の原因は、嵐などの緊急事態に対処するための動力と操縦装置の不足である。巨大タンカーには動力源としてたった1つのボイラーしかなく、また船を動かすのに1つのプロペラしかない。だが問題の解決は、直ちにタンカーの使用を差し止めてしまうことではない。というのは、世界中に供給されている石油のおおよそ80%は、巨大タンカーによって運搬されているからである。まず第一に、巨大タンカーの航海士に高度な操縦訓練が必要である。第二に、予備制御のための複数のプロペラと、非常動力源の予備ボイラーを備えたタンカーを建造しなければならない。第三に、巨大タンカーが沿岸近くを航行する所には、地上管制センターを設置すべきである。こうした管制センターは航空管制塔のように、通行量の多い航路や危険な海峡でタンカーを先導するのである。

"ハイウェイ"

戦後、D.D.アイゼンハワー大統領が政権を担っていた時、アメリカを変革するような道路建設計画が着手された。それは、大がかりなハイウェイ計画で、隣接する48州の主要都市をすべて結ぶものであった。戦後、平和が戻り経済が繁栄したので、都市から都市へあるいは都市から地方へ、物資を運搬する道路がきわめて必要になった。というのは、戦争から戻った兵士は、戦争で故国を離れている間に知った新しい便利な製品を求めていたからであった。そのうえ、その頃、鉄道は衰退期に入っていた。戦争で鉄道施設を使い過ぎ、線路、貨車、機関車、駅を修理するにはかなり費用がかかった。それと同時に、車の数も増え始めていた。ガソリンは十分に供給されたし、自動車産業界も戦争から戻った復員兵を労働力として使い、生産した車を彼らに売りたがっていた。アメリカ各州を結ぶハイウェイシステムという、信じ難いほど複雑な事業の条件は整っていたのだった。