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ABSTRACT

This paper first gives a brief chronological overview of reading theory development and a short introduction to schema theory, and then comprehensively reviews, comments, and synthesizes research-based studies, published between 1980 and 2002, that examined the effect of text structure (reader effect and text effect) on L1 and L2 reading comprehension and recall. Factors that have shown to have the potential to intervene research results are discussed and an interactive reading model of formal schema is proposed. Suggestions for educators and future research are also made. (Contains 91 references, and 2 tables and 3 figures of data.) (Author/RS)

The Reader Effect (Instruction/Awareness of Text Structure) and Text Effect (Well-structured vs. Bad-structured Texts) on First and Second/Foreign Language Reading Comprehension and Recall-What Does Research Teach Us?

by Carrie Chang

The Reader Effect (Instruction/Awareness of Text Structure) and Text Effect (Well-structured vs. Bad-structured Texts) on First and Second/Foreign Language Reading Comprehension and Recall—What does Research Teach Us?

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Abstract:

This paper first gives a brief chronological overview of reading theory development and a short introduction to schema theory, and then comprehensively reviews, comments, and synthesizes research-based studies, published between 1980 and 2002, that examined the effect of text structure (reader effect and text effect) on L1 and L2 reading comprehension and recall. Factors that have shown to have the potential to intervene research results are discussed and an interactive reading model of formal schema is proposed. Suggestions for educators and future research are also made.

An Overview of Reading Theory and Model Development

Reading theories and models have undergone various stages of development over the past half century (Pearson & Stephens, 1994; Obad, 1997; Grabe, 1991).

1940~1960—with the dominance of audiolingual, reading was neglected.
1960s—reading as a passive, decoding process (Bottom-up).
1967—Goodman, reading as a psycholinguistic guessing game where the reader takes active role (Top-down).
1970s—Rumelhart, reading as an interactive, cognitive psycholinguistic process where both bottom-up and top-down processes are simultaneously involved (schema theory).

Sociolinguistic and sociocognitive models have also been trying to explain the process of reading (Rumelhart, 1994), but psycholinguistic and cognitive models remain the most popular and well adopted. Most reading psycholinguistic and cognitive models fall into one of the 3 categories—bottom-up, top-down or interactive (Lally, 1998; Obad, 1997; Grabe, 1991; Frehan; Klapper, 1992).

During the 1960s, reading was deemed a passive, decoding activity (Obad, 1997). Terms such as bottom-up, letter-and-word-recognition theory, text-based, text-driven or data-driven have been used to describe models and theories that hold this view of reading (Lally, 1998; Purcell-Gates, 1997; Frehan, 1999; Klapper, 1992). Generally speaking, theories and models that hold such a bottom-up viewpoint claim that reading is linear in that readers recognize letters, transfer them to sounds and then move on to decode the next letters (Purcell-Gates, 1997; Pearson & Stephens, 1994; Lally, 1998; Obad, 1997; Grabe, 1991; Frehan; Klapper, 1992; Jannuzi, 1997). Researchers like LaBerge and Samuels (cited in Purcell-Gates, 1997) took a step further to suggest that after readers master the letter and word recognition skill, they attend to letters and words automatically. Thus, meaning was built from the smaller units to the larger units (Obad,

1997). Variables including vocabulary, grammar, and syntax are the main foci of bottom-up theories and models.

In 1967, Goodman proposed a ground-breaking notion that reading was a "psycholinguistic guessing game" (Pearson & Stephens, 1994; McInnis & Morrison; Carrell & Eisterhold, 1983) where the reader is actively engaged in the activities of "prediction, sampling, confirmation, and correction" (Obad, 1997:276), meaning that with the linguistic cues, readers either confirm or disconfirm their predictions and expectations that are based on their background knowledge and experiences (Jannuzi, 1997; Zakaluk, 1998). Such terms as top-down, comprehension theory, knowledge-based, reader-based, reader-driven, concept-driven, or hypothesis-driven are commonly associated with theories and models that hold this view (Obad, 1997; Lally, 1998; Purcell-Gates, 1997; Frehan, 1999; Klapper, 1992). Variables including readers' background knowledge of the texts and the world, cognitive development, use of strategy, and purpose of reading are the main emphasis of top-down theories and models.

In reaction to the deficiencies of bottom-up and top-down approaches, a third theory, also known as the interactive or balanced theory, was proposed. This interactive model insists that reading neither a bottom-up nor top-down process, but instead an interaction of the two, an interaction between the text and the reader (Klapper, 1992; Zakaluk, 1998; Lally, 1998; Purcell-Gates, 1997; Eskey, 1997; Grabe, 1991; Frehan, 1999; Jannuzi, 1997; Rumelhart, 1994; Trollope, 1995; Murtagh, 1989). Specifically, bottom-up processing is evoked by the incoming data from the text while top-down processing occurs as the reader makes predictions in light of their background knowledge (Carrell & Eisterhold, 1983). Although focusing mainly on cognition and failing to take such crucial components as social, affective, or cultural factors into account, this viewpoint has gained its popularity since the emergency of schema theory in the 1980s (Eskey, 1997).

Schema Theory

Born in the 1980s through the delivery of such distinguished researchers as Anderson, Rumelhart, and Carrell, schema theory maintains that "oral or written text does not have any meaning in and of itself. Instead, a text gives direction to readers and listeners concerning how they should retrieve and construct meaning from their own previously acquired knowledge" (Lally, 1998:271). This previously acquired knowledge is commonly known as "background knowledge", or as some researchers called "schema". At least two kinds of schemata have been identified—Content schema refers to reader's general world knowledge or knowledge of the subject matter; formal (the adjective of "Form". Do not confuse it with the opposite of "informal") schema refers to reader's knowledge of the text structure or rhetorical form (McInnis & Morrison; Grabe, 1991; Jannuzi, 1997; Klapper, 1992; Carrell & Eisterhold, 1983; Singhal, 1998; Reves, 1993; Myers, 1997). The gist of schema theory lies in that reading is a process of matching incoming information to readers' background knowledge, of "constructing meaning by connecting old knowledge with new information encountered in text" (Pearson, et al., 1992: 149). For comprehension to occur, there must be a match between the text and reader's schema (Lally, 1998), suggesting reading is an interaction between top-down and bottom-up processes.

Formal Schema and Reading Comprehension & Recalls—Opinions Statements:

The schema that is going to be discussed in depth in this paper is formal schema, "background knowledge of the formal, rhetorical, organizational structures of different types of texts" (Obad, 1997:279). Reader's schema for stories, for instance, includes that the story should have at least a setting, characters, a beginning, a development, and an ending (Carrell & Eisterhold, 1983; Taylor, 1992).

A number of researchers and educators contended that texts that follow a certain conventional norm of organizational structure were easier to comprehend and store in the long-term memory than texts that do not (Collins, 1994; Coiro, 2001; Dickson, et al). By the same token, some argued that awareness of text structure gave an impetus to reading comprehension and retention (Myers, 1997; Slater & Graves, 1989; Collins, 1994; Coiro, 2001; Grabe, 1991; Dickson, et al; Mueller, 1997; Taylor, 1992). Dickson and her colleagues, for example, did a thorough synthesis of studies investigating the relationship between text organization and reading comprehension, with a focus on students with learning/reading disabilities. Another researcher, Taylor (1992) cited research studies to back up her claims that skilled readers were more likely to follow the original text structure in recall or summaries, suggesting their awareness of structure. Poor readers, after being instructed the structure of expository and narrative texts, had better comprehension than those who did not. Taking a step further, after reviewing expository text research, **Slater and Graves (1989)** categorized studies on this topic into 6 groups—

1. developmental findings (i.e. students' ability to use text structure for comprehension increases with age),
2. recall findings (i.e. readers who can identify and use text structure recall more than those who can not),
3. main idea and supporting idea findings (i.e. main ideas are usually retained better than supporting details),
4. using text structure findings (i.e. training in the use of text structure improves reading comprehension), and
5. prior knowledge and text structure findings (i.e. when the content is unfamiliar and readers fail to use text structure strategies).

In addition to Slater and Graves' taxonomies, **Fitzgerald (1989),** after comprehensively reviewing story schema research conducted before 1989, also came to the following conclusions:

1. Important information tends to be recalled better.
2. Good readers tend to have more fully developed formal schema.
3. Remarkable effects emerged even after a short training session of 1 to 6 lessons.
4. Studies tend to have small sample size.
5. Many people have acquired knowledge about story structure.
6. People use their knowledge of story structure to "guide their expectations, understanding, recall, and production of text" (p.28).
6. There seems to be a positive relationship between reading ability and knowledge of story structure.

Roller in her **(1990)** commentary article comprehensively synthesized literature on content and formal schemata and offered insightful suggestions to future research as well. Roller found that five kinds of manipulations had been used by researchers who

investigated the influence of text structure on reading: 1. Earlier studies leaned toward the research design of scrambling the sentence or paragraph order. Subjects read both original and scrambled passages. 2. Some researchers used texts that included or did not include topic sentences and signaling. 3. Some researchers replaced content words with psudowords while the text structure stayed unaltered to eliminate content schema. 4. Other researchers measured subjects' awareness of text structure or instructed them structure related strategies. 5. Still other researchers compared performance on texts of different levels of a hierarchy. Research has produced conflicting findings—some reported no effects, some reported strong effect of text structure while others reported inconsistent results.

Roller also commented on research design examining content and formal schemata simultaneously. The common design had been selecting 2 topics, one familiar, the other unfamiliar to subjects, and investigated how readers responded to the text structure of familiar and unfamiliar passages. Findings from these studies had suggested that structure assisted reading when the text was moderately unfamiliar because structure helped establish relations between concepts. On the other hand, when the text was too unfamiliar or familiar, structure became useless because in the former case, readers needed to sort out concepts first before establishing their relations while in the latter case, readers were so familiar with the content, concepts and their relations had already been established, thus text structure became redundant. Findings also indicated that readers aware of the text structure were more likely to follow the author's structure in recall tasks than those less aware. Roller, in the conclusion, urged future studies to scrutinize the effect of text structure at various degrees of content familiarity.

Comprehensive and thorough as Slater and Graves' 1989 classification of studies or Roller's 1990 synthesis of literature, the former lacks descriptions of research findings, whereas the latter only discusses various research designs. Before discussing what text structure research has taught us, some areas deserve in-depth understanding and examination:

1. What exactly do researchers refer to when they said "effect of text structure instruction"? Moreover, how did they measure "awareness of text structure"?
2. What do researchers mean when they claimed they measured "reading comprehension"?
3. What have we known about text structure awareness/instruction on the performance of reading comprehension and recall?

This paper will answer these questions.

Definitions of Terms

In order to understand formal schema research, some commonly used terms in this field needs to be first defined. Following is a list of definitions of terms discussed in this paper. While definitions vary slightly, if not greatly, from one researcher to another, these working definitions are this author's momentary taking to help the audience understand this paper.

Reading comprehension—"Reading comprehension is a multifaceted process, with performance indicators ranging from simple recall to interpretations of Shakespearean plays, analyses of concepts, and applications in new contexts" (Dickson, et al).

Text structure—"Text structure is the organization of ideas in text" (Taylor, 1992:221). It encompasses the general organizational plan the author follows as s/eh writes, structural patterns between paragraphs and structures within paragraphs, that is, how main ideas and supporting details are presented to convey a purpose (Dickson, et al.; Nuttall, 1996; Taylor, 1992). Some common text structures are narrative, expository, and so forth. Other terms like rhetorical form, text type, macrostructure, or top-level structure are used interchangeably with text structure.

Narrative Text—Narrative is also called story grammar where the main components are characters, setting, plot, attempt, reactions, outcomes, and ending (Taylor, 1992; Fitzgerald, 1989).

Expository Texts—Expository texts covers description, collection (sequence), cause/effect, compare/contrast, and problem/solution (Carrell & Eisterhold, 1983; Myers, 1997; Taylor, 1992).

Description Structure—Description is a top-level structure that "presents s topic and gives more information about it through attributes, specifics, explanations or settings" (Raymond, 1993: 4).

Collection Structure—Collection is a top-level structure that "presents a list of elements associated in some manner. This listing becomes more organized when it is sequenced in some way as for examples in time" (Raymond, 1993a: 5; Taylor, 1992).

Cause/effect Structure—Cause/effect is a top-level structure that "presents a causal relation between topics, as well as relationships in time; one idea is the antecedent or cause and the other is the consequent of effect" (Raymond, 1993a: 5; Taylor, 1992).

Compare/contrast Structure— Compare/contrast is a top-level structure that discusses the differences or similarities between two or more people, places, events, or topics; it can take three forms: "analogy, alternative and adversative" (Raymond, 1993a: 5; Taylor, 1992).

Problem/solution Structure—Problem/solution is a top-level structure that "presents a problem and its solution(s); it includes all the organizational components of causation; in addition, there is overlap between the problem and the solution...one part of the solution must match an aspect of the problem" (Raymond, 1993a: 5 Taylor, 1992).

Signal—Signal is "information in the text that does not add new content of a topic, but points out...or gives emphasis to certain aspects of the topic content...or structure" (Meyer, 1984: 19; Meyer et al., 1982 cited in Raymond, 1993; Dickson, et al). Two types of signals are 1. signal paragraphs that highlight structure of the passage, such as introductory paragraph or concluding paragraph, 2. signal sentences that pinpoint the structure within the paragraph, such as the topic sentence (Ohlhausen & Roller, 1988; Dickson, et al). Raymond (1993a) and Dickson, et al also included title words/headings in signals.

Idea units—Idea units refer to "both the content units (role relations or the actual information in a text) and the relationship units (rhetorical relations or labels for

identifying relationship between units of meaning) of a content structure of prose" (Raymond, 1993a: 9).

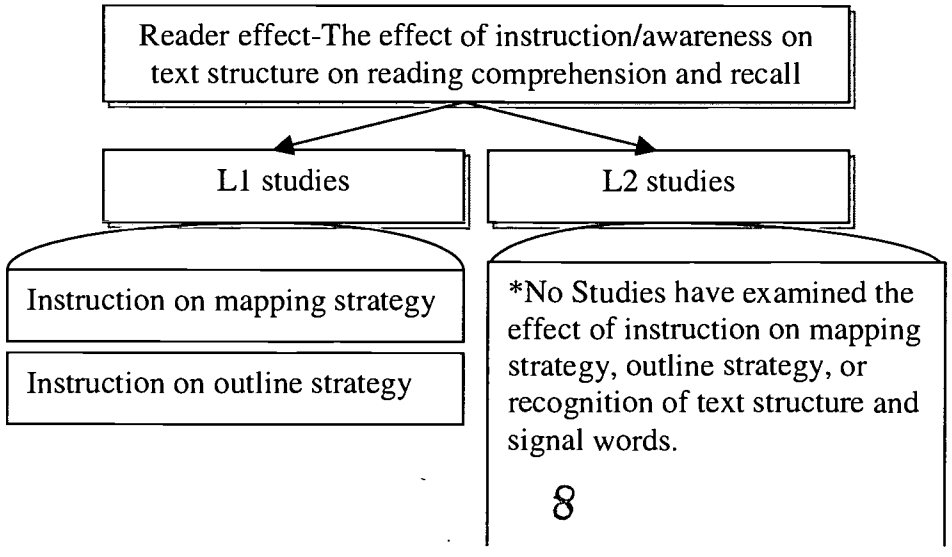
Map—A map is a visual representation of a passage's text structure. It identifies the main ideas, supporting ideas, and important details of a text, then graphically displays the ideas and their relationships. The map usually consists of nodes containing key phrases and the nodes connect links between them (Tyan, 1989).

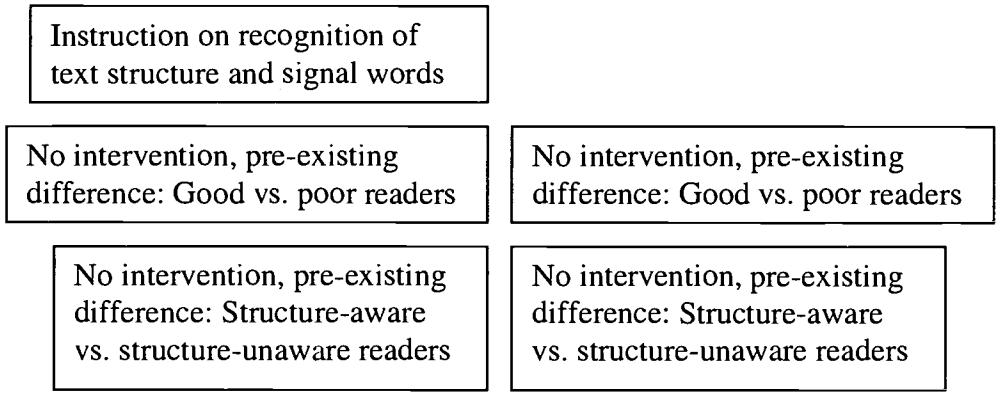
Literature Review—Research studies on formal schema, reading comprehension and recall

The following "Literature Review" section annotates, categorizes, synthesizes and critiques research-based journal and doctoral dissertation studies published between 1980 and 2002. These annotations are classified into one of the two groups: A. Reader effect-studies that examined the effect of instruction/awareness on text structure on the reading comprehension and recall of L1 and L2 readers, or B. Text/Readability effect (Anderson & Urquhart, 1984)-studies that examined well-structured vs. bad-structured texts on reading comprehension and recall of L1 and L2 readers (also see tables 1 and 2 for a general overview). It, however, should be cautioned that although studies were annotated and classified exclusively into one of the sub-categories within the two groups, more often than not, they belong simultaneously to many sub-categories. Annotations, however, excluded 1. studies that investigated students with reading disabilities, 2. studies that compared comprehensibility across texts (e.g. comprehensibility of cause/effect text vs. description), 3. studies that examined concreteness or coherence, or 4. studies that compare text structure cross-culturally (e.g. how Chinese cause/effect texts organize ideas vs. how English cause/effect texts organize ideas).

A. Reader effect—The effect of instruction/awareness on text structure on reading comprehension and recall

The "reader effect-The effect of instruction/awareness on text structure on reading comprehension and recall" section is further divided into L1 and L2 studies, each with 5 sub-categories: 1. Instruction on mapping strategy, 2. instruction on outline strategy, 3. instruction on recognition of text structure and signal words, 4. no intervention, pre-existing difference: good vs. poor readers, 5. no intervention, pre-existing difference: structure-aware vs. structure-unaware readers. Figure 1 below illustrates the organization of this literature review section.





(Figure 1: Organization of the "Reader effect" section)

L1 Studies:

1. Instruction on Mapping Strategy

A few L1 studies have investigated the effect of mapping strategy on reading comprehension and recall of expository text, including Troyer (1993), Berkowitz (1986), Tyan (1989), and Gallini and Spires (1995).

To test the effectiveness of 3 instructional strategies on reading comprehension and writing performance of three expository text structures, **Troyer (1993)** analyzed the reading comprehension results of 173 4~6th graders randomly assigned to 1 of the 3 conditions, mental modeling (teacher demonstrated "think-aloud"), graphic organizer (concept mapping), and a control group (read and answer questions). In this 6-week study, students received instruction about the characteristics of attribution, comparisons, and collection, and their reading comprehension was measured by a fill-in-the-blank/short answer posttest and a writing. Before the study began, a test of prior knowledge was administered and showed no difference among the 3 groups. At the end of the study, 21 students were randomly selected for interview that explored students' opinions about instructional treatment and text structure they were exposed to. Graphic organizer group not only outperformed, but also recalled more details than the other 2 groups in all 3 texts. Results of an ANCOVA analysis demonstrated that the performance among groups differed after instruction on the attribution text. Interview data revealed that mental modeling group and graphic organizer group both found comparison text difficult while graphic organizer reported attribution text easy. Students from the experimental groups reported they would recognize text structure in the textbooks. Troyer thus concluded 1. Students who were taught strategies for extracting information from text structure outperformed those who were not. 2. The use of graphic organizer for text structure was most effective.

Unlike Troyer (1993), **Berkowitz (1986)** took a different approach. Instead of examining multi-grade students, ninety-nine 6th graders participated in Berkowitz's (1986) research. Four treatments (map construction, map study, question-answer, and rereading) that lasted for 6 weeks were randomly assigned to classes. Unlike the map construction treatment where students created their own maps after finishing reading, the

map study group discussed a map prepared by the teacher. While the question-answer group located answers to questions prepared by the teacher, rereading group simply were told to read the text twice. At the end of the intervention, students read 3 passages—2 were read for immediate written recall, the second one was recalled again 2 weeks later for delayed recall, and a third one was used to determine transfer of learning. All recall tests included written free recall and written short-answer questions that probed main-idea, and detail understanding. It was found that the map construction group outperformed the other groups only in one immediate free recall test passage. Berkowitz's interpretation was that some passages were better suited for mapping than others. Regarding performance on short-answer questions, question-answer group outperformed map study group in immediate test passage 1, and test passage 2. However, a closer examination revealed that question-answer group consisted of more capable readers than the map construction group. When only capable students were compared, it was found that map construction group did significantly better than the question-answer group on written immediate as well as delayed recalls. Recall of main ideas showed that map construction group recalled more main ideas than the rest in immediate free recall passage 2 and delayed recall. Map construction and question-answer group answered more main-idea questions correctly than the other two groups. Berkowitz's conclusion was that teaching structure strategy aided recall. She also speculated that map study did not appear useful because students studied the map constructed by the teacher rather than themselves. She consequently suggested that map strategy would be more effective when students constructed them.

In order not to penalize the question-answer group by asking them to focus on material unrelated to the tests, some main-idea and detail test questions had been answered by the question-answer group prior to the experiment. This might be able to explain why the question-answer group outperformed the map study group in short-answer questions, thus lowers the truthworthiness of this finding. Besides, it would have been a better study if students could be randomly assigned to different treatment groups instead of assigning treatments to classes.

Tyan (1989) studied 45 college undergraduates in a Learning Skills class. Five treatments were randomly assigned to the 5 existing groups. The table below shows the treatment design.

Interventions	*Trained readers*	*Untrained readers*
Study full semantic map	Group 1	Group 2
Complete partial semantic map	Group 3	Group 4
Reread the passage	N/A	Group 5 (control group)

Group 1 was trained via teacher demonstration and guided practice to study a full semantic map while group 2 was not trained but was told to study a full semantic map. By the same token, group 3 was trained to study a partial semantic map, and group 4 was not trained but told to complete a partial semantic map. Group 5, the control group, was simply told to read the passage twice. Students were given the test passage, and full or partial maps developed by Tyan at the same time. Groups 1 and 3 were also trained to read the semantic map first to get a general idea of the passage before reading. No special instruction was given to groups 2, 4, and 5. The pre-test assessing students' prior

knowledge on the test passage showed no difference among the 5 groups. Immediately after finishing reading the test passage, students wrote a free recall and took the post-test. The post-test consisted of short-answer questions assessing main and supporting ideas, one matching question assessing important details, one multiple-choice question assessing unimportant details, one fill-in-the-blank question assessing supporting ideas, and one open-ended question requiring students to link their understanding of the test passage to real world events. The analyses of correlation between written free recall subscores and post-test subscores led to the redefinition of dependent variables as gross structure awareness (skeleton of the passage, including introduction, body, and conclusion), fine structure awareness (recall of definitions, examples of supporting ideas), and recall of test passage (recall of major and supporting ideas). No significant difference was found among the 5 groups, when it comes to awareness of gross structure, suggesting the ineffectiveness of text structure instruction. However, groups 1, 2, and 4 all outperformed the control group on fine structure awareness. Furthermore, groups 2 and 4 both outperformed group 3, and surprisingly untrained groups outperformed the trained groups. As far as the overall recall score was concerned, groups 1, 2, and 4 again outperformed the control group. Group 2 outperformed group 3, untrained groups outperformed the trained groups. There was no difference between studying full semantic map or completing partial map groups, except that group 2 consistently did better than group 3 on fine structure awareness and recall of test passage.

Tyan speculated that the fact that the trained groups did not outperform untrained groups might have been due to their loss of concentration on the semantic map. However, this speculation seems contradictory to the conventional belief that acquisition of new strategies requires persistent practice over time. A more possible explanation could be that the trained and untrained groups used the map differently. Unlike other mapping-strategy studies where the map was provided during or after students finished reading (thus the map functioned more as a memory-enhancer), the 2 trained groups in Tyan's study were instructed to read the map before reading (thus the map functioned more as an advance organizer). Post-test interviews could have been conducted to check if the untrained groups used the semantic map, and more importantly, if they did, did they use it differently from the trained group? A second weakness of Tyan's report lies in that why the full semantic map group did not outperform the partial map group was not discussed.

Similar to Tyan's (1989) study, **Gallini, et al (1993)** also used undergraduate students in remedial classes as their participants. Sixty-six high school students in a remedial class were randomly assigned to each of the 3 conditions— macro-strategy group were supplemented with a hierarchical schematic map that visually showed the relationship among superordinate and subordinate concepts across sentences and paragraphs; micro-strategy group were presented with passages where connectives and transition words were underlined and antecedents and their referents were connected with lines; the control group was involved in activities like identifying main ideas, topic sentences, and supporting details. During of the experiment, students read a test passage, answered multiple-choice questions, and then wrote free recalls each week. The whole intervention encompassed two 50-minute trainings per week for 6 weeks. Three weeks after the intervention, a delayed test was administered. The pre- and post-test were then compared to assess the gains. Results showed that the macro-strategy group

outperformed the other two groups in reading comprehension assessed by multiple-choice questions. In terms of written recall scores, the macro-strategy group outperformed the other two groups in total recall scores, recall of explicitly stated information, and use of text structure to organize recalls. However, recalls contained few inferred information, suggesting that readers were unlikely to make inferences without prompts.

Following the 1993 study, **Gallini and Spires (1995)** conducted another study with 71 students enrolled in a developmental reading class. Students were randomly assigned to 4 groups. In addition to the 3 groups from the previous research design, a combined group receiving prompts that macro-strategy and micro-strategy groups received was added. Students first read the test passage, wrote down an immediate free recall, and then answered multiple-choice questions that assessed their reading comprehension of basic-level knowledge of the passage. The distracters on the multiple-choice questions were designed to yield a correct, a partially correct, and two poor responses. The test was then scored for number of correct, partially correct and poor responses. Results showed that 1. The group means for the number of summary statements revealed significant differences between the macro- and micro-, and the macro- and control groups. Two-three summary statements were used in the macro-strategy groups' recalls. Yet surprisingly, the control group's recall of major idea units nearly matched the macro and combined groups. The micro group, as expected, recalled the lowest number of idea units. 2. Multiple-choice comprehension questions demonstrated that the macro-strategy group outperformed the combined group on the number of good responses whereas the micro group produced a greater number of poor responses than the macro group. Gallini and Spires concluded that the use of hierarchical map fostered reading comprehension. Their comments on the fact that the combined group did not benefit from macro- and micro-strategies were that successful orchestration of both the macro- and micro-strategy required "skillful knowledge of how the two interact in facilitating text processing"; however, lacking the skill to use them interactively resulted in intervention of students' efforts to use either strategy (p.35).

The biggest weakness of this study design lies in that training only took place during one class session. Apart from this, with 71 students divided into 4 groups, resulting in approximately 18 in each, the small sample size could have cast treat to the statistical power.

To sum up, studies under this mapping category can be further classified as "*map-study*" as in Tyan (1989), and Gallini and Spires (1995) or "*map-construction*" training as in Troyer (1993), and Berkowitz (1986) with students in the map-study treatment studied a map prepared by the instructor while students in the map-construction treatment constructed a map themselves. Overall, map construction training has shown to be even more effective than map study (except the study undertaken by Tyan, 1989), although both trainings helped readers become aware of description, collection and compare/contrast text organizations as were examined in these studies, and thus improved reading comprehension and recall performance of these 3 types of texts. Future research should examine the effectiveness of map-study and map-construction strategy on reading and recall of cause/effect or problem/solution texts.

2. Instruction on Outline Strategy

Researchers including Taylor (1982), Taylor and Beach (1984), Slater (1985), and Slater et al (1985), on the other hand, explored the effects of outline strategy that visually represents the top-level text structure.

Taylor (1982) conducted two experiments to test the effects of outline training of text structure on 5th graders' comprehension and retention for expository texts. In experiment one, 48 students were classified as good and poor readers, and then randomly assigned by reading ability to the control or experimental group. While the control group practiced answering questions after reading, the experimental group studied hierarchical summaries where they outlined the text structure of passages. At the end of this 7-week training, all students read the test passage, and then answers to questions finished by the control group and summaries done by the experimental group were collected. The next day, students did written recall of the passage they had read, and answered short-answer questions. Two weeks later, students read a second test passage. The same procedures done for the first passage were used to collect data of the second passage. It was found that 1. The experimental group recalled more propositions and had higher organization scores than the control group. The same results were found between good and poor readers. 2. An ANOVA on short-answer questions performance revealed no significant effect for treatment. 3. Poor readers in the experimental group performed as well as good readers in the control group, suggesting that text structure training worked for good and poor readers alike. Taken all together, Taylor claimed that hierarchical summary was more effective in recall than in short-answer questions.

Experiment 2 was carried out concurrently with experiment 1, with exactly same design yet a different student group and test passages. Forty-two 5th graders served as participants. Results revealed no difference between the control and experimental groups on recall of propositions and organization, indicating that hierarchical summary failed to enhance main-idea recall or organization. As for short-answer questions, the control group outperformed the experimental group in repeated questions on social study text, not new questions.

To examine the discrepancy between results from experiment 1 and 2, some analyses were performed. It was found that the reading ability of experimental group and control group differed or reading ability of participants from experiment 1 and 2 differed. Difference was also found in the difficulty of passages used in the two experiments.

Another study Taylor was involved was carried out 2 years later. One hundred and fourteen 7th-graders in **Taylor and Beach's (1984)** study were randomly assigned to 1 of the 3 groups—the experimental group received instruction and practice in hierarchical summary, a conventional group received answering-questions-after-reading instruction, and the control group received no special treatment. Before the 7-week instruction, students took pre-tests, including writing an opinion essay and reading a passage followed by a written recall and short-answer questions. After the 7-week instruction, students took post-tests, including reading 1 of the 2 social studies passages, the experimental group doing a hierarchical summary, the conventional group answering questions, and the control group rereading the passage. Then they rated familiarity with the topics tested. The next day, students recalled in writing what they remembered and answered short answer questions. The following week, all students wrote an opinion essay. Findings showed that the experimental group had higher recall scores than the

conventional and the control group in one passage. Both experimental and conventional groups outperformed the control group in the recall of the energy crisis passage. Short-answer question scores revealed that both experimental and conventional groups did better than the control group in both test passages. Essay writing scores, on the other hand, indicated that the experimental group had higher ratings than the control group. Ratings on familiarity with the topics tested showed that students were more familiar one passage. Taylor and Beach's final conclusion was that instruction on text structure was effective in enhancing recall of relatively unfamiliar passage, not familiar one. They further suggested that in reading familiar texts, readers could readily process, thus the rigor of hierarchical summary no longer seemed necessary.

This research design is good in the sense the sample size was big enough (number of participants was 38 in each group) to show statistical difference. However, no tests were administered to compare reading abilities across 3 groups, as it could contaminate findings.

The main purpose of **Slater (1985)** and **Slater, et al's (1985)** study was to examine the effects of instruction on structure on 9th graders' reading comprehension and recall of four expository texts—adversative (claim-counterclaim), attribution (claim-support-conclusion), cause/effect, and problem/solution. Two hundred and twenty-four participants categorized as low, average, or good readers were randomly assigned to each of the four treatment groups (structure organizer with outline grid, structure organizer alone, notetaking, and control condition). In structure organizer instruction, students were told the definitions of text structure, supplied with examples. As for outline instruction, when students read, they were required to complete an outline grid that highlighted text structure. Students first took a multiple-choice pre-test that assessed their content knowledge of the topics tested, then 8 well-organized history texts were presented to participants. After reading each text, students wrote a recall. In the multiple-choice post-test, students were assessed of their comprehension and recall of the texts. Finally, participants completed a questionnaire that investigated their attitudes toward the experiment. ANOVAs revealed that students receiving structure organizer with outline instruction recalled the largest number of propositions, followed by those taking notes, structure organizer alone, and control condition. The same results were found in the analysis of multiple-choice posttest. When idea units were broken down into hierarchical levels, students recalled more higher- than lower-level propositions. Students also indicated in the questionnaire that filling in the outline grid, taking notes, or being instructed about the organization of passages helped them remember more. Slater (1985) and Slater, et al (1985) thus came to the conclusion that structural organizer could assist comprehension and recall of expository text.

Two main constraints of this study, as Slater, et al were aware of, are that time allotted to each of the 4 treatments differed, with the structure organizer with outline and notetaking groups spending more time on the text than structure organizer alone group that spent more time than the control group. Consequently, results of this study could have been the outcomes of groups spending different amount of time on the text. A second constraint that Slater, et al cautioned is that instruction was given in only 1 class period instead of an extended duration. Hence, the long-term effect of text structure instruction was unable to probe. Finally, since the study examined structure organizer with outline and structure organizer, Slater, et al could have also examined the effect of

instruction on outline grid to see whether structure organizer or outline grid facilitate comprehension recall best. In spite of all the constraints, credits should be awarded to the authors for the large sample size, and the statistical power that comes with it.

In summary, 3 out of the 4 studies examined here showed that outline instruction is effective in facilitating the reading comprehension and recall of such expository texts as collection, compare/contrast, cause/effect as well as problem/solution that have been under investigation. What is interesting is the discrepancy between the findings in Taylor's (1982) experiment 2 and other studies. In her study, the experimental and control group did not show any difference in relation to recall of propositions and organization after the treatment. More research is needed to replicate Taylor's experimental 2 and to examine the effectiveness of outline strategy on reading and recall of narratives.

3. Instruction on Recognition of Text Structure & Signal Words

Researchers including Spires, et al (1992), Meyer, et al (1989, 1998), Meyer and Loon (2001), and Meyer and Theodorou (2001) are pioneers in the area of instruction on recognition of text structure and signal words.

With 74 fourth graders leveled as good and poor readers, **Spires, et al (1992)** inspected the effects of content and formal schema on comprehension of expository texts. Students were randomly assigned to 1 of the 3 groups—preview group was instructed to link what they were to read with prior knowledge; structure group training emphasized text structure of compare/contrast and problem/solution in addition to cue words; the control group received no special treatment. The pre-test (students read 2 expository texts and answered multiple-choice questions followed by a summary) showed no difference across groups. The training sessions encompassed 6 meetings over 3 weeks, with a focus on problem/solution and compare/contrast structure. A delayed measure assessing both structures was administered 3 weeks after the training session. Data collection procedures were: Students read one problem/solution and one compare/contrast text. When they were done with 1 text, they answered multiple-choice questions that assessed reading comprehension. They were also asked to predict the number of questions they thought they had answered correctly, as a measurement of their ability to monitor reading. In addition to multiple-choice questions, students wrote summaries of the text they just read. Summaries were scored for comprehension as well as the degree it resembled the organization of the original passage. Another sets of multiple-choice questions and delayed recall were administered 3 weeks later to assess retention. Summary scores revealed that the structure group outperformed the control group in immediate recall of both passages, but no difference was found in delayed summary. Difference was either found between structure and control groups in both multiple-choice question tasks. Overall, the preview group outperformed both structure and control groups most of the time.

This study, however, needs more elaborations in the report. First of all, the content of test passages was not reported, let alone students' prior knowledge on these topics was not assessed. Second, in the method section, it was mentioned that CAT reading scores were used to classify students as good or poor readers, but the reason this classification was related to the study was not discussed, not to mention that results of the performance difference between good and poor readers were not reported. For similar

reason, it was mentioned that student summaries were measured for the degree it resembled the original passage, but findings on this were not reported. The finding that structure group outperformed the control group in immediate recall, but not delayed recall is especially intriguing. It could have been that the training effect was not persistent, thus participants failed to use it after the instruction was terminated. This definitely needs to be further examined in future studies.

Meyer is another well-cited researcher that has published numerous studies related to structure strategy. To answer the question "can instruction aimed at teaching the strategy improve the reading comprehension of high school educated older adults with average to high average vocabulary scores" (p.4), **Meyer, et al (1989)** recruited 80 learners who did not show use of strategy on the pretest. Young and old adults, matched on vocabulary scores, were randomly assigned to 3 groups. During the 7.5 hour training sessions over 2 weeks, the strategy group was given instruction on using 5 expository structures to organize ideas and to remember. They also learned to recognize the structures and use them to systematically retrieve information from memory. Another experimental group practiced reading and remembering information from reading while the control group received no treatment. The materials and their administration order in the pretest were identical to the two posttests given 2 days and 2 weeks, respectively, after the training sessions were over. All participants took the test in which they read and then recalled 15 passages. Half an hour later, 3 of the passages were recalled again. Test passages within each set were counterbalanced over the 3 test times. The first set of texts read and recalled were 3 problem/solution passages. Afterwards, participants underlined main ideas in the passages and answered main-idea, detail, and problem-solving questions. The second and third sets of texts read and recalled were 3 comparison texts, and 3 sets of texts about contrasting views. Upon completion of all the tasks, participants answered multiple-choice questions that required them to sort passages based on their structures, underline main ideas in the passages, answer main-idea, detail, and problem-solving questions about the passages, and complete questionnaires about reading strategies and attitudes. Thirty minutes later, participants recalled the 3 comparison texts again followed by the Metropolitan Survey of Reading. Participants' reading and recall time was also recorded. The second post-test involved the same set of materials and sequence as the pre-test, except that the Metropolitan Survey of Reading was not given. Participants were first asked questions about their memory, reading strategies, and any changes they had noticed over the instruction. Then, they recalled the problem/solution text read 2 weeks ago, and answered questions that required them to solve novel problems based on their understanding of the text. Another problem/solution text was read, and participants underlined main ideas. They also read a description text, again answered main-idea and detail questions, and then described its text structure. Next, participants read and recalled a comparison text whose structure they were asked to describe. This text was previously studied by the treatment groups. Finally, 17 passages taken from magazines or the Bible were sorted by participants into 5 piles based on text structure- description, sequence, cause/effect, problem/solution or compare/contrast.

Findings were 1. The strategy group showed significant improvement from the pretest to the posttests, in the use of structure to organize recall of problem/solution texts. Additionally, while in the pretest nobody from the strategy group showed use of text structure, 93% and 87% of them did so in the 1st and 2nd posttests. 2. When comparison

texts were concerned, the only group that showed significant gains was again the strategy group, from 33% on the pretest to 95~100% on the posttests. Both young and old adults from this group made large gains, in terms of use of structure in written delayed recalls. As for immediate recalls, while no difference was found among the 3 groups in the pretest, the strategy group only used structure more than the control group in the 1st posttest. 3. When strategy use on culturally salient comparison texts was examined, it was found that the strategy group made significant gains. While the control group used text structure more frequently than the 2 experimental groups in the pretest, such as difference did not exist in the 2 posttests. 4. During the second posttest, participants were asked to read a description and a comparison text and then describe their text structure. They also sorted 17 passages into 5 piles. Again, both old and young adults in the strategy group tended to correctly identify the text organization, as well as sorted more passages correctly than the other 2 groups. 5. Data collected from questions probing reading and remembering strategies in the 2nd posttest suggested that the strategy group tended to find the text structure to facilitate comprehension and retention, but the other 2 groups tended to use other strategies, such as finding main ideas, or facts and dates. The strategy group also reported remembering more and trying to find the overall text structure after the treatment. 6. When number of idea units recalled was compared, it was found that all 3 groups showed improvement from the pretest to posttest, with the largest gains of the strategy group significantly greater than the gains of the control group. Meyer, et al's interpretation was that "practice with the reading and recall task increased recall" (p.68). 7. Time spent on the tasks also revealed that the practice group was more likely than the other 2 groups to read at a slower speed, which overthrew the hypothesis that the improvement in recall of the strategy group was a result of slow reading pace and further supported that efficiency of reading strategies. 8. While in the pretest the 3 groups did not differ in terms of number of questions answered correctly, the strategy group outperformed the other 2 groups in both posttests. However, when types of question (main idea vs. detail) answered correctly were taken into account, a type by group interaction was not found. Meyer et al's interpretation was that the text was descriptive with little signaling and thus less structurally organized, therefore training effect did not show. 9. While recall of information low in the structure hierarchy showed no difference among groups, the strategy group recalled more high-level information. 10. The strategy group showed the largest gains from pretest to posttest for the immediate recall rather than delayed recall, but the other groups showed similar gains at both tasks. 11. In the pretest, the practice and control groups tended to underline more main ideas from problem-solution texts, then the control group did, but reversed result was found on the posttest. A further analysis of percentage of high- and low-level information underlined (number of high information underlined in total number of high information in the text) revealed significant differences between the strategy and practice groups. The control group did not differ from the other two. Taken together, the strategy group became better at identifying main ideas after the training. 12. The 3 groups' performance on the 2 standardized multiple-choice reading tests did not differ. Same result was found in problem-solving questions.

Case studies of 1 young and 1 old adults from the strategy group were also reported. The young adult, did not use comparison or problem/solution structure on the pretest recalls (she simply listed ideas), and recalled an average of 10% of idea units,

answered 38% of the questions correctly. In contrast, after the instruction she used text structures in all recalls, remembered an average of 27% of idea units and answered 75% of the questions correctly during the 1st posttest. In the 2nd posttest, she still used text structures in the recalls, recalled 23% of idea units, answered all the questions correctly and sorted out all passages correctly into 5 piles. She even recalled 68% of the idea units from 1 comparison passage. The young adult also reported feeling remembering more and thinking more about what she was reading. She tried to figure out the structure and main idea sentence during the tests, as well as in daily reading. The old adult, on the other hand, showed no used of problem/solution or comparison structure on the pretest, but was able to use them on the posttests. Her recall of the comparison text went from 16% to 59% of the idea units.

With an attempt to replicate the 1989 study (Meyer, et al), **Meyer, et al (1998)** had 41 young and 48 old adults read passages on 5 topics. During the pre-test, participants read one problem-solution passage, and then wrote down free recalls, and completed cued recall with main-idea questions. Free recalls were analyzed to examine whether participants used the problem/solution structure to organize their recalls prior to the intervention. Significant differences were not found. Like the 1989 study, participants received five 90-minute instructions on structure strategy that they were constantly reminded to use to remember information. During the post-test, 2 problem/solution passages and 1 comparison passage were read via computer that controlled the speed (90 vs. 130 words per minute) as well as fashion (isolated vs. contiguous sentences) at which the sentences were presented. The comparison passage was read in between the 2 problem/solution passages so that facilitation effects due to the consecutive reading of two identically structured texts could be filtered. Free recalls and main-idea questions were administered right after each passage, and a cloze test was also given for the 2 problem/solution passages. During the follow-up phrase taking place 6 month later, 27 young and 29 old adults from the original groups were randomly assigned to one of the two conditions (signaled vs. unsignaled problem/solution passage) presented via computer, wrote summaries of the main ideas, and then answered main-idea questions. They also answered questions asking how the absence of presence of signals affected their reading. Findings are: 1. In the post-test, 87% of the participants used the problem/solution organization in their recalls, as opposed to the 38% during the pre-test. This suggests that structure instruction increased the use of structure strategy. 2. Results from the follow-up study showed that signaled passage facilitated more top-level structure use than unsignaled one. Specifically, regardless of signaled or unsignaled passages, young adults used the top-level structure to organize their recall, but 60% of the old adults failed to do so in recalling the unsignaled passage. In addition, while signals had little impact on young adults' recall of main ideas and details or old adults' recall of details, it had significant impact on old adults' recall of main ideas. 3. An examination of summaries from the follow-up phase demonstrated that more main ideas than details were recalled. Analyses of main-idea questions also revealed that participants reading the signaled passage remembered more information than those reading the unsignaled passage. 4. Most young and old participants reading the signaled passage reported that signals assisted their reading. On the contrary, all old adults reading the unsignaled passage felt that the lack of signals did not affect their reading, but 64% of the young adults felt they were hurt by the absence of signals.

In a similar follow-up study, Meyer, et al (1998) investigated topic interest on reading comprehension and recall of 72 young and 76 old adults. Results showed that signaled passage helped old adults with low interest, but not those with high interest. Old adults included more main ideas in summaries than young adults, and high interest readers included more main ideas than low interest readers. Taken together, the influence of topic interest was magnified in the reading and recalling of unsignaled passage. Meyer, et al's interpretation was that while unsignaled passage called for inference of logical relationships in the text, readers with high topic interest were more likely to use such sophisticated strategies as elaboration and inferencing.

One thing needs to be cautious about is that the questions for both problem/solution passages were identical, which could have hinted participants that the two passages were written in the same structure.

A second study that attempted to replicate the 1989 (Meyer, et al) design was **Meyer and Loon's 2001** study. The main purpose of this study was to test the "strategy switch hypothesis", stating that "readers do not routinely encode a text's overall structure in the absence of signals" (p.142). This was also a study that examined reader effect and text effect together. Fifty-six young and sixty-five old adults were randomly assigned to each of the 3 groups, the strategy group, interest-list group, or the control group. Like the 1989 study, the strategy group was involved in activities such as underlining signals words and identifying the text structure to aid encoding and retrieval of information from memory, taking notes organized with the text structure and then compared their notes with a model provided by the instructor. The interest-list strategy, on the other hand, was engaged in such activities as evaluating their interest in a given passage and then using this information to "minor and increase their motivation for reading" (p.146). Prior to the treatment, participants took a pretest in which they were asked to read and recalled 5 passages. A total of six 90-minute sessions over 3 weeks were devoted to the reading, summarizing, and recalling of problem/solutions texts, half of which with signals while the other half without signals. Right after each recall, participants also answered questions about each passage. Two days after the completion of the training sessions, a posttest similar to the pretest was administered. To test the effect of transfer, participants watched a video as well as reading a passage on contrasting views and then later asked to recall them, and based on what they watched and read, to make decision for the given scenario.

Findings were the following: 1. On the pretest, there were no significant main effects on training groups or signaling, but on the posttest, the strategy group outperformed the other 2 groups in the amount of information recalled and intraindividual gains. No effect, however, was found in signaling. 2. The strategy group included more main ideas in the summaries, recalled more main ideas, and correctly answered more main idea questions than the other groups. Signaling, however, did not increase recall of main ideas. 3. The strategy group outperformed the other groups in using structure to organize their recalls. 47% of strategy group consistently used structure strategy on all texts. Moreover, participants were more likely to use structure to organize recalls when the text was signaled than it was not, suggesting that structure strategy training (reader effect) was more influential than signaling (text effect) on reading and recall performance. Meyer and Loon thus concluded that the "strategy switch hypothesis" was supported. 4. Results from the transfer tasks also revealed that the strategy group recalled

more and tended to organize recalls with the text structure. More importantly, it indicated that instruction on problem/solution structure was possible to transfer to compare/contrast texts.

With 98 college undergraduates, **Meyer and Theodorou (2001)** conducted a few more studies examining transfer of structure strategy. Participants were given a 2-hour training session during which they were randomly assigned to 1 of the 3 conditions (structure with training, structure only, and control), and received different instructions. Before reading the well-structured with signal words passage, the structure with training group read information about the structure strategy, including signal words and writing plan of a problem/solution structure, and steps to follow in applying the structure strategy to recalls of a text. The structure only group, on the other hand, proceeded immediately to the well-structured with signal words passage without any instructions. The control group, read the same passage organized in a structure other than problem/solution and without signal words. Upon completion of reading and recalling of the first passage, participants took the Motivated Strategies for Learning Questionnaire, read and recalled the second passage organized in well-structured problem/solution format with signal words. Successful transfer was measured by the use of top-level structure on both the first and second passages. Results showed that 1. More participants from the structure with training group used problem/solution structure in their recall of the 1st passage than those from the structure only group. The structure with training group also used problem/solution structure more frequently than the other two groups in the recall of the 2nd passage. Both evidence led to the conclusion that explicit instruction about structure strategy contributed to its use on both passages. 2. While there was no difference among the 3 groups as to the total number of idea units recalled from the 1st passage, the structure with training group recalled more ideas than the other two groups. There was, however, no difference between the structure only and control groups. 3. Training aided recalls of high-level information. 4. More participants from the structure with training group (67%) than from the structure only group (26%) showed successful transfer of structure strategy. 5. When motivational and cognitive variables were taken into account, it was found that participants trained to use the structure strategy tended to rely on the strategy. In contrast, those not trained tended to rely on their motivation and metacognition to remember text information.

In addition to these studies, those by Slater (1985) and Slater, et al. (1985) cited earlier under the "mapping "category also investigated the effect of instruction on recognition of text structure and signal words. What is intriguing is that they found students receiving outline and structure organizer instruction recalled more idea units than those receiving only structure organizer. Results on the multiple-choice questions showed similar patterns. Taken together, Spires, et al (1992) along with Slater (1985), and Slater, et al (1985) have proved that instruction on recognition of such expository texts as description, problem/solution, compare/contrast, and cause/effect and their signal words did benefit immediate recall, but conflicting findings were found in delayed recalls. Since little has been done in the strategy of recognition of text structure and signal words, future research should focus on this.

4. No intervention, pre-existing difference: Good vs. poor readers

One study cited in Pearson and Camperell (1994) was the research conducted by Meyer and her colleagues (Meyer, et al, 1978 cited in Pearson & Camperell, 1994) who

classified 9th graders as good, average, and poor readers and had them read and recall 2 types of expository texts, one response and the other adversative. It was found that good readers organized their recall similarly to the original text structure and they recalled more idea units then readers who did not adopt this strategy. This result still held true even when signal words were absent in the texts. On the contrary, signal words gave an impetus to immediate recall, although not delayed recall, of average and low readers.

Whether good and poor readers were aware of expository structure and whether such awareness influenced recall were the 2 main questions **McGee** attempted to answer in his **1982** study. Forty good readers (20 3rd-graders and 20 5th graders) and 20 poor readers (5th graders) were instructed to read 2 description texts. When they finished each passage, they orally retold what they remembered. Results were 1. With regard to recall, 5th-graders good readers recalled proportionally more superordinate idea units than 5th-grade poor readers who recalled proportionally more superordinate idea units than 3rd-grade good readers. There were no differences in the recall of subordinate idea units. While 5th-grade good readers recalled proportionally more superordinate than subordinate idea units, 3rd-grade good readers showed the opposite. No proportional difference was found for 5th-grade poor readers. 2. Unlike most of the 5th-grade good readers who used full text structure to organize their recall, most 3rd-grade good readers used no text structure. Most 5th-grade poor readers used partial structure in their recall. When results of recall and awareness of text structure were examined together, it was shown that 5th-grade good readers were more aware of text structure and recalled proportionally more total as well as superordinate idea units. In contrast, 3rd-grade good readers were unaware of text structure and recalled proportionally more subordinate idea units. McGee stated that "awareness is correlated with recall of important textual information" (p.581), meaning readers aware of text structure could employ an effective structure strategy to encode and retrieve ideas.

As McGee had discussed in the report, such correlation could at best be interpreted as concurrent relationship while factors like age, experiences with expository text could intervene results. Another aspect of the report itself that could use some more elaborations is that whether reading time was restricted or not was not reported. This factor could have also intervened test results. Finally, it would be a better design if a group of 20 3rd-grade poor readers could be recruited to compare against 3rd-grade good readers.

To investigate whether differences in reading abilities influenced knowledge of text structure and textual characteristics, 14 good readers (graduate education majors) as measured by the GRE verbal part, and 14 poor readers (students in the local adult education program with reading levels between 5th and 10th grade) as measured by SAT participated in the study (**Davis, 1981**). They were first given 2 representative samples of narrative and expository texts, and then asked to categorize 8 passages of narrative and expository structure as similar to the expository or narrative text, and then articulate based on what they made decisions. Results suggested that readers were able to distinguish between narrative and expository texts, using the samples. The average categorization rating for good readers was not different from poor ones. However, good readers tended to rate the fable passage as narrative while poor readers rated expository. Characteristics or factors articulated by subjects were categorized and revealed significant difference between good and poor readers in the number of expository

characteristics given, implying that the former group was more aware of the text structure of various expository prose. In contrast, both good and poor readers were aware of the narrative structure. Taken together, poor readers were less aware of expository text structure than narrative. Examples given by good readers included recognition of style and paragraph structure, and poor readers, on the other hand, often judged based on topic or content characteristics. The conclusion is that good readers were more aware of text structure than poor readers.

One aspect of this study that needs to be cautious about is that good and poor readers were selected based on differing criteria, which casts threat on the comparability. A better design could select good and poor readers in light of their performance on one test.

Forty-eight 10th and 11th graders, half of whom categorized as good readers and the other half poor readers, participated in **Kletzien's (1991)** study of strategy use in reading expository texts of 3 levels. Participants met individually with the researcher and were given 3 expository texts: description, cause/effect, and sequence+cause/effect structure. Although the original passages were simplified by changing some vocabulary and sentence structure to cater to poor readers' ability, the 3 passages represented easy, medium, and difficult level in relation to participants' ability. Participants were asked to fill in the randomly deleted context-dependent content words in each passage, and then explained their reasoning processes immediately after. Think-aloud data revealed that recognizing sentence and passage structure was most often reported in reading the medium level passage than other levels. Some good readers even reported that the medium level passage was easier than the easy level passage because of its text structure, suggesting their awareness of text structure and its impact on reading. Kletzien attributed the increased use of organizational strategy at medium level to increased task demands that called for understanding of meaning as a whole in the text instead of relating ideas in the text to prior knowledge, which was consistent with the fact that participants' explanations of cloze test choices showed decreased use of prior knowledge. When reading difficult passage, on the other hand, participants concentrated on word recognition and individual sentences because vocabulary and sentence structure were both more complex, thus paying less attention to meaning of the passage as a whole.

Two main limitations of this study design as Kletzien pinpointed were 1. cloze test lent itself toward vocabulary focus, and 2. the three passages represented not only 3 levels of readability but also text structure. Thus, it was very likely, as previous researchers pointed out, that information in cause/effect structure would be recalled more easily than descriptive or sequence, and it demands more use of organizational strategies than other structure. This confounding effect could be resolved by using passages of different rhetorical structure at same difficulty level or passages at different difficulty level of same rhetorical structure.

With an attempt to look at what differentiated good from poor readers with regard to strategies in comprehending expository texts of differing structure and the interaction of the two, **Tarlow (1990)** selected a total of 80 eighth-graders (40 good and 40 poor readers). Four expository passages (1 problem-solution, 1 descriptive, and 2 collection structure) were adapted from trade books. Each passage was written in 2 versions with different text structure: One with main idea explicitly stated in the form of an introductory paragraph or a topic sentence; the other with main idea implicitly presented,

and main idea must be inferred from the passage. To ensure students' content knowledge was controlled, students completed a background knowledge questionnaire after reading each passage. No significant difference was found between good and poor readers, except for one topic. Nevertheless, the means were low compared to other topics, suggesting that both groups knew little about this topic. Students were seen individually and their oral responses tape-recorded. Students read one explicit and one implicit passage for the main-idea-statement task where they were instructed to orally stated the main idea and then select the best main idea statement from a multiple-choice question. In the second task that investigated main idea development strategy, students were given the other 2 passages, one explicit and one implicit. They were told to read one sentence group at a time as the text was divided into sentence groups. At each stop point, students were asked to articulate what they considered the gist of the sentences, and the main idea of the passage so far. Upon completion of the procedures, students reread the whole passage and orally stated the main idea. In the 3rd task, students were shown the 2 explicit passages they had read, and told to reread and rate each sentence group as to its importance in relation to the gist of the passage. They also identified the five most important sentence groups. In strategy analysis, 6 grading categories were adopted: 1. Students failed to link information from one sentence to another. 2. Students combined information but failed to synthesize. 3. Students continued to select the same sentence for main idea sentence while it was not. 4. Students continued to select the same sentence as topic sentence as it was. 5. Main idea was developed but students were unable to relate information. 6. Students continued to refine main idea as they read new information (gradual development). Findings were 1. Good readers were able to generate an effective main idea better than poor readers as to whether the text contained topic sentences. 2. A significant difference was found between scores on explicit and implicit texts for poor readers but not for good readers, suggesting that poor readers had difficulty with implicit text. 3.When good and poor readers were taken together, in the "main-idea-statement" task, performance was better in the explicit than implicit text. In contrast, in the development strategy task, readers tended to perform slightly better in implicit text and their performance in this task was better than in the first task, which according to Tarlow, was owing to the fact that readers were directed to keep thinking about the main idea. 4. Good and poor readers tended to use different strategies. While poor readers used "gradual development" strategy, the most effective strategy, only 15% of the time, good readers used it 60% of the time. Similarly, poor readers maintained same/appropriate sentence 2.5% of the time whereas good readers used it 10% of the time. Both evidence suggested that poor readers used strategies used by good readers less frequently. 5. While good readers consistently used similar strategies in reading explicit and implicit texts, poor readers failed to use more effective strategies on explicit than implicit text. 6. With good readers outperformed poor readers in identifying important sentences, poor readers rated sentences as important based on visual appeal, or concrete details.

By and large, poor readers' ability to state the main idea was determined by whether the text was explicit or implicit, and good readers were not influenced by text type. Yet poor readers' performance improved as they were reminded to link information to the gist of the text.

Troyer's (1993) study, already discussed in "Mapping strategy" section, also found that capable readers tended to outperform less capable ones; however, it is not clear from the report how many capable readers were assigned to the experimental groups and how many to the control group.

The studies summarized here all sought to answer the question, "whether good readers are more aware of text organization than poor readers". All the expository texts, including description (Tarlow, 1990; Troyer, 1993; Davis, 1981; McGee, 1982; Kletzien, 1982), collection (Tarlow, 1990; Troyer, 1993), cause/effect (Davis, 1981; Kletzien, 1982), compare/contrast (Troyer, 1993), and problem/solution (Tarlow, 1990; Davis, 1981), have been examined. Except Troyer's (1993) study, it is consistently found that good readers were more aware of text structure and outperformed poor readers in reading comprehension and recall.

5. No intervention, pre-existing difference: Structure-aware vs. structure-unaware readers

Fifty-seven 6th graders participated in **Sturgell's (1992)** study investigating the relationships among awareness of text structure, reading comprehension, and writing performance. Students were first given a text structure recognition test where they were to identify 1. discourse categorization (narrative, expository, etc.) 2. feature usage (focus, elaboration, organization, etc.), and 3. text plan (compare/contrast, problem/solution, etc.) of 7 essays and 6 paragraphs. They also wrote an essay, took 2 standardized reading tests, as well as the local Reading criterion-referenced test (CRT). Analyses of correlations between test structure recognition test and reading comprehension suggested 1) a correlation of 0.40 between discourse categorization and ITBS and 0.38 between discourse categorization and the Reading CRT. The text structure recognition test as a whole correlated significantly with both ITBS (r=0.37) and the Reading CRT (r=0.36). No other significant correlations were found. Sturgell therefore came to the conclusion that awareness of text structure, especially discourse classification, related positively to reading comprehension.

One thing to be cautious about is that the correlations between text structure recognition and the 2 reading comprehension tests showed at most concurrent, not casual relationship since intervening variables were not controlled. As Sturgell cautioned that such standardized tests as the 2 used in this study were not intended to assess awareness of text structure, thus texts did not necessarily reflect clear structure and might not be the ideal materials to assess structure awareness. Lastly, the correlations discussed here ranged from r=0.36 to 0.40, which are relatively low. This suggests that awareness of text structure only plays a relatively minor role in the performance of reading comprehension.

Another researcher that also examined the influence of text structure on readers' recall and comprehension was Durham. One hundred and four college undergraduates participating in **Durham's (1990)** study were randomly assigned to 1 of the 6 passages conditions—passage 1 news, passage 1 narrative, passage 1 expository, passage 2 news, passage 2 narrative, and passage 2 expository. One passage was about a captive-breeding program to protect the Florida panther, and the other about a political uprising in Surinam. The two news passages were modified to the structures of narrative and expository. Students first completed the media use survey, read the passage, completed a

questionnaire about demographic information, and then took a reading ability test. After that, students wrote down immediate recall. Upon completion of all the tasks, students were tested for awareness of text structure by reorganizing a scrambled passage (putting slips of papers, each of which had a node from the passage) whose text structure corresponded to the passage they had read. Their sequence of passage was compared to the original passage to yield a correlation between the two. Finally, students answered a comprehension questionnaire. One week later, delayed recall of the passage they had read was administered. Findings were 1. In immediate recall of both passages, students reading the narrative and expository versions both outperformed those reading the news version. No significant difference was found between the narrative and expository group. When recall of propositions was concerned, the 3 groups did equally well for the panther passage but the narrative group did not do as well as the expository or news group. 2. In delayed recalls, students reading the narrative and expository version outperformed the news group in the panther passage, but not political uprising passage. Again, no significant difference was found between the narrative and expository group. 3. In reading comprehension, both the narrative and expository groups outperformed the news group in the panther passage. No difference was found for the political uprising passage. Similarly, the performance of narrative and expository groups on the 2 passages showed no difference. Therefore, the prediction that comprehension would be influenced by text structure was partially supported. Durham's comment on the findings was that recall of narrative and expository texts was superior on the grounds that reader's schema for these 2 structures developed better than that for news structure, although this claim was later overthrown by awareness of text structure scores which showed that students tended to have higher awareness for news than for expository structure. Durham also speculated that comprehension could be influenced more by content schema than formal schema, though further analysis also failed to confirm this.

The main limitation of Durham's study lies in that the factor of students' background knowledge on the topics tested was not assessed, since research has shown that content schema plays part in reading comprehension. The conflicting finding that readers reported higher awareness of news structure yet performed better in narrative and expository structures especially deserves researchers' attention.

In conclusion, narrative (Durham, 1990; Sturgell, 1992), news report (Durham, 1990), and all expository texts (Sturgell, 1992) were examined. Results have been conflicting. While Sturgell's (1992) study showed low positive correlation between awareness of text structure and reading comprehension, Durham's (1990) dissertation with college undergraduates revealed interesting results that while students were more aware of news than expository structure, their recall performance on news was not as good as on expository or narrative texts. Many more research studies are needed to test whether structure-aware and structure-unaware readers indeed differ in reading comprehension performance and recall.

L2 Studies

No L2 studies have examined the effect of instruction of mapping strategy, outline strategy, or recognition of text structure and signal words on reading comprehension and recall.

1. No intervention, pre-existing difference: Structure-aware vs. structure-unaware readers

In **1992, Carrell** conducted a study investigating the relationship between awareness of expository structure and recall performance of ESL students. Forty-five high-intermediate level Intensive English Program (IEP) students first read a compare-contrast and a collection passage, and then wrote down recalls immediately after finishing each passage. Awareness of text structure was measured by students' organization in written recall and open-ended questions that called for explicit identification of the structures in the passages. It was found that 1. Students who recognized the text structure tended to use the same organization in their recalls, and those who did not use the text structure in the recalls also tended to be unable to recognize the structure. 2. Students who used the text structure to organize their recalls recalled more total ideas (quantity) as well as more main ideas (quality) than those who did not, but students who recognized text structure did not recall more total ideas than those who did not. 3. More top-level idea units were recalled from the compare/contrast than from the collection passage. Carrell came to the conclusion that awareness of text structure resulted in quantitatively and qualitatively better recall.

Besides ESL students such as IEP students investigated extensively by Carrell, EFL students have also been under investigation. Two doctoral dissertations have been conducted with Chinese speakers. Thirty Chinese and fifteen American graduate students studying in the U.S. participated in this study (**Chen, 1990**). Two English and two Chinese compare-contrast passages were chosen from magazines without adaptation. While 1 English and 1 Chinese passages preserved the original text structure, starting with a topic sentence introducing the main idea, followed by supporting evidence and expansion of the main idea, and a conclusion, the other 2 passages were scrambled at sentence level to destroy the original structure. Students wrote recalls, and took multiple-choice comprehension questions that required inference, or identifying author's stance were administered for each passage. Upon completion of the reading comprehension tests, students were asked to select one passage in each language that was better organized in text structure to assess their awareness of text organization. Students, then, were categorized as "aware" or "unaware" based on their answers. Reading comprehension tests were scored and information subjects wrote down was then analyzed for number of sentence in the recall, presence of original sentence orders, and number of propositions, and then converted to percentage of propositions recalled. Results are 1. Both Chinese and American students recalled more propositions and sentences from original passages. 2. As far as Chinese passages are concerned, "aware" and "unaware" students performed similarly in the recall of scrambled passage, "aware" students outperformed "unaware" in the recall of original passage. However, the difference was insignificant. Nevertheless, "aware" students recalled significantly better in original than scrambled passage. 3. When English passages are concerned, "aware" recalled better than "unaware" in original passage, but no significant difference was found in their recall of scrambled one. While "aware" group performed better in original passage than

scrambled one, "unaware" did slightly better in scrambled one. The difference was insignificant, however. 4. All Chinese students' recall of original passages in Chinese and English preserved the original order. 5. Multiple-choice questions suggested that there was no difference in comprehension of original or scrambled passages. Chen therefore concluded that text structure was crucial in facilitating L1 and L2 reading comprehension. Moreover, those who are aware of text structure made use of it, and had better comprehension and recall.

With the fact that the majority of studies reviewed here tested exclusively on literal understanding, leaving very few studies tested the effect of text structure on reader's performance on making inferences, Chen's finding that students' performance on inferences in multiple-choice questions did not differ in well-organized and scrambled passages seems particularly important and intriguing. Future research should look into this area to test the hypothesis "the effect of text structure (scrambled vs. well-organized) is stronger in literal understanding than in inferences".

Nine years after Chen's study, **Chu (1999)** conducted another research examining 240 Taiwanese undergraduates' awareness of rhetorical structure. With 2x2x4 factorial design, subjects read passage written in Chinese or English rhetorical conventions, and 4 topics (childcare problem for career women, the abuse of charity resources, male nurses, and humanity education-forest schools). Topics familiar to subjects were selected to ensure no one would be advantaged or disadvantaged from topic familiarity. Passages were taken from a bilingual magazine published in Taiwan. Each subject read 2 texts on 2 topics, one following English and one following Chinese convention. Reading comprehension was measured by percentage of textual units in immediate written and delayed recall 1 week after. Subjects also answered text-perception questionnaire conducted upon completion of each passage to assess their interest and familiarity with the content tested, and whether they were aware of the rhetorical structures. Besides, subjects took topic-assessment questionnaire upon completion of the experiment to assess their interest and familiarity with the topics tested. However, only ratings on the 2 topics subjects did not read were analyzed. Results showed that 1. Overall students recalled significantly more of passages in Chinese rhetorical convention than English convention, in both immediate and delayed tasks. 2. Students recalled more of "Charity" and "male nurses" in Chinese rhetorical convention than English convention. 3. Students' reported interest and comprehensibility showed significant impact on both recalls. 4. When readers reported interest in and familiarity with the passages and interest in the topics, and perceived the passage as less organized, rhetorical convention did not show influences. In other words, rhetorical convention played a crucial role only when subjects showed low interest and familiarity, and when they perceived the text as well-organized. Chu concluded that EFL subjects were unaware of rhetorical differences, although a familiar rhetorical convention assisted comprehension, suggesting that perception and performance might work at different levels.

The main limitation of Chu's study lies in that 83% of all the subjects were female, as the author was aware of it. Also, passages were originally written in Chinese with Chinese rhetorical convention and then translated into English. Hence, how closely the translation followed the English rhetorical convention is of concern.

Another EFL population that has been examined is Thai college students. To test the hypothesis that readers who are aware of text structure would utilize it as a reading

strategy, and therefore enhance reading comprehension, a total of 145 freshmen at a university in Bangkok, Thailand, with 52 high, 53 intermediate, and 40 low English proficiency level participated in **Tirawanchai's (1996)** study. Two sets of reading passages, one short and one long expository texts, were used. The sets of 10 short expository passages (1 paragraph of 4~5 sentences) comprised of 4 problem/solution structure, 3 comparison, and 3 collection of description. The problem/solution structure was the structure under investigation, thus the other 6 passages served as distracters. The sets of 2 long expository passages (5 paragraphs) were both problem/solution texts. Students first read the short passages, and then wrote down their recall in Thai. The same procedures were followed for the long passages, except that each student read only 1 long passage, either passage 1 or 2 and short-answer questions about the texts were also answered by students. The same procedures were administered again a few days later for the other long passage that students did not read. Students' recalls of short and long passages were analyzed for the use of text structure, as well as main idea units recalled. The other measurement of comprehension was students' scores on the short-answer questions. Findings were 1. Most high proficiency students employed full-developed structure whereas most low-proficiency students employed no structure in written recalls. Many from the latter group simply listed information. On the other hand, intermediate students used fully-developed structure more than less well-developed structure in short passage recall. The situation was the opposite when they recalled long passages. 2. Students who utilized the text structure in the short as well as long passage recalls also performed better in grasping the main ideas, as measured by written recalls and short-answer questions. They were also found to recall more minor details. 3. Regardless of proficiency, the use of expository structure facilitated comprehension of main ideas of short and long passages, as measured by written recalls and short-answer questions. All the above findings supported the tested hypothesis. Tirawanchai proposed that good readers "must have proceeded through a reading text by searching for a particular relations which cohesively interrelated the propositions in the text. These relations probably activated their prior knowledge of text structures" (p.91).

Apart from the strength of this research design, that is, the large sample size, the finding that "intermediate students used fully-developed structure more in short passage recall, and less well-structured more in long passage" is an interesting one. Future research should look into the factor of passage length, to see whether length of the reading passage might influence the use of text structure strategy.

A general overview of all the studies reveals that L2 studies of structure-aware and structure-unaware readers showed similar patterns as in L1 studies. Structure-aware readers consistently outperformed structure-unaware ones in reading comprehension and recall of expository texts, including description (Chu, 1999), collection(Carrell, 1992), compare/contrast (Carrell, 1992; Chen, 1990), and problem/solution (Tirawanchai, 1996). Carrell (1992) also found that structure-aware students did not recall more total ideas than structure-unaware students, suggesting that structure awareness is more beneficial in the recall of top-level ideas. Chen's (1990) finding that aware and unaware readers performed similarly in the recall of scrambled passage, but the former outperformed the latter in well-structured passage (not statistically significant, though) pinpoints the direction for further investigation.

2. Instruction on recognition of text structure

Patricia Carrell not only actively involved in research examining the difference between structure-aware and structure-unaware readers, but also the effects of instruction on recognition of text structure. To investigate whether teaching text structure would facilitate ESL reading, **Carrell (1985)** recruited 25 high-immediate level IEP students, 14 of whom were assigned to the treatment group while the other 11 assigned to the control group. During the five 1-hour training sessions over 1 week, the treatment group received instruction on top-level rhetorical structure of expository texts while the control group went through sentence analysis and vocabulary work. A pretest was administered to make sure that the experimental and control group showed no difference. Immediately after the training sessions, students read one comparison and one collection passage, and then wrote immediate free recalls followed by identifying the text structure. Three weeks after the 1st post-test, a 2nd post-test same as the first one was given to the experimental group to test the persistence of training effect. Free recalls were scored for the quantity as well as quality of idea units. The latter was analyzed as hierarchical levels (introduction, top, high, mid, or low-level idea units). Results included 1. After the training, the experimental group significantly increased in the proportions of students who recognized and used the text's structure. The training effect remained persistent even in the second post-test 3 weeks later. 2. While pre-test showed no difference, the experimental group recalled significantly more than the control group in relation to the total idea units recalled or top, mid, and low-level idea units recalled. Carrell (1985) therefore concluded that "explicit, overt teaching about the top-level rhetorical organization of texts can facilitate ESL students' reading comprehension" (p.741).

Because Carrell's study revealed that 1-week training was effective, researchers might want to further investigate the effect of training duration. This study, however, is vulnerable in that the sample size was too small, with less than 15 participants in each group, casting threat to statistical power.

Raymond (1993a, 1993b) undertook a research replicating Carrell's (1985) study. Forty-three college students of high-intermediate level in French at University of Ottawa participated. Prior to the experiment, students took a test to ensure that they had equivalent reading proficiency. The two classes participating were randomly assigned to treatment and control conditions. The former received 5 hours of instruction on each of the 5 expository prose. Training was spread over 2 weeks and focused on the use of expository prose and their corresponding signal words as a strategy for facilitating recall. In contrast, the control group followed a question-answer routine. Two problem/solution texts were used for the pre- and post-tests. Prior to the experiment, students read one of the 2 counterbalanced texts, and then completed questions that assessed their perception of text difficulty, memorability, interest, content schema, organization, and clarity of argument. They also recalled the text in English writing. The same procedures were followed in the post-test 1 month after the training sessions, except that students read the counterbalanced text they did not read on the pre-test. Results were 1. The experimental group responded more positively to all the questions assessing their perception, except for clarity of argument. Nevertheless, some students in both experimental and control groups had had formal schema prior to the treatment. 2. On the grounds that the macrostructure of texts would develop as more time was spent on reading, reading time of experimental and control groups in pre-and post-tests was examined, and no

significant difference was found. Moreover, after training sessions, the experimental group recalled significantly more main ideas than control group, confirming the hypothesis that structure strategy training facilitated free recall of main ideas.

Raymond suggested that 5-hour training might be too short for students to develop structure strategy, not to mention only one out of the 5 hours was devoted to problem/solution structure. It would have been a better design if the total 5 hours targeted at training on problem/solution structure. Also, confounding variables could have been controlled had students been randomly assigned to treatment instead of the other way around.

Similar to Raymond's (1993a, 1993b) study, Davis also recruited French learners. The difference is that students in Davis' research were studying French as a foreign language in the U. S. Forty college undergraduates enrolled in French classes served as participants in **Davis' (1987)** study examining the awareness of text structure on comprehension of expository texts in French. Students were assigned to 2 treatments, 1 receiving training on the text structure of scientific reports, 1 receiving no training. The training concentrated on recognition and locating the 4 parts of a science report by answering guided questions on text structure. Two texts in 2 forms (normal vs. scrambled) were randomly distributed to students who read them, completed the text difficulty rating, wrote down immediate recall, then completed a distracter task, followed by a short summary of the main ideas. Recalls were scored for the number of idea units, which were then compared with the rating of text difficulty to yield a correlation. Davis found that 1. The training group outperformed the control group in immediate recall of idea units only on normal text. When the text was scrambled, the training and control group performed similarly. 2. When the factor of treatment was ignored, students reading the normal form outperformed those reading the scrambled form. 3. Although the scoring procedures were not mentioned, students who organized their recall in the same structure as the science report outperformed those who did not. Moreover, none of the recalls produced by students reading the scrambled form followed the order of the scrambled text. 4. The correlation between students' perception of text difficulty and their actual performance on recall yielded a nonsignificant r= -0.08. 5. An analysis of comprehension errors in students' recall and summary revealed that students from the training group were able to reconstruct readings more globally than those from the control group, thus less likely to misunderstand the whole text. Therefore, taken all the findings together, Davis suggested that awareness of text structure aided reading comprehension and retrieval.

One major flaw in Davis' study is that the training only took place in 1 class period with no pre-tests to assess participants' awareness of text structure prior to the experiment. The other weakness is associated with the presentation of results. It was consistently unclear and confusing whether data from immediate recall or summary was discussed.

Like Davis' (1987) study, **An (1992)** also reported the effectiveness of text structure instruction on reading comprehension in an FL classroom. Participants were 105 twelfth-graders from two classes in Korea, randomly assigned to 1 of the 2 conditions. During the five 1-hour training sessions over 1 week, the experimental group received instruction on text structures of 4 expository texts, how to use structure to process a text, and to organize recall, as well as focusing on the relationship between

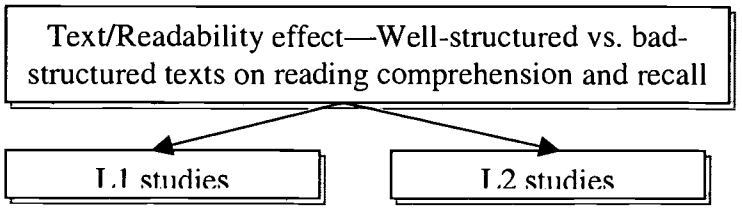
main ideas and supporting details. The control group at the same time, was involved in such activities as sentence analysis, translating and answering questions about the content of readings. Before the experiment, all students took a pre-test that consisted of reading and recalling 1 comparison and 1 problem/solution passages, and answering a question identifying the organization of the passages, with the goal to measure students' prior knowledge of text structure. One day after all the trainings, all students took a post-test where the procedures were exactly the same as the pre-test, except that 2 new expository passages were read, to measure the effectiveness of instruction on comprehension. Another post-test was delayed 2 weeks after the 1st to assess the persistence of training effect. Written recalls were scored for not only the number of propositions recalled, but also the type of organization structure used (classified as either used or not used the text structure of original passages). Pretest results indicated that more than 50% could not identify or use the text structure in their recall, suggesting a lack of formal schema prior to the study. Nonetheless, the correlations between the number of main ideas recalled and the degree the recall followed the original text structure ranged significantly from 0.41 to 0.66 in all 3 tests, which confirmed the relationship between use of structure strategy and reading comprehension. While pre-test revealed no difference between the experimental group's and control group's use of structure strategy, such a significant difference did exist in both post-tests, favoring the experimental group. Furthermore, in the pre-test, the control group was found to have better recall than the experimental group, but such a difference was not observed in post-tests. Hence, an analysis calculating the gains after treatment was performed and showed significant gains in both experimental and control groups. Correlations between gains in structure strategy from pre-test to the 1st and 2nd post-tests also supported the persistence of training effect. In summary, the hypothesis that instruction on text structure improved comprehension was supported.

One strength of this study lies in its large sample size. What is interesting in this study was that the control group also showed significant gains in recall scores even without treatment. This is worth further investigation.

In a word, while Raymond's (1993a, 1993b) and An's (1992) studies demonstrated that instruction on text structure facilitated the recall of main ideas, Davis (1987) found via analyses of recall errors that students receiving instruction on text structure were less likely to misunderstand the whole text. Instruction on recognition of text structure has shown to be effective.

B. Text/Readability Effect—Well-structured vs. bad-structured texts on reading comprehension and recall

The "text/readability effect—Well-structured vs. bad-structured texts on reading comprehension and recall" section is further divided into L1 and L2 studies. Figure 2 below illustrates the organization of this section.



(Figure 2: Organization of the "Text effect" section)

> *"When investigating the impact of formal schemata, the content of a text is kept constant. The rhetorical organization is then manipulated as comparable groups of subjects read the same information organized in different rhetorical patterns. Any performance differences on dependent measures are then interpreted to show the effects of the different organizational patterns" (p.107).*

This quotation from Myers (1997) explains research design in this section.

L1 Studies

Having conducted numerous research on comprehension and text macrostructure, **Kintsch (1998)** argued that readers know particular text types tend to be organized in certain ways and they use this knowledge to facilitate reading. This facilitation, however, only occurs at macro level, not micro level. For example, Kintsch and Yarborough (1982 cited in Kintsch, 1998) had their participants read not only well-structured essays conforming to 4 familiar text structures (classification, illustration, compare/contrast, and procedural description) but also the scrambled ones where a partial reordering of sentences and deletion of rhetorical signals was manipulated. Participants performed better on topic and main idea questions that required understanding of macrostructure when they read the well-structured texts. A cloze test that assessed micro-understanding, on the other hand, showed no significant difference between the well-structured and scrambled texts.

The effect of picture and text structure on reading comprehension and recall was the research question of the study of **Talley (1989)** who was among the few researchers examining young readers. With this question in mind, Talley recruited 72 second-graders who were then randomly assigned to 1 of the 6 conditions—basal text with or without picture, story grammar with or without picture, and literature with or without picture. Pictures were illustrations from the original book. The same basal stories were rewritten to conform to the organization of story grammar. During the experiment, the examiner orally read each student stories. After each story, students were given an intervening task and then asked to orally recall the story. After the free recall, students were assessed of their comprehension via question answering that specifically focused on understanding of characters, events, plot, and theme. Recalls were scored for propositions recalled. Some of the results were: The type of text was shown to be a significant factor for all five dependent measures. Further analyses revealed that both story grammar and literature texts were more effective for answering comprehension questions correctly, proportion of propositions recalled as gist, proportion of details correctly recalled, and proportion of propositions recalled as fragments than the basal text. The story grammar even outperformed the literature text in the first 3 measures just mentioned. The final conclusion was that "texts with a high degree of structure, such as story grammar or literature texts, assist readers in answering comprehension questions" (p.94), recall, and grasping of story themes.

However, with only 12 participants in each group, this study is vulnerable in terms of statistical power.

The main purpose of **Moes, et al's (1984)** study was to examine the influence of text structure, reader's vocabulary ability, and prior knowledge on reading comprehension of expository text. Participants were 43 seventh-graders. A pre-test assessing students' vocabulary and background knowledge of insect-eating plants was also administered. The test passage about insect-eating plants was rewritten, so that each of the 4 versions resembled F+D+, F-D+, F+D-, and F-D- where F stands for macrostructure, D for microstructure, + for considerate, and – for inconsiderate. Students were randomly assigned to each of the 4 versions. Macrostructure manipulations included identification of relevant and irrelevant attributes, examples and nonexmaples, as well as related concepts. Microstructure manipulations, in contrast, employed clausal connectives, content connective information, and point of view. When students finished reading, a number of posttests were carried out, including open-ended questions keyed to macro-level information, multiple-choice questions keyed to micro-level information, and 1 information matrix used to determine the effect of macro- and micro-structure manipulations on students' ability to organize specific factual information. Some of the findings were 1. Regardless of reading ability, students reading the F+ versions outperformed those reading F- version as far as macrostructure and information matrix were concerned. The former group also found their text to be more comprehensible. 2. The analysis of microstructure revealed no significant result, suggesting that microstructure manipulations did not play a crucial role in comprehension. 3. The benefit of F+ text on information matrix decreased as verbal ability increased, showing that poor readers could benefit more from a macrostructural text. Taken together, Moes et al. arrived at the conclusion that readers aware of text structure would recall more than those unaware.

Again, like Talleys' study, Moes, et al's (1984) study could have attained higher statistical power had they recruited at least 20 more participants to each group.

Unlike Moes, et al who looked at 7th graders, **Richgels, et al (1987)** investigated 6th graders' awareness of four expository text structures. Fifty-six students participating in the 8-week study were instructed during week 1 to take the matching task where they read one expository passage and then chose one that best resembled the first expository structure from two other passages. The four expository structure examined were collection, cause/effect, compare/contrast, and problem/solution. During weeks 2~3, the recall task was performed. Students read passages in normal and scrambled forms and then wrote down what they remembered in immediate recall. They were told that some passages were not well-organized and were encouraged to reorganize information as they read. During week 4, students were shown the matching task passages and allowed to reread and review their answers. They then were interviewed for how they made their choices (why and why not selected the passage). During the last 4 weeks, students wrote compositions on 4 topics, each of which had been discussed in class and represented one text structure type. Several weeks after all the tasks, students took the prior knowledge survey that assessed their knowledge of the topics tested in this study, to ensure that content schema did not skew test results. It was found that 1. Students were more aware of comparison/contrast structure and less aware of cause/effect structure in light of their performance in written recall, composition, and interviews. 2. Recall of main ideas from

the normal form was better than the scrambled from in comparison/contrast and problem/solution passages. No difference was found in cause/effect passage, suggesting that 6th graders were not aware of cause/effect structure.

Richgels, et al claimed that "a comparison of awareness and recall performances supported the hypothesis that structure aware students are more likely to use a structural strategy...than unaware students" (p.177), but no data or discussion was reported in the study to support such a claim. Also, think-aloud was delayed for a week, which might have caused some students to forget how they made decisions. Immediate interview could have been conducted to control this factor.

With an attempt to examine the interaction between content and formal schemata, **Ohlhausen and Roller (1988)** developed a passage about an unknown country and then modified it to three versions so that one version discouraged the use of content schema but encouraged the use of formal schema (S passage), another version discouraged formal schema but encouraged content schema (C passage), and the third encouraged the use of both content and formal schemata (C/S passage). Two hundred and thirty-one 5th, 7th, 9th graders and college students were randomly assigned to 1 of the 3 versions. They first read the passage and then were told to underline the 7 most important sentences followed by written explanations on how they decided which sentences were the most important. Responses in the underlining task were assessed of students' awareness of main ideas, and the written explanations were assessed of their strategy awareness. Underlining task showed that 1. All but 5th graders performed better on the C/S passage than C or S passage. Ohlhausen and Roller's explanation was that 5th graders had little exposure to expository texts at school, thus they knew few structure strategies. Nevertheless, "the extra structure support in the form of text signaling in the C/S passage helped them attempt to use a content strategy" (p.86). Written explanations revealed that mean score of structure strategy showed differences between C and S passages, and C/S and C passages, but not between C/S and S passages. Moreover, structure strategy scores were lower on the C/S passage than on S passage, suggesting that when content schema worked well on the C/S passage, readers did not make full use of structure schema. Another close examination of college students' performance (who represented readers of more fully developed content and structure schemata) pointed out that when they encountered the C passage that was difficult and unfamiliar, they automatically activated structure schema. In the case of well-structured text as in the C/S passage, signaling seemed to help college students focus on content strategies. They concluded by suggesting that content and formal schemata interacted with text and schooling.

To again assess the interaction between content and formal schemata in the reading of history text, Voss and Silfies (1996) assigned each of the 40 college students to 1 of the 4 text conditions, topic1-expanded+topic2-unexpanded, topic1 unexpanded+topic2-expanded, topic2-expanded,+topoic1-unexpanded, and topic2-unexpanded,+topic1-expanded. Each text topic described the history of one fictional country, and was written in 2 versions, with the unexpanded version simply listing events leading to a military conflict while the expanded version adding more elaborations of causal factors related to the conflict. Participants' background knowledge and interest in history was assessed, and so was their reading comprehension. They first read the two texts, answered completion questions (without referring to the texts), and then wrote an essay indicating the causes of the military conflict. They were allowed to refer to the

texts while writing the essay. Results suggested that 1. With respect to the completion questions asking information presented in both expanded and unexpanded versions of the text, participants reading the unexpanded version outperformed those reading the expanded version. Voss and Silfies speculated that this was due to the fact the greater amount of information was presented in the expanded text. In addition, when correlations among reading comprehension, background knowledge, and text version were computed, it was found that reading comprehension skill was more important in the reading of expanded text, and background knowledge of history was more influential in the reading of unexpanded text. 2. With respect to the completion questions asking information presented in expanded text but no in the unexpanded text and essay quality, similar results were found. Voss and Silfies thus concluded that "the more developed a text is with respect to its topic, the less the reader needs to draw on his or her own knowledge in developing an appropriate representation...because more information about the topic has been made explicit in the text" (p.55-56). Nevertheless, they also cautioned that readers having background and interest in history might have approached the history texts with a focus on figuring out the causal relationships among events.

Like Voss and Silfies (1996), Barnett also worked with college students. In the first study conducted by **Barnett (1981)**, 72 undergraduate Educational Psychology students were randomly assigned to 1 of the groups, each of which read passages of one text structure (narrative, research report, or journalism) and topic (bumper stickers and the cops, smoking and sleep disorders, intelligence and pupil size). In this Latin square design, each subject only read 3 out of the 9 passages, in either normal or scrambled version. While narrative and research report passages followed the conventional text structure, journalistic passages was structured in the form of the most important information, explanation of the information, background information followed by less important information. After reading each passage, subjects were given a free written recall followed by a cued recall where subjects answered short questions or filled in the blanks. An analysis of free written recalls demonstrated that subjects reading the normal version recalled more than those reading the scrambled version. However, no difference was found among the 3 text structures. An analysis of cued recall also showed advantage of normal version over scrambled one. More analyses of correlation between the order of recalled ideas and rank order of the same ideas in the normal version (named organizational index) were conducted. The comparison of organizational index for students reading normal texts and those reading the scrambled version showed no difference for narrative, research report, or journalism structure, implying that when reading scrambled texts, readers deliberately imposed structure. Another comparison between the mean correlation of the sequence of ideas recalled and the sequence of ideas in the normal passage given was carried out. For narrative and research report texts, recall based on normal version corresponded more closely to the actual order than for that based on scrambled version. The difference was not found in the journalism text. A third comparison was made to examine the difference between mean correlation of the order of ideas recalled and the order of ideas presented in the scrambled version. Although no significant difference was found in the research report and journalism texts, the narrative text did show a significant difference. Barnett claimed that all the findings supported the hypothesis that readers restructured scrambled text. This was especially salient in the narrative text where the recalled ideas structured like a normal narrative but unlike the

scrambled text they actually read. Interestingly, subjects who read the journalism texts, either normal or scrambled, hardly used the journalism structure.

As for quantity of recall, subjects reading the normal text recalled more than those reading the scrambled version.

To test whether more time was needed to comprehend the scrambled text, a follow-up experiment was conducted where subjects were given as much time as they desired to read the normal or scrambled text and asked to record the time they spent. No difference, however, was found in this test.

The analysis of cued recall did not yield a significant interaction between structure and organization (normal vs. scrambled). Taken the results of free and cued recalls together, Barnett contended that since difference was found in free recall but not cued recall, schema had a major influence at the time of retrieval. The finding that normal text led to better free and cued recalls suggested that scrambled texts made retrieval difficult and resulted in less information stored in memory.

As a follow-up test, Barnett conducted a second study with 16 undergraduates enrolled in journalism classes and another 16 from an Educational Psychology class to see if readers' background had any interaction with text structure. This time 2 structures (journalism and research report) and 4 topics were put to test. No scrambled texts were used. With restricted time that disallowed subjects to reread or reorder the paragraph, each subject read 2 topics, one in journalism style, the other in research report style and then took a free recall and a sorting test. To ensure the texts were structured differently, rank-order correlations between the order of paragraphs in the research report and journalism texts were calculated. A distracter test was administered before the free recall to eliminate the effects of short-term memory. Upon completion of the free recall, 10 cards were given to subjects who were then asked to reorder the cards so that they resemble the original text presented. Each card had one important superordinate sentence, usually topic sentences from each paragraph, taken from the texts. Findings of free recall were 1. The average of ideas recalled from research report outnumbered that from journalism, suggesting the structure of research report was more effective as far as free recall was concerned. 2. In journalism text, journalism students outperformed education psychology students and vice versa in the research report text, suggesting that background played a role in reading. 3. Consistent with the first study, an analysis of organizational index showed that readers tended to reorganize the journalism text more than the research report text. On the other hand, findings of sorting test showed 1. Again via the organizational index readers tended to reorder information in the journalism text, regardless of majors. Furthermore, readers moved details of the methods forward and results to the end, making the journalism text look more like a research report.

Barnett's conclusion was that the existence of narrative and research report schemata was supported, but not for journalism schema. He, however, cautioned that reading purpose be taken into account. That is, information presented in narrative and research report resembles a close relationship to the "temporal order of events" (p.115), which could be recalled more easily by readers. Well designed as this study was, 2 weaknesses were detected. First, 87.5% of participants in the second study were female, making the generalizability low. Second, journalism majors had an average of 100-point SAT verbal score higher than education psychology students, which could have biased the results.

Lorch and his colleagues **(Lorch, et al, 1993; Lorch & Lorch, 1995, 1996)** have been extensively investigating the effects of signals on text recall. In their studies, multiple variables including text length (short vs. long text), text complexity (simple topic structure vs. complex topic structure), and signals (with vs. without signals) were examined simultaneously. The manipulation of signals was further classified as 1. an overview listing upcoming topics in the sequence in which they were going to be discussed, 2. a summary listing all the topics discussed, 3. headings indicating major sections and subsections of the text, and 4. typographical indicators. Undergraduate students first read the test passage, and then wrote down free recalls. Results consistently showed that 1. students reading the signaled texts recalled more topics than those reading the unsignaled texts (Lorch, et al, 1993; Lorch & Lorch, 1996). The same result was found for text complexity, favoring those reading the simple text. Lorch and his colleagues' interpretations were that, on the one hand, the signal effect was larger for shorter texts because signals took up proportionally more space in short texts than in the long texts, resulting in "more salient and ...memorable" information about text structure (Lorch, et al, 1993: 284). On the other hand, long texts tended to discuss topics in more depth, thus did not need explicit signals. 2. Correlations between students' recall organization and text organization revealed higher correlations for the signaled conditions, suggesting that signals helped readers construct a representation of the text structure. 3. In terms of details or subordinate ideas, it was found that for topics discussed briefly, recall of details was higher in the signaled condition than in the unsignaled condition. Such a difference was not found for topics discussed at length. Recall of signaled text showed little influence of length manipulation.

The Lorch and Lorch's (1995) study put another variable, recall cues, to test. Half of students were provided the names of the topics while the other half were not. Findings demonstrated that overall recall, recalls of main ideas and details, and correlation between recall organization and text organization were higher when recall cues were present. This effect was bigger when the text was signaled, meaning that students reading the signaled text benefited from being provided the topic names as recall cues while those reading the unsignaled text did not.

In the 1996 study (Lorch & Lorch), topic familiarity was examined. Headings were shown to improve overall recall of unfamiliar topic rather than familiar topics. Overall recall, recall of main ideas and details were higher for familiar topics. Length had an effect on summarization only in no-heading condition, not heading condition. Taken together, Lorch and his colleagues came to the conclusion that signaling effect on text recall depended on complexity of text structure, how topics were organized, depth of discussion of topics, and topic familiarity.

Pearson and Camperell (1994) commented on 3 research studies to illustrate the importance of story schema on reading of narrative. Participants in Bower's (1976 cited in Pearson & Camperell, 1994) study first read a biography, and then half of them read 2 more biographies with similar text structure while the other half read 2 unrelated texts. When they were asked to recall the first biography, students reading 3 biographies with similar text structure recalled more of the macrostructure but confused details of the second and third with the first. It was said that the similarity on text structures "created macrostructure facilitation and detail interference" (Pearson & Camperell, 1994: 458). Following Bower's research design, Thorndyke (1977 cited in Pearson & Camperell,

1994) conducted another study and found that participants who read a second story with the same structure as the first recalled more information from the second story than those reading a second story with different structure.

The third study cited was Gordon's (1980 cited in Pearson & Camperell, 1994) dissertation investigating the effectiveness of story structure training. During the 8-week instruction, fifth-graders assigned to the experimental group were instructed to apply a simplified story schema to their regular basal reader stories, while the control group was left untreated. Findings from the test story showed that the experimental group recalled more in total as well as certain categories of main ideas than the control group. Gordon therefore claimed that storing and retrieving of textual information could be improved through direct instruction on story schema.

In addition to narrative, research on expository reading and structure strategy were also cited by Pearson and Camperell. Meyer (1975 cited in Pearson & Camperell, 1994) developed a text-structured system that placed emphasis on relations among propositions in a text. She proposed that while lexical propositions showed the "case relations between words within simple sentences and clauses" (Pearson & Camperell, 1994: 458), rhetorical propositions establish the relations between and among sentences, paragraphs, and longer units of text. More specifically, propositions high in the hierarchy of text structure would be comprehended and recalled better than those low in the hierarchy. With this hypothesis in mind, Meyer conducted an experiment in which participants read 1 passage where the test paragraph was embedded high in the hierarchy of structure and a second passage where the test paragraph was embedded low, and found that the test passage was recalled better when it was high in the structural hierarchy. The difference even increased in delayed free and cued recalls administered one week after.

An extension of this study was Meyer's second research involving sixth-graders to examine whether they were aware of the structural hierarchy (Meyer, 1977a, 1977b cited in Pearson & Camperell, 1994). Students answered main-idea and detail questions immediately after listening to a short article about parakeets. While main ideas represented propositions high in the hierarchy and details low in the hierarchy, results demonstrated that all students, regardless of high or low ability, answered more main-idea questions correctly. Additionally, high ability students remembered significantly more high-level information than low-ability students.

In summary, Findings of Talley (1989), Moes, et al. (1984), and Richgels et al. (1987) all indicated that texts with high degree of structure were recalled better. Barnett (1981), on the other hand, found that readers were more aware of narrative and expository structure than journalism because narrative and expository present ideas in a logical order that readers were familiar with.

L2 Studies

Roloff's (1998) study involved 92 Brazilian EFL undergraduate (representing low ability readers) and graduate students (representing high ability readers). Students were randomly assigned to read a magazine article, the original and a modified version where explicit statements of the beneficial aspects of smoking were removed and the middle section (5 paragraphs) where testimony of researchers on the reasons for prejudice against smoking was also removed. Immediately after finishing the article, students recalled in writing. Information was removed to test whether readers could make

inference. Each text version was analyzed for its prepositional structure: Macroproposition-topic of the text; primary proposition: main ideas; secondary proposition: ideas clarify or expand main ideas; tertiary proposition: ideas providing details to secondary propositions; quarternary proposition: details related to name of places and institutions, details for tertiary proposition; fifth proposition: names of people and institutions. Results were 1. Readers benefited from reading less explicit text. 2. Students performed better in full explicit text than less explicit when textbase recall was concerned. They performed better in less explicit text when numbers of propositions and inferential recall were concerned. 3. Text difficulty was not a factor. 4. Overall, those reading explicit text elicited better textbase propositions while those reading less explicit made more inferences. Recall of original text was better at macropropositional in textbase recall. Text version showed no difference for other propoistional levels. Recall of modified text was better at macropropositional and primary levels in inferential recall, suggesting that modified version allowed students to generate inferences to compensate for missing information. For both versions, macropropositions were better recalled than others. Primary propositions were better recalled than secondary and tertiary propositions that were better recalled than the rest. Roloff cautioned that immediate recall would increase the number of propositions at textbase recall compared to delayed recall.

Again with Spanish speakers, Lahuerta Martinez (2002) recently conducted a study with 60 English-as-a-foreign-language colleges undergraduates in Spain. Students were randomly assigned to read each of the 5 versions of one passage: 4 texts written in the structure of collection, cause/effect, problem/solution, and comparison with explicit signals, and 1 text without clear text structure or signals. After reading the test passage, each student wrote an immediate recall, and then reported whether they recognized the text structure of the passage they had read. If they did, they were asked to identify it. Results showed that 1. Students reading the 4 well-structured passages with signals had better reading comprehension than those reading the no-structure, no-signal passage. 2. Of all the students whose recalls resembled the structure of the original text, only those reading the collection, cause/effect, and problem/solution passages showed superior reading comprehension than those reading the no-structure passage. In other words, students who used the comparison structure recalled less information than those reading the no-structure passage. 3. Use of text structure and recognition of structure are shown to be dependent variables on the grounds that students who used the text structure of collection, cause/effect, and problem/solution to organize their recalls also reported recognizing these structures. Furthermore, students reading the comparison structure failed to recognize it, and their recall performance also failed to outperform the no-structure group. The use of structure had a positive effect on reading comprehension and recall only when readers were able to not only organized their recall in the original structure but also explicitly identified it. In the case where readers were able to organize their recall to resemble the original text structure but failed to explicitly identify it, rhetorical organization did not affect readers' reading performance. That is to say, "the conscious identification of the rhetorical organization" (p.93) is more reliable measurement of awareness of text structure than examining the recall structure.

The main limitation of this study, however, lies in that the sample size was small. With a total of 60 participants divided into 5 groups, only 12 stayed in each group.

Studies were not only conducted in EFL settings, but also pervasively in ESL classroom. To test the existence of formal schema in ESL students, 40 intermediate-level IEP students in **Carrell's (1984)** study, half of whom reading the standard version and the other half reading the interleaved version of 3 narrative stories, recalled in free writing 1 day after reading the stories. Standard versions were constructed according to the story grammar with 1 common setting and 2 episodes. Each standard story was then rearranged to create an interleaved version where 2 beginnings, preceded 2 reactions, 2 attempts, and 2 outcomes followed by 2 endings. Recalls were scored for quantity (number of episodes and nodes recalled), as well as temporal sequence. When performance of students reading the standard and interleaved versions were compared, no significant difference was found in the number of episodes recalled, although a difference was found in the number of nodes recalled, favoring the standard version. When mean number of nodes recalled per episode was analyzed, a significant difference was shown favoring the standard version. These findings suggested that students had relatively more difficulty retrieving information from the interleaved stories in which information was presented in unfamiliar format. Regarding temporal sequence of recall, it was no surprise that students reading the standard version recalled following the input order. What is intriguing was that, without reading the standard version, those reading the interleaved version tended to reconstruct the stories to the standard version in their recall. Also, much higher percentage of two ideally adjacent nodes from the same episode were recalled together in correct sequential order, given that both were recalled (e.g. reaction and attempt, or outcome and ending), suggesting the presence of formal schema during retrieval.

With an attempt to replicate Carrell's (1984) study with a different population, **Mahoney, et al. (1991, 1997)** investigated the effects of formal schema on quantity, quality and sequence of recall of English narratives with 56 freshmen at the City University of Hong Kong. Students were classified as lower or higher proficiency levels. Three stories were read in either standard or interleaved form. The interleaved form broke the normal story grammar by "resequencing artificially after each sentence" (1997: 71). Data collection procedures involved students reading a set of either standard or interleaved stories, and then recalling them all together in writing. Their findings included 1. Students reading the standard form did not recall more than those reading the interleaved form in relation to recall of stories, episodes (several nodes), and nodes (settings, attempts, outcomes, etc.). 2. When it comes to quality, students reading the standard form did not produce a higher quality of recall than those reading the interleaved form. Additions and distortions were minimal in both groups. 3. As far as temporal sequence of recall was concerned, students reading the interleaved form tended to reorganize the story into the standard form during written recalls, which confirmed the existence of formal schema. Mahoney, et al speculated that, given the content familiarity and lexical simplicity of narratives in the 3 stories, students from the lower proficiency group performed as well as the higher proficiency group. By the same token, students reading the interleaved form could recall as much as those reading the standard form.

It, however, should be cautious that participants from this study were students enrolled in a remedial course because they scored below 50% on the Diagnostic Examination, thus they represented less competent readers.

Another focus of **Carrell**'s research resides in looking at content and formal schema together. She studied 2 groups of high-intermediate ESL students, 28 with Muslim and 24 with Roman Catholic background, who represented 2 culture groups **(1987).** Students read historical narrative texts that were fictionalized, one in culturally familiar and the other in culturally unfamiliar content. Within each group, half of the students read the original while the other half read the altered form where events were interleaved. After reading each text, students took debriefing questionnaire that asked their familiarity with the information presented (e.g. overall organization of the text). The debriefing questionnaire also served as a distracter to minimize the effect of short-term memory. Upon completion of the debriefing questionnaire, students wrote down recalls. Multiple-choice questions were also answered to check their understanding. Findings showed that content familiarity was a stronger predictor of student performance on written recall and multiple-choice questions than text form. Specifically, performance was best in familiar content and original form, and worst in unfamiliar content and altered form. More importantly, performance in familiar content and altered form was better than that in unfamiliar content and original form. However, when recalls were scored for whether they clearly expressed the top ideas, the form of texts was found to be significant factor. Simply put, rhetorical form played a critical role in the "comprehension of the top-level episodic structure of a text and...event sequences and temporal relationships among events" (p.476). Carrell's final note was that content and formal schema worked differently in comprehension.

Because studies under this category examined various aspects of text structure, results have varied. While Roloff's (1998) indicated that top-level ideas are better recalled than low-level ideas, Carrell's (1984) study showed that recall of information from scrambled texts was more difficult than from normal texts. Inconsistent with Carrell's (1984) results, Mahoney et al. (1991, 1997) found no difference between the recall of normal and scrambled texts. Another study by Carrell (1987) revealed that text structure played a crucial role in the recall of top-level ideas, which in some way corresponds to Roloff's findings.

Conclusion

To sum up, a close examination of these research studies provides answers to the three questions posed earlier in this paper. What did researchers refer to when they said "instruction on text structure? The answer to this question is, it could mean training on studying a conceptual map or completing one by readers, it could mean training on studying an outline provided by the teacher or students filling out an outline grid themselves. It could also refer to teaching or raising students' awareness of signal words or particular transition words like sentence, or paragraph connectors of certain text structure. Along the same vein, when researchers claimed they measured reading comprehension, it could mean many things—ranging from free recall of a piece of reading to answering multiple-choice or short-answer questions that did or did not necessarily measure students' ability to make inferences out of the reading. Even within the measurement of free recalls, scoring could also vary from counting the numbers of total ideas recalled to the number of main ideas and details recalled or the percentage of main ideas in total ideas recalled. Finally, awareness of text structure could mean many things depending on how it was measured. The biggest debate lies in whether readers

should be conscious of how they read (metacognition) in order to be categorized as "aware". Hence, some researchers used indirect method, that is, asking readers to rearrange a scrambled passage or to select a passage whose text structure corresponded to that of a given passage, or think-aloud during interviews on how they went about reading a text, or the most widely-adopted technique, examining whether the recall structure represented the structure of the test passage, assuming that these behaviors reflected readers' awareness of text structure that they might or might not be conscious of. Aside from this group of researchers using indirect methods, another group of researchers incorporated direct method, asking readers to explicit identify the text structure as narrative, cause/effect, compare/contrast, and so forth. This method, however, requires readers to have a higher level of consciousness of their text structure knowledge. What is worth further investigation is that Carrell's (1992), and Lahuerta Martinez's (2002) study both suggested that being able to organize the recall in the structure of the original reading passage is insufficient for readers to achieve higher reading comprehension and recall. Readers needed to be able to explicitly recognize and identify the text structure in order to take advantage of it.

On the other hand, even though what researchers meant by instruction on text structure, reading comprehension, or awareness of text structure differed, and minor flaws were detected in some of the studies, robust findings across a variety of ages and tasks have been found in this literature review and they are basically consistent with Slater and Graves (1989), Fitzgerald (1989), and Richgels, et al (1989)–

Reader Effect

1. Good readers are more likely than poor readers to be aware of text structure (Taylor, 1982; Meyer, et al, 1978 cited in Pearson & Camperell, 1994; McGee, 1982; Kletzien, 1991; Tarlow, 1990; Davis, 1981; Tirawanchai, 1996).
2. Readers aware of text structure tend to organize recalls in well-structured form (Carrell, 1992; McGee, 1982; Davis, 1987; Meyer, et al., 1978 cited in Pearson & Camperell, 1994; An, 1992; Meyer, et al, 1989, 1998; Meyer & Loon, 2001; Meyer and Theodorou, 2001).
3. When well-structured texts were read, readers aware of text structure tend to have better reading comprehension and recalled of main ideas than those unaware (Chen, 1990; Moes, et al, 1984; Gordon, 1980 cited in Pearson & Camperell, 1994; Sturgell, 1992; Carrell, 1985, 1992; Tirawanchai, 1996; Taylor, 1982; Raymond, 1993a, 1993b; Berkowitz, 1986; Slater, 1985; Slater, et al., 1985; Spires, et al, 1992; Taylor & Beach, 1984; McGee, 1982; Myers, 1997; Davis, 1987; Gordon, 1980 cited in Ruddell, et al., 1994; Meyer, et al., 1978 cited in Pearson & Camperell, 1994; Meyer, 1977a, 1977b cited in Pearson & Camperell, 1994; An, 1992; Meyer, et al, 1989, 1998; Meyer and Theodorou, 2001; Meyer & Loon, 2001).
4. While some studies (Tirawanchai, 1996; Carrell, 1985) showed that awareness/instruction on text structure aided recall of main ideas and details alike, others (Taylor, 1992; Kintsch & Yarborough, 1982; McGee, 1982; Moes, et al, 1984; Meyer, et al, 1989; Meyer and Theodorou, 2001) showed that awareness/instruction on text structure only improved recall of main ideas, not

details. It, however, should be cautioned that many of the studies examined in this paper did not report the results of detail recalls.

5. Readers have the tendency to reconstruct a scrambled passage to a well-organized form in recalls, supporting the existence of formal schema, with journalism texts an exception (Barnett, 1981; Carrell, 1984; Mahoney, et al., 1991, 1997).
6. When retention was measured in immediate and delayed posttests where participants were asked to recall passages read a few days or weeks ago, instruction on text structure improved immediate recall, but not delayed recall (Spires, et al, 1992; Meyer, et al, 1978). On the contrary, when retention was examined in immediate recalls and transfer of training effect in delayed posttests where participants were asked to read a new well-structured passage, instruction on text structure improved both immediate and delayed recalls (Carrell, 1985; Berkowitz, 1986; An, 1992). Taken together, it is found that trained readers' performance on immediate recalls that measured retention persistently improved. However, trained readers only showed superior performance in delayed recalls when transfer of training effect was in examination. When retention was measured in delayed recalls, however, trained readers failed to show such a superiority. Therefore, it seems that trained readers continued to use and apply the learned structure strategy to new situations long after the training session had been terminated, but when they were asked to recall texts read sometime ago, their performance failed to stand out. One possible interpretation is that instruction on text structure had been effective in that learners continued to apply structure strategy to new situations, but after a long interval, the natural obliteration might have caused trained readers to forget what they had read.

Text Effect/Readability

1. Recalls of main ideas from the normal texts tend to be better than the scrambled texts (Kintsch & Yarborough, 1982; Richgels, et al, 1987; Barnett, 1981; Carrell, 1984, 1987; Moes, et al., 1984; Davis, 1987; Lahuerta Martinez, 2002), except the studies on narratives conducted by Mahoney et al. (1991, 1997) that showed no difference.
2. Top-level ideas tend to be recalled better than lower-level ideas (Slater, 1985; Slater, et al., 1985; Kintsch & Yarborough, 1982 cited in Kintsch, 1998; Meyer, 1977a, 1977b cited in Pearson & Camperell, 1994; Roloff, 1998; Meyer, et al, 1998; Gallini, et al, 1993).
3. Recalls of idea from the normal texts tend to be quantitatively higher than from the scrambled texts (Richgels, et al, 1987; Barnett, 1981; Carrell, 1984; Moes, et al., 1984; Davis, 1987; Lahuerta Martinez, 2002), except the studies conducted by Mahoney et al. (1991, 1997) which showed no difference.
4. Text structure is not as important in reading comprehension when the subject matter is familiar or difficult to the reader (Carrell, 1987; Myers, 1997; Taylor & Beach, 1984; Kletzien, 1991; Voss & Silfies, 1996; Lorch & Lorch, 1996).
5. While good readers performed better than poor readers when text structure was not highlighted, highlighting main ideas improved the recall performance of poor and good readers alike (Meyer, 1977a, 1977b cited in Pearson & Camperell, 1994; Moes, et al., 1984; Tarlow, 1990).

6. Structure-aware and structure-unaware readers performed similarly in recall of idea units when the text was scrambled (Davis, 1987; Chen, 1990).

A further examination of the attached tables 1 and 2 gives a general overview of what has been done in the area of the effect of text structure awareness/instruction on the performance of reading comprehension and recall, which in turn gives insight to what is demanded in future research. Here are some of the findings—

1. Teaching of signal words has not been pervasively examined in L2 studies (only Raymond, 1993a, 1993b reviewed here).
2. No L2 studies reviewed in this paper have examined cause/effect structure.
3. No L2 studies reviewed here have examined such strategies as outline or mapping.
4. While L1 studies have investigated every grade level except preschool, including 1~6 grades in Taylor (1982), Berkowitz (1986), Richgels, et al (1987), McGee (1982), Spires, et al (1992), Troyer (1993), Sturgell (1992), Talley (1989), 7~9 grades in Ohlhausen and Roller (1988), Tarlow (1990), Moes, et al (1984), Taylor and Beach (1984), Slater (1985), Slater, et al (1985), 10~12 grades in Gallini, et al (1993), Kletzien (1991), undergraduate in Tyan (1989), Durham (1990), Ohlhausen and Roller (1988), Gallini and Spire (1995), Lorch & Lorch (1995, 1996), Lorch, et al (1993), and Meyer and Theodorou (2001), graduate in Davis (1981), and adults in Meyer, et al (1989, 1998), and Meyer and Loon (2001). L2 studies were conducted with 12th grades and above, with undergraduate or Intensive English Program students under most investigations (Tirawanchai, 1996; Mahoney, et al, 1991, 1997; Raymond, 1993a, 1993b; Carrell, 1984, 1985, 1987, 1992; Davis, 1987; Chu, 1999; Lahuerta Martinez, 2002). My speculation is that ESL/EFL/FL students need to reach certain proficiency level to be testable, thus older learners with more language experiences make better participants.

Also, although not shown in the tables, all the studies, except Chen (1990) and Roloff (1998), tested literal understanding/memory rather than inferences when they claimed they measured comprehension. Thus, the effects of test structure awareness or instruction on literal understanding and memorization have been proved, but it remains unclear whether such effects still hold true for inferential understanding since little has been done in this area. Taken together, it can be concluded that future L2 studies should focus on the effect of long-term outline, and mapping strategy instruction or teaching of signal words on the reading comprehension, recall, and inference-making of cause/effect text with learners other than undergraduates or IEP students. Moreover, after comprehensively reviewing research-based studies and opinion-statement articles, it has brought to this author's attention that a number of potential intervening variables should be controlled or at least taken into account in the design of study, as well as the analysis and interpretation of data.

1. *Time given in reading*: Whether to set up a limited or unlimited time for readers to read the passage is controversial. Slater (1985) and Slater, et al. (1985) contended that if time allotted to reading was not restricted, those who spent more time could perform better than those who did not. Yet the other side of the story is that unrestricted time allows groups that need different amount of time to complete the task. Among the studies, some set up limited time (Barnett, 1981; Taylor, 1982; Spires, et al., 1992) while most did not (Gallini, et al, 1993; Meyer,

et al, 1989, 1998; Chen, 1990; Slater, 1985; Slater, et al., 1985; Tyan, 1989; Carrell, 1984, 1987; Raymond, 1993a, 1993b; Mahoney, et al., 1991, 1997; Lorch & Lorch, 1995, 1996; Lorch, et al, 1993; Meyer & Loon, 2001; Lahuerta Martinez, 2002). Barnett (1981) actually went out to test if reading a scrambled text would take more time than a well-structured text, but no difference was found. Meyer, et al (1989) also found that the experimental group focusing on text structure did not read a at slower speed than the control group, ruling out the possibility that time spent on the task was intervening data. Nevertheless, this time factor is particularly crucial when scrambled passages are involved on the grounds that readers might need extra time to reconstruct the relationship among ideas when sentences are disorganized.

2. *Task*: Whether a written or oral task, a free or cued recall, multiple-choice or short-answer questions are performed. These represent measurements of varying degrees of structure. Also, it has been argued that non-native readers recalled more and better when writing in their mother tongue (An, 1992; Raymond, 1993a, 1993b; Tirawanchai, 1996).
3. *Recall*: Recalls can be further divided into immediate and delayed recalls, depending on whether there was time elapse between the completion of reading task and when the recall was administered. While immediate recall carries the confounding factor of short-term memory, delayed recall not only rules out this variable but also serves to examine retention. Also, while most studies (Slater, 1985; Slater, et al, 1985; Talley, 1989; Spires, et al, 1992; McGee, 1982; Carrell, 1992, 1985; Tirawanchai, 1996; Meyer, et al, 1989, 1998; Meyer & Loon, 2001; Meyer & Theodorou, 2001) asked participants to recall upon completion of each passage, Mahoney, et al (1991, 1997) asked participants to recall multiple passages all at one time. This could intervene recall performance.
4. *Persistence of training effect vs. retention*: Depending on the research focus, delayed recalls of a passage read sometime ago assess information retention (Meyer, et al, 1989; Berkowitz, 1986; Spires, et al, 1992; Durham, 1990; Chu, 1999; Meyer, 1975 & Meyer, et al 1978 cited in Pearson & Camperell, 1994), whereas delayed tasks of reading and recalling a new passage sometime after the intervention is finished assess persistence of training effect (An, 1992; Raymond, 1993a, 1993b; Troyer, 1993; Berkowitz, 1986; Taylor, 1982; Taylor & Beach, 1984; Tirawanchai, 1996; Carrell, 1985; Meyer, et al, 1998).
5. *Familiarity with the content*: It is usually agreed that learners' familiarity with the passage content (content schema) should be simultaneously examined along with text structure awareness (Roller, 1990; Carrell, 1987; Ohlhausen and Roller, 1988; Chu, 1999; Kletzien, 1991; Taylor & Beach, 1984; Myers, 1997; Mahoney, et al, 1991, 1997; Voss & Silfies, 1996; Lorch & Lorch, 1996). Researchers speculated that texts with moderately unfamiliar content demands formal schema most, and this demand diminishes in importance when readers possess adequate content schema. In the same way, when the text is difficult in the sense that it contains unfamiliar concepts, readers tend to focus on decoding processes, and top-down process such as using text structure to interpret the texts becomes less active. Although it is an insightful suggestion that formal schema is most demanded in texts with moderately unfamiliar content, how to assess the

"moderate unfamiliarity" and based on it to find the most appropriate passages in empirical studies remain a big challenge.

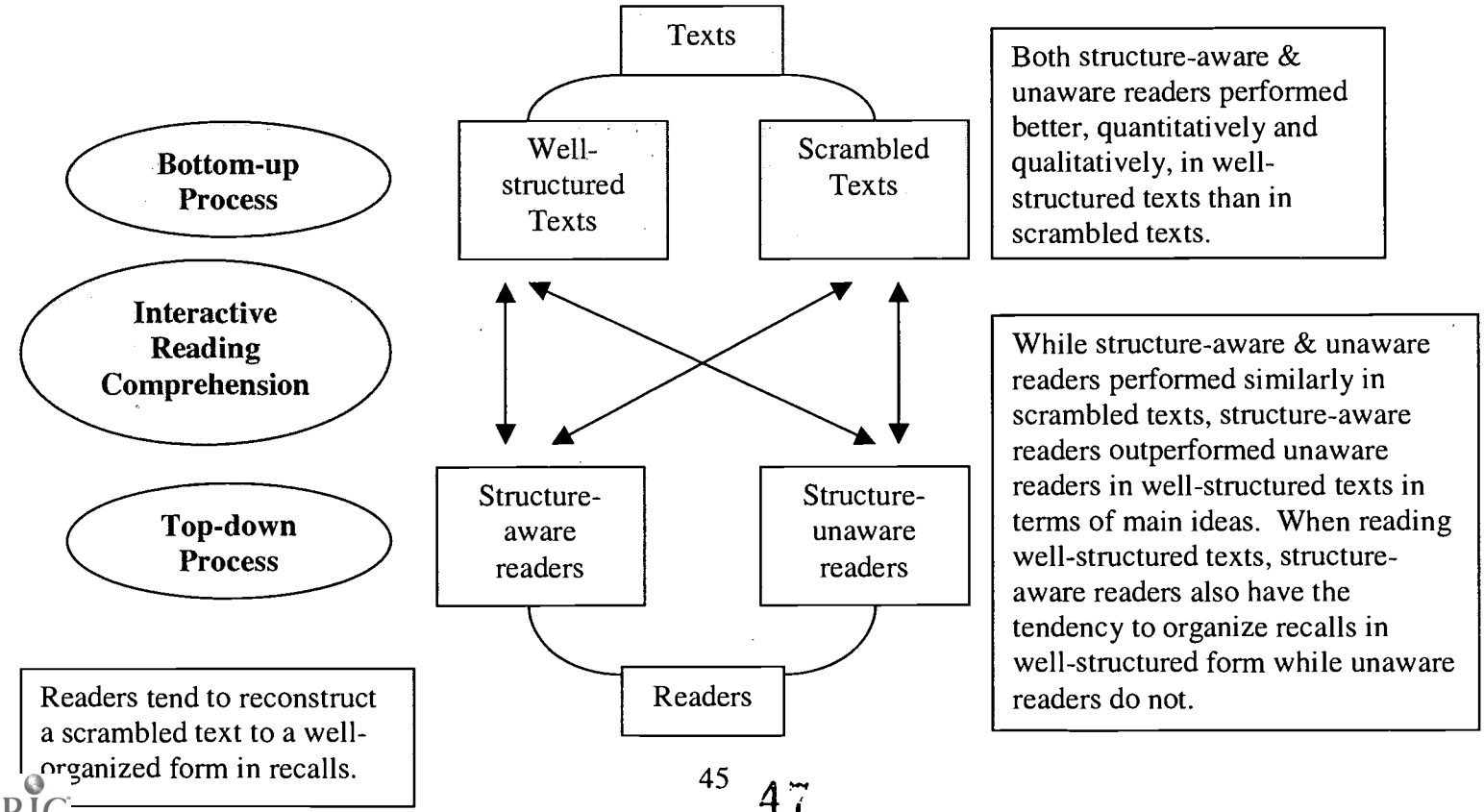
6. *Passage Authenticity*: While a few of the studies reviewed here used authentic texts, such as trade books in Tarlow (1990) and Talley (1989), magazines in Chen (1990), Roloff (1998), Meyer, et al (1989), Meyer and Loon (2001), Lorch & Lorch (1995, 1996), Lorch, et al (19930, and Chu (1999), most of the studies borrowed test passages from health (Taylor, 1982), social studies (Berkowitz, 1986; Taylor & Beach, 1984; Kletzien, 1991) or history textbooks (Slater, 1985; Slater, et al, 1985; Meyer, et al, 1989) whose authenticity is of concern.
7. *Interest*: Studies like Voss and Silfies (1996), Chu (1999), Meyer, et al (1998), had showed that readers' interest in the topic played a role in reading comprehension and recall. Their findings have shown that text structure is of less importance when readers' interest in the passage is high.
8. *Length of training*: Pearson and Camperell (1994) cautioned that whenever a structure strategy was taught, students should be given time and opportunities to practice systematically in order to internalize it. Some of the studies reviewed here, particularly L2 studies, only gave 5 or 6-hour training over 1 to 2 weeks (Raymond, 1993a, 1993b; Carrell, 1985; Spires, et al., 1992; Slater, 1985; Slater, et al., 1985; Tyan, 1992; An, 1992), which is consistent with Fitzgerald's (1989) findings. In contrast, most of the L1 studies provided training sessions over 6~7 weeks (Taylor & Beach, 1984; Taylor, 1982; Berkowitz, 1986; Richgels, et al., 1987; Gordon, 1980 cited in Ruddell, et al., 1994; Gallini, et al, 1993). All the studies seem to suggest that, regardless of the length of training, trained readers tended to consistently outperform untrained readers. This is worth further investigation.
9. *Sample Size*: Sample size is highly related to statistical power. With a sample size less than 30 in each group, the difference among groups has to be relatively large to reach statistical significance. Of the dozens of studies reviewed here, only a few had sample size that was large enough (Taylor & Beach, 1984; Slater, 1985; Slater, et al, 1985; Tarlow, 1990; Tirawanchai, 1996; An, 1992; Ohlhausen & Roller, 1988; Meyer and Theodorou, 2001; Meyer & Loon, 2001; Lorch & Lorch, 1995), which echoes with Fitzgerald's (1989) finding that structure studies tended to have small sample size. Nevertheless, what is intriguing is that even with small sample sizes, these studies consistently supported the instruction/awareness of formal schema on reading comprehension and recall.
10. *Length of test passage*: Length of test passages has varied remarkably, primarily depending on participants' grade level. The length of test passages for L1 readers has ranged from elementary level, such as 500-550 words for 4th graders (Spires, et al, 1992), 800 words for 5th graders (Taylor, 1982), 133 words (Richgels, et al, 1987) or 600-800 words (Berkowitz, 1986) for 6th graders, 125 words for 3rd, 5th, and 7th graders (McGee, 1982), to high school level, such as 1500 words for 7th graders (Taylor & Beach, 1984), 670-680 words for 9th graders (Slater, et al, 1985; Slater, 1985), 250 words for 10th and 11th graders (Kletzien,1991), 340-410 words for high school students (Gallini, et al, 1993), to college level, such as 1750 words (Lorch & Lorch, 1996), 2200 words (Gallini & Spires, 1995), 2400~3600 words (Lorch, et al, 1993), or 467-504 words (Meyer, et al, 1998) for college

undergraduates to adults, such as 506 words (Meyer, et al, 1989) whereas the length of test passages for L2 IEP students have been somewhere between 230 and 280 words (Carrell, 1985, 1992).

Synthesizing everything together, I am proposing an interactive reading model of formal schema.

Presuppositions:

1. When the language read is English as a first or second/foreign language, French as a second/foreign language, or Chinese as a first language,
2. When the content is moderately unfamiliar,
3. When the text difficulty is approximate to reader's proficiency level,
4. When the text structure is narratives, research reports, or expository (description, collection, cause/effect, problem/solution, and compare/contrast),
5. When the text structure is not journalism,
6. When awareness of text structure is measured by how the organization of recalls resembled that of the test texts,
7. Format of reading comprehension and recall measurements is similar to that of instruction,
8. When reading comprehension and recalls measure literal understanding, not inferences,
9. When the recall is scored for the total number of ideas recalled, and/or number of main ideas recalled,
10. When recall is administered immediately, within a few days after the texts are read, and
11. When the reader is prompted to use structure strategy during the test.



(Figure 3: An interactive reading model for formal schema)

Suggestions for educators

It has been found in this literature review that well-structured texts are easier to understand and remember because the structure of idea presentation in the texts corresponds to that of readers' expectation deriving from their background knowledge in text structure. Consequently, readers do not need to reorganize information while reading. In contrast, scrambled texts are difficult to comprehend, not to mention remember, because the organization of idea fails to match up with that of reader's expectation. This mismatch in turn slows down readers' ability to process incoming information, causing them to spend extra time reorganizing information in order to figure out the inter-relationships between concepts.

By the same token, it has been found that text structure has a close relationship with text content. Specifically, it is speculated that text structure plays a much more determining role when the content is so-called "moderately unfamiliar". When the text content is very familiar, reliance on content schema is sufficient and efficient enough to comprehend the text and understand the relationships between concepts, thus formal schema becomes less important. In contrast, when the text content is very unfamiliar, reliance on formal schema is neither efficient nor sufficient to understand the relationships between concepts since such relationships have not been previously established in readers' cognition. As a result, formal schema becomes useless for a different reason.

Based on findings from this literature review, several suggestions are made for educators and language teachers-

1. Reading materials should be written according to the structure conventions so that reading comprehension can be facilitated.
2. Since awareness of text structure can be achieved in a short period of time, class time should be allotted for explicit instruction on text structures.
3. Students should not only be trained but also constantly reminded to use the structure strategy, such as outline or map construction, paying attention to signals and text structure, to facilitate reading comprehension and retention. More importantly, students should be explicitly taught why, when, and how to apply the structure strategies and given ample opportunities to exercise and practice them (Oxford, 1990).
4. While L1 readers have the tendency to have well-developed formal schema over time with ample exposure to the target structure, L2 readers are limited for exposure and thus could be disadvantaged. Therefore, it is recommended that L2 teachers provide as many authentic reading materials as possible to students.
5. While good readers tend to develop awareness of text structure over time, poor readers usually do not. Consequently, language teachers need to pay attention to poor readers' development of text structure awareness, and develop lessons or trainings that tailor to their needs.
6. Instruction on text structure is not and should not be limited to language arts class. It can be done via content subject readings, such as reading well-structured social studies, history, or healthy books, or outside everyday readings of magazines,

books, non-fictions, newspapers, and Internet articles. Attention, however, should be brought to students that not every writing would necessarily follow the structure conventions (Meyer & Loon, 2001).

Suggestions for future research

Although robust findings have been attained in the text structure research, more on the following areas are needed.

1. Examination of structure strategy transfer to novel situations/persistence of training effect.
2. Examination of structure strategy awareness/instruction on readers' ability to make inferences.
3. Examination of structure strategy awareness/instruction on readers' recall of subordinate ideas/details.
4. Examination of other variables on the use of structure strategy, such as motivation, interest, learning styles, attitude, age, proficiency level, or gender.
5. In-depth and prolonged qualitative studies investigating readers' perception of usefulness or application of structure strategies.

Also, it has brought to this author's attention that there seems to be a clear trend in the investigation of coherence of text in reading comprehension (see Lehman, 2001; McNamara & Kintsch, 1996; McNamara, et al, 1996, and McNamara, 2001). Due to the limitation in space, studies on this area are not reviewed, but it is recommended for readers of interest to check into this area.

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Table 1. L1 studies examining effects of text structure instruction/awareness on reading comprehension and recall P.1

L1 Study	Text Type								Grade Level						Treatment				Good vs. Poor readers
Author(s) & Publication Year	Narrative	Research Report	News Report	Expository					Kindergarten	1~6 Grade	7~9 Grade	10~12 Grade	College/Undergraduate	Graduate	Outline	Mapping	Recognition of Structure	Signal Words	
				Description	Collection	Cause/Effect	Problem/Solution	Compare/Contrast											
Taylor & Beach (1984)								*			*				*				
Tyan (1989)					*								*			*			
Taylor (1982)			Not clear							*					*				*
Berkowitz (1986)			Expository							*						*			
Slater, et al (1985) & Slater (1985)				*		*	*				*				*		*		
Richgels, et al (1987)					*	*	*	*		*									
Durham (1990)	*		*										*				N/A		
McGee (1982)				*						*									*
Spires, et al (1992)							*	*		*							*	*	
Kletzien (1991)				*		*						*							*

Note: Asterisks indicate the presence of components in the research design.

	Recall Scoring					Measurement										Test Passage	
	Degree Recall Structure Resemble Text Structure	Percentage of Main Ideas in Total Ideas Recalled	Number of Details Recalled	Number of Main Ideas Recalled	Number of Total Ideas Recalled	Awareness of structure			Recall						Compre-hension		
						Interview	Choose Matching Text Identify Structure		Retention		Structure		Form		Short-Answer Q	Multiple-Choice Q	Original vs. Scrambled	Well-Structured
									Delayed	Immediate	Cued	Free	Oral	Written				
				*						*		*		*	*			*
	*		*	*	*					*		*		*	*	*		*
	*			*						*		*		*	*			*
				*					*	*		*		*	*			*
			*	*	*					*		*		*		*		*
						*	*			*		*		*			*	
							*		*	*						*		*
	*	*	*	*	*					*		*	*					*
	*								*	*				*		*		*
						*												*

Note: Asterisks indicate the presence of components in the research design.

Table 1-continued.

L1 Study	Text Type								Grade Level						Treatment				Good vs. Poor readers
				Expository															
Author(s) & Publication Year	Narrative	Research Report	News Report	Description	Collection	Cause/Effect	Problem/Solution	Compare/Contrast	Kindergarten	1~6 Grade	7~9 Grade	10~12 Grade	College/Undergraduate	Graduate	Outline	Mapping	Recognition of Structure	Signal Words	
Ohlhausen & Roller (1988)				*							*		*				N/A		
Tarlow (1990)				*	*		*				*								*
Troyer (1993)				*	*			*		*						*			*
Davis (1981)	*			*		*	*							*					*
Sturgell (1992)	*			*	*	*	*	*		*							N/A		
Gallini & Spires (1995)				Not clear									*			*			
Talley (1989)	*									*							N/A		
Moes, et al (1984)				*							*						N/A		
Meyer, et al (1989)							*	*					*				*		
Meyer, et al (1998)							*						*				*	*	

Note: Asterisks indicate the presence of components in the research design.

Test Passage		Measurement										Recall Scoring					
		Compre-hension		Recall						Awareness of structure							
				Form		Structure		Retention									
Well-Structured	Original vs. Scrambled	Multiple-Choice Q	Short-Answer Q	Written	Oral	Free	Cued	Immediate	Delayed	Identify Structure	Choose Matching Text	Interview	Number of Total Ideas Recalled	Number of Main Ideas Recalled	Number of Details Recalled	Percentage of Main Ideas in Total Ideas Recalled	Degree Recall Structure Resemble Text Structure
	*																
	*	*			*		*	*								N/A	
*			*					*	*								
*						N/A					*	*				N/A	
*						N/A				*						N/A	
*		*		*		*		*						*	*		*
	*		*		*		*	*						*	*		
	*	*	*			N/A										N/A	
*		*		*		*		*	*		*		*				*
*		*		*		*		*	*				*	*			*

Note: Asterisks indicate the presence of components in the research design.

Table 1 continued

L2 Study	Text Type								Grade Level						Treatment				Good vs. Poor readers
				Expository															
Author(s) & Publication Year	Narrative	Research Report	News Report	Description	Collection	Cause/Effect	Problem/Solution	Compare/Contrast	Kindergarten	1~6 Grade	7~9 Grade	10~12 Grade	College/Undergraduate	Graduate	Outline	Mapping	Recognition of Structure	Signal Words	
Meyer & Theodorou (2001)							*						*				*	*	
Meyer & Loon (2001)							*	*					*				*	*	
Gallini, et al (1993)					*		*					*				*			
Voss & Silfies (1996)					*	*							*				N/A		
Lorch, et al (1993)							*						*				N/A		
Lorch & Lorch (1995)							*						*				N/A		
Lorch & Lorch (1996)							*						*				N/A		

Note: Asterisks indicate the presence of components in the research design.

	Recall Scoring					Measurement										Test Passage	
	Degree Recall Structure Resemble Text Structure	Percentage of Main Ideas in Total Ideas Recalled	Number of Details Recalled	Number of Main Ideas Recalled	Number of Total Ideas Recalled	Awareness of structure			Recall						Compre-hension		
						Interview	Choose Matching Text Identify Structure		Retention		Structure		Form		Short-Answer Q	Multiple-Choice Q	Original vs. Scrambled	Well-Structured
									Delayed	Immediate	Cued	Free	Oral	Written				
	*			*	*					*		*		*				*
	*			*	*					*		*		*				*
	*			*	*					*		*		*		*		*
				*	*					*		*		*		*		*
	*	*	*	*	*					*		*		*				*
	*	*	*	*	*					*		*		*				*
	*	*	*	*	*					*		*		*				*

Note: Asterisks indicate the presence of components in the research design.

Table 2. L2 studies examining effects of text structure instruction/awareness on reading comprehension and recall P.4

L2 Study	Text Type								Grade Level						Treatment				Good vs. Poor readers
Author(s) & Publication Year	Narrative	Research Report	News Report	Expository					Kindergarten	1~6 Grade	7~9 Grade	10~12 Grade	College/Undergraduate	Graduate	Outline	Mapping	Recognition of Structure	Signal Words	
				Description	Collection	Cause/Effect	Problem/Solution	Compare/Contrast											
Tirawanchai (1996)							*						*						*
Mahoney, et al (1991, 1997)	*												*						*
Raymond (1993a, 1993b)							*						*				*	*	
Carrell (1992)					*			*					*				N/A		
Carrell (1987)	*												*				N/A		
Davis (1987)		*											*				*		
An (1992)							*	*				*					*		
Chu (1999)				*									*				N/A		
Carrell (1985)					*			*					*				*		
Chen (1990)								*						*					

Note: Asterisks indicate the presence of components in the research design.

Test Passage		Measurement										Recall Scoring					Notes
		Compre-hension		Recall						Awareness of structure							
				Form		Structure		Retention									
Well-Structured	Original vs. Scrambled	Multiple-Choice Q	Short-Answer Q	Written	Oral	Free	Cued	Immediate	Delayed	Identify Structure	Choose Matching Text	Interview	Number of Total Ideas Recalled	Number of Main Ideas Recalled	Number of Details Recalled	Percentage of Main Ideas in Total Ideas Recalled	Degree Recall Structure Resemble Text Structure	
*			*	*		*		*						*			*	Thai read English
	*			*		*		*						*				Hong Kongnese Read English
*				*		*		*									*	Canadian Read French
*				*		*	*	*		*			*	*			*	IEP students read English
	*	*		*		*		*					*	*				Muslim & Catholic read English
	*			*		*		*					*					English read French
*				*		*		*	*	*				*			*	Korean read English
*				*		*		*	*	*							*	Taiwanese read English & Chinese
*				*		*		*		*			*	*			*	IEP students read English
	*	*		*		*		*			*		*	*		*	*	Taiwanese read English

Note: Asterisks indicate the presence of components in the research design.

Table 2-continued.

L2 Study	Text Type								Grade Level						Treatment				Good vs. Poor readers
				Expository															
Author(s) & Publication Year	Narrative	Research Report	News Report	Description	Collection	Cause/Effect	Problem/Solution	Compare/Contrast	Kindergarten	1~6 Grade	7~9 Grade	10~12 Grade	College/Undergraduate	Graduate	Outline	Mapping	Recognition of Structure	Signal Words	
Carrell (1984)	*												*				N/A		
Lahuerta Martinez (2002)					*	*	*	*					*				N/A		

Note: Asterisks indicate the presence of components in the research design.

Test Passage		Measurement										Recall Scoring					Notes
		Compre-hension		Recall						Awareness of structure							
				Form		Structure		Retention									
Well-Structured	Original vs. Scrambled	Multiple-Choice Q	Short-Answer Q	Written	Oral	Free	Cued	Immediate	Delayed	Identify Structure	Choose Matching Text	Interview	Number of Total Ideas Recalled	Number of Main Ideas Recalled	Number of Details Recalled	Percentage of Main Ideas in Total Ideas Recalled	Degree Recall Structure Resemble Text Structure	
	*			*		*		*					*	*			*	IEP students read English
	*			*		*		*		*			*				*	Spaniards read English

Note: Asterisks indicate the presence of components in the research design.

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