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THE EFFECTS OF TIME OF PRESENTATION AND TYPE OF DIAGRAMMATIC ORGANIZER ON RECALL MEASURES OF READING COMPREHENSION IN BEGINNING COLLEGE SPANISH

The Ohio State University

Ph.D. 1979

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THE EFFECTS OF TIME OF PRESENTATION AND TYPE OF DIAGRAMMATIC ORGANIZER ON RECALL MEASURES OF READING COMPREHENSION IN BEGINNING COLLEGE SPANISH

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By
Angela Labarca, B.A.

* * * * *

The Ohio State University
1979

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CHAPTER I
THE PROBLEM

Introduction

Increasing student comprehension or learning from a text has always been one of the main goals of education. Diverse theories have been formulated and various techniques designed to facilitate comprehension after reading a text (or a "stimulus passage"). Although in the past decades new, frequently conflicting approaches have been developed (consider, for example, programmed instruction and Ausubel's (1978) theory of advance organizers), some long established reading aids continue to be recommended by educators as efficient tools for reading comprehension.

Because outlining or outline structure is a familiar feature of discourse (Grimes, 1972b, p. 513), structured overviews, outlines, and diagrams are often prescribed as aids for reading or writing. In fact, prescriptions to use outline structure "are probably as old as rhetoric itself" (Grimes, 1972b, p. 516).

Outlines are seen as realizing their organizing potential in the learner's mind by clearly pointing out the clusters of meaning in a passage and the relationships
between them. The comprehension of connected discourse is therefore believed to be enhanced when students use word outlines or diagrams as note-taking or study devices. Glynn and Di Vesta (1977), for example, state:

Teachers and students use outlines because they depict the topics within a text, the sequence in which the topics are presented, and the superordinate-subordinate relationships among topics in the textual presentation. (p. 89)

Thus, outlining and diagramming form part of study skills programs (e.g., Bandt, Meara and Schmidt, 1974), style manuals (e.g., Strunk and White, 1972), and foreign language texts [e.g., Allen and Widdowson (Eds.), 1974]. In addition, foreign language educators often encourage the use of diagrams and point out their utility in the reading comprehension process (e.g., Jones and Roe, 1975).

Ironically, however, little experimental evidence in the native language has been collected, and educators do not have the data to support the alleged facilitative effect of the construction or provision of outlines or diagrams on comprehension and learning. There also is a lack of empirical knowledge in the area of foreign language learning; thus, there is no evidence to support instructors' pedagogical intuitions. In fact, there is no information about what kind of conceptual, non-pictorial, non-linguistic devices can facilitate reading comprehension, rule learning, or vocabulary memorizing in the process of
learning a foreign language.

Many research efforts are needed to determine the effects of various reading aids (outlines, diagrams, underlining, boldface in topic sentences, heading placement and quantity, glossing or signalling) on reading comprehension measures. It is also necessary to examine the locus of the effect: is the effect exerted when the organizers are used as reading aids or as retrieval aids? Likewise, it is necessary to determine the differential effects of selected types of these aids on comprehension and learning, just as it would be useful to know about the effects of different degrees of activity on the part of the subjects on making these aids for and by themselves.

Findings from studies such as the ones delineated above should have implications for materials design and instruction. Furthermore, given a cognitive approach to learning, the results from the same studies should give educators more information about the kind of elaborations that foreign language learners perform on material that is almost always only partially understood. This kind of knowledge is necessary so that attention is focused on the cognitive processes in foreign language learning, thereby producing information that is urgently needed for the design of self-instructional sequences (where learners' elaborations become the teaching process itself) as
well as for the formulation of more effective instructional methodologies. Specifically, the results of this study are intended to provide data that would influence the development of schematic aids for the comprehension of reading materials in foreign language instruction, and provide direction for a line of research related to the role of non-pictorial, non-linguistic conceptual aids in language comprehension and learning.

Statement of the Problem

It is the purpose of this exploratory study to examine the effects of two types of diagrammatic organizers presented as reading or retrieval aids on reading comprehension measures in beginning college Spanish. The research questions are:

1. What are the effects of two selected types of diagrammatic organizers used as comprehension aids on measures of reading comprehension in beginning college Spanish?

2. What are the effects of the time of presentation of two selected diagrammatic organizers on measures of reading comprehension in beginning college Spanish? Do the diagrams exert their facilitative effect when used as reading aids or as retrieval aids?
Value of the Experiment

Given the lack of data related to the role of reading aids in written discourse comprehension, foreign language instructors and material developers must rely on their pedagogical intuitions when devising aids for comprehension, or when using diagrams or outlines to facilitate the process. Because of the lack of pertinent knowledge, reading selections are frequently followed directly by comprehension questions without any reading aids provided to facilitate comprehension of the passage. It is therefore hoped that this study will produce evidence on the effects of at least one type of schematic aid on measures of reading comprehension.

Theoretical Bases

Current theories of reading (Goodman, 1968; Smith, 1973) and comprehension propose that comprehension and learning are the result of the interaction among three memory fields: 1) the learner's cognitive structure at the moment of reading; 2) the organization of this cognitive structure; and 3) the depth and manner of processing the new knowledge. Inserted within this theoretical frame, instruction is concerned with facilitating the processes developed in the second and third fields. Thus, the study of the effects of advance organizers and of organizational aids that enhance or facilitate learners' elaborations on the new material becomes a matter
of central interest.

The provision of organizational aids is, in turn, of crucial importance for foreign language learners, who see their hypothesis-forming abilities, and their capacity to impose a structure on new materials seriously impaired by an imperfect knowledge of the foreign language code. The learner can still probably transfer his abilities to bring meaning to a passage by drawing from his knowledge of the world and from his knowledge of the ways in which passages are conventionally organized. However, it becomes of top priority to support the tasks dealing with the processing of new material. Contextual aids such as pictorial, diagrammatic, and prose organizers merit research efforts that might lead to elucidating their role in comprehension. In fact, Omaggio's (1977) study produced evidence about the organizing potential of one type of these organizers: pictorial organizers. In her study, comprehension was found to be significantly facilitated by the prethematic pictorial context, which was therefore proposed to function as an advance organizer in accord with the theory of Ausubel et al. (1978) of meaningful learning.

Given the visual features of diagrams, which have also been described as spatial conceptual arrays, the pertinent question would then ask whether or not these
visual arrays are to the descriptive text, as Omaggio's pictorial contexts are to the narrative passage. The assessment of the degree of certainty in this ratio should not only lead to developments in the selection and design of reading passages, but it could also provide educators with a theory about the mental constructions that language learners create when building their comprehension or memory for a non-narrative passage. It is the contention of this investigator that information on the processes used by foreign language learners when reading and comprehending should result in more efficient instructional designs.

Objectives

The central hypothesis of the study is that selected types of diagrammatic organizers will facilitate reading comprehension in a foreign language (Spanish) by functioning as either reading or retrieval aids. If reading comprehension is a constructive process, the presentation of an organizational aid in the form of a spatially arranged diagram that is an already organized memory construction for later recall, should facilitate the reader's task. The diagram is actually a word outline of the sequential or logical development of the ideas in a passage. Specifically, it is the purpose of this exploratory study to examine the effect of two selected types of diagrammatic
organizers used as reading or retrieval aids on recall measures of reading comprehension in beginning college Spanish.

Operational Definitions

The following operational definitions were used in preparing the materials for the main and pilot studies:

1. **Diagrammatic Organizer.** A structured, schematic verbal representation of the superordinate propositions found in a reading passage, presented in a downward-vertical fashion.

2. **Superordinate Propositions.** Main propositions in a reading passage, as identified by applying Meyer's (1975) technique of content analysis.

3. **Reading Diagrammatic Organizer.** A diagrammatic organizer meant to be used when reading the passage.

4. **Retrieval Diagrammatic Organizer.** A diagrammatic organizer presented after reading the passage and before the administration of the comprehension measure.

5. **Indented Diagrammatic Organizer.** A word, schematic diagram indented following traditional outlining procedures.

6. **Boxed Diagrammatic Organizer.** A word, schematic diagram laid out in tree form with the nodes
boxed and interconnected by arrows.

7. **Comprehension.** Comprehension is considered as a global concept consisting of recall knowledge and recognition knowledge acquired from a stimulus reading passage. Only recall is considered and tested in the present study, however.

8. **Recall Knowledge.** Recall knowledge is a construct measured by means of a 10-minute summary written in English by the subject after reading the reading passage with the help of the diagram.

**Limitations of the Study**

The following limitations of the study should be considered when analyzing its results:

1. **Reading Passage:** The study is based on one expository reading passage in Spanish. Because reading passages differ not only in content and difficulty, but also in their rhetorical mode (narrative vs. descriptive vs. subjective-poetic), it is not advisable to generalize the results to all reading selections, but only to descriptive-expository passages.

2. **Diagrammatic Organizers:** Only two types of diagrammatic organizers were used in this study. Because other types of organizers in various kinds of print can be produced, it is difficult
to generalize the findings to all kinds of outlines or diagrams. Additional studies should explore the role of other types of diagrams on comprehension, as well as the effects of the subject's activity on diagram construction or completion. In fact, a number of other dimensions, including extension of the diagram and the language (native or foreign) used in the organizer, remain to be explored.

3. **Instrument:** Comprehension was a construct measured by a recall measure based on the application of Meyer's technique of analysis to the text. As with any construct, a limitation resides in the extent to which this criterion measure is a valid instrument in assessing what is going to be learned from reading the passage. Diagram-generation techniques other than Meyer's procedure should also be explored and possibly validated as measures of subject's recall.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Outlining is the salient pattern of organization preferred in many cultures. Through it, semantic elements or units of meaning that have equal importance in the overall meaning of the discourse are assigned paratactic or coordinate forms of expression. Conversely, semantic elements that are subordinated to other units of meaning are marked as subordinate by the use of sequence or order, conjunctions, or clause embedding (see Grimes, 1972b).

Thus, study skill manuals, reading skill courses, and style manuals always include outlining and diagramming as essential devices to aid reading comprehension and learning from text reading (see Wrightstone, Legitt and Reid, 1944; Baldridge Reading Instruction Materials, 1966; Strunk and White, 1972; Meara and Schmidt, 1974). As Glynn and Di Vesta (1977) state, teachers and students also rely on the organizing, facilitative potential of outlines and diagrams because "they depict the topics within a text, the sequence in which the topics are presented, and the superordinate-subordinate relationships
among topics in the textual presentation" (p. 89). Language teachers and textbook writers frequently use diagrams to present new vocabulary, morphological paradigms, and syntactical rules. A review of the literature, however, identifies only a few articles that describe the utility of schematic aids in the foreign language classroom, but no experimental studies on the role of diagrammatic aids in language learning or in reading comprehension in a foreign language. Thus, strong suggestions for the use of outlines are found in Jones and Roe (1975), who define diagrams (and their more technical forms, such as flow charts and graphs) as devices for semiotic encoding. These educators proceed to emphasize that in some foreign language learning situations, the ability to understand and use these realizations is an important requirement for reading success. Bartolic (1975) and Mead and Lilley (1975) also advocate the use of diagrams as aids for reading comprehension exercises. Diagrammatic representations have also been used in several textbooks [e.g., Allen and Widdowson (Eds.), English in Focus Series, 1974].

This study is based on research conducted in first language reading comprehension. The review of literature is divided into the following sections: 1) types of topical outlines or diagrams; 2) procedures for diagram generation; 3) research on the role of diagrams in
reading comprehension; 4) research on the locus of the
effect; 5) research on mental representations of dis­
course.

1. **Types of Outlines and Diagrams**

In general, outlining can be defined as putting
information "into a perspective in two dimensions, by
coordinating parallel elements and subordinating other
things to them" (Grimes, 1972b, p. 513). Nevertheless,
no formal system of classification exists at present for
describing different outline's features. The traditional
division into sentence outlines and topical outlines pre­
sented by Wrighstone, Legitt and Reid (1944) can be used,
however, as a basis for classifying outlines. These
authors emphasize the organizing potential of a topical,
schematic outline by describing it as a "device showing
by its skeleton form the main and subordinate divisions
of thought . . . and the relations of the ideas one to
another" (p. 116). Topical outlines have been developed
most successfully in the last decades, because they are
easy to read and retain. These diagrams owe their wide­
spread use and their varied forms, not only to the growing
complexity of knowledge to be acquired in formal (academic)
or informal (mass media) situations, but also to the
deliberate efforts of Communications Engineering ex­
perts. Today, students and ordinary citizens are pre­
sented with a wide variety of devices in the form of
indented, keyed, or boxed diagrams, and tree diagrams; flow charts, pie charts and other kinds of charts; profiles; and graphs. The overt goal of diagrams is to communicate information in a more organized and visual, therefore more efficient, way.

While the selection and use of diagrams remains a privilege of information communicators (teachers, journalists, writers, specialists), it is easy to see that oftentimes this is dictated by a compromise between considerations on the nature of the subject matter to be presented, and the kind of audience to be reached.

It would seem necessary and convenient then to delineate a classification now in order to make the conceptualizations in this study operational. The classification proposed herein takes a visual dimension as one axis, and a downwards-rightwards dimension as another. (Some evidence on downwards-rightwards preferences for setting up mental schemata will be discussed in section 5 of this chapter.)
On the basis of these criteria the following schematic organizers are considered as possessing an increasingly larger potential along both dimensions:

1. indented word diagram
2. keyed word diagram
3. tree word diagram
4. box-and-arrow tree word diagram

It is fair to argue that other equally valid systems of classification could be generated on similar bases. Because this study is an exploratory one, however, and because some claims will be made about facilitative effects being realized by arrays that can be analyzed along perceptual dimensions, the above classification can be considered adequate for the present purposes.

2. Procedures for Diagram Generation

Several researchers have devised procedures for analyzing the organization of information in prose in
order to manipulate different aspects of this organization and study its effects on comprehension. Although this study is not concerned with the manipulation of organization per se, a proven technique for diagram generation is needed to obtain an accurate representation of the ideas in a passage as well as an indication of the position of these ideas in a superordinate or sequential hierarchy.

All of the procedures that are going to be reviewed here, borrow from the most recent developments in the study of memory, especially from the new theories of discourse analysis and case grammar. Both Grimes' landmark book (1972), and Fillmore's leading paper (1968) form the backbone of these analytical techniques. It should not be surprising then that the procedures were published in 1972 and 1973, when there was a need for more systematic techniques for analyzing studies on memory for text content. It will also be apparent that from devising these representations of the semantic structure of passages, some psychologists went on to propound that the same representations also correspond to the memorial representations of fluent readers after reading the passages. The diagrams are therefore also used as templates against which to match and score subjects' protocols.
Fredericksen (1972, 1973) has devised a very complete system for analyzing and specifying the content of passages. His goal was to determine differences and similarities among the structures of passages in order to compare subjects' memory for them. This procedure requires the construction of two diagrams: One for the semantic structure of the passage, and one for the logical or relational structure. While the former is generated on the basis of Fillmore's case grammar (1968) and is organized into a hierarchy by using top-level subsuming concepts, the latter graphs propositions from the semantic structure represented as nodes, but it is not hierarchical. Fredericksen's contention is probably the strongest: People think in propositions. Thus, he directly proposes that the hierarchical semantic structure of a piece of discourse equals the structure in memory for the information in the discourse. Actually, the problem lies in that it is very difficult to describe and measure a memorial construction, if one does not postulate that this is similar to a schematic representation of the piece of discourse itself.

Crothers' technique (1972), on the other hand, also yields two graphs, but the form of generating them is different and relies more heavily on the analyst's conception of the structure of the passage. Thus, his
semantic hierarchy is crowned by higher-order concepts that certainly provide an ideational umbrella for the more specific concepts in the passage, but that do not appear in the passage itself. The hierarchy consists of an array of trees of concepts plus their intersentential relations. This second diagram depicts the fundamental structure of a paragraph and contains the trees from the semantic structure, plus their interconnections through logical connections. Although the data failed to support his predictions specifying that superordinate concepts would be recalled more often than subordinate, and that secondary subtrees would be recalled less often than primary, he states that his view "expressly denies that an outline is a rhetorical relic" (p. 277). It is clear then that he also assigns to his hierarchical mappings the essential quality of being representations of the reader's memory for a passage. In addition, he points out the practical value of the graphs as computational devices for analyzing protocols.

Van Dijk (1977) has also postulated a set of rules to reduce a text to its semantic macrostructures in order to represent the global meaning of a piece of discourse. He claims that "the processes (of comprehension) involve the use of macro-rules" (p. 4) by the reader. Therefore, the resulting "macro-structures help explain the ability to summarize discourse and to use information from discourse for other cognitive tasks" (p. 4). The macro-rules used to
obtain the macro-propositions are the following:

1. Generalization. The rule allows predicates and arguments to be generalized by a super-concept that encompasses all of them.

2. Deletion. By using this rule, full propositions that are not interpretable conditions, nor a consequence of a macro-proposition, can be deleted.

3. Integration. This rule deletes all information integrated into other propositions of the discourse that is not a normal condition, a normal component or a normal consequence of the fact denoted by the macro-proposition.

4. Construction. This rule allows the construction of information or the writing of a macro-proposition on the basis of micro-information in the text but at a more global level than the one in the text: this macro-information is "new" is the sense of not being explicit in the text.

These rules are, in fact, two very practical deletion rules to delete irrelevancies and redundancies; one generalization rule that substitutes category names for category members, and a construction rule that refers to a set of information as a whole, in an inferential way. Kintsch (1977) who has collaborated closely with Van Dijk in the generation of the semantic macro-structures theory, further specifies that after producing the macro-structures for a text, these can be made into a hierarchy by using the repetition rule. The
rule states that "after designating one of them (the macrostructures) as topical...levels of subordination can be determined objectively by noting the argument overlap that exists in a set of propositions" (p. 233). Using the Van Dijk-Kintsch procedure, the theory has been tested in a number of experiments. In one of these experiments, for example, it was proved that the probabilities of recall are a function of the level of the proposition in the hierarchy (Kintsch, 1977, p. 249). The problem with this procedure, however, lies in the fact that the designation of one of the macro-structures as topical remains a subjective decision of the text analyst.

Meyer's procedure has several advantages over the rest: It generates only one diagram that is hierarchical and that labels the informative and rhetorical functions of the units that compose it in an objective manner. Meyer (1975) adapted Grimes' procedure for discourse analysis, which also uses Fillmore's case grammar, to formulate a very comprehensive and accurate technique for content analysis which, at the same time, yields a hierarchy of the ideas in a passage. Her studies on the effects of manipulating the height of the ideas in the hierarchy of given passages have certainly signified an important advance in the study of comprehension (Meyer, 1975a and 1975b). Her data supported previous hypotheses that memorial traces are hierarchical or "staged" in the sense that lowering the height
of macro-propositions in a discourse affects recall negatively, while the raising of subordinate propositions does not result in their enhanced recall. "Staging" is a concept proposed by Grimes (1972), whose cross-cultural studies on the nature of connected discourse have led him to think that human discourse in organized into superordinate and subordinate propositions. Meyer's data point towards the psychological existence of staging, since they prove that staging manipulation is reflected on recall measures in the predicted direction and magnitude. Thus, we encounter once again the same proposal that semantic structures correspond to memorial structures.

To analyze the content structure of a passage following Meyer's technique, it is necessary to analyze all content words and phrases in a text and label the relationships between them meticulously. The labels that classify these relations are of two kinds: role relations and rhetorical relations.

**Role relations** specify the kind of relationships existing between a lexical predicate (content word that relates other words together) and its arguments (content words that describe, define, classify). Verbs, adjectives and adverbs are usually lexical predicates, while nouns and phrases realize arguments. These roles correspond to Fillmore's (1968) cases.
Rhetorical relations relate together large segments of text and their arguments, which are formed by whole propositions that are the top level of subordinate propositions. Although rhetorical predicates are not related to their arguments by specified roles, they "are ... responsible for giving prose its overall organization" (Meyer, 1975a, p. 31).

Role predicates and rhetorical predicates can be distinguished one from the other, because roles are always dominated by certain special types of content words, whereas rhetorical predicates are not (Meyer, 1975a, p. 41). Because this major division into role and rhetorical relations is subdivided into several subcategories, the interested reader is referred to Chapter II in Meyer's (1975) book, in which both the categories and the step-by-step procedure are explained in detail. Only a list of the main steps will be presented here:

**Step 1.** Write down all sentences in the passage. Break compound sentences into simple sentences. Diagram each sentence into its predicate and arguments.

**Step 2.** Analyze arguments that are rhetorical propositions.

**Step 3.** Identify rhetorical predicates in complex and compound sentences.

**Step 4.** Identify other rhetorical predicates among sentences.

**Step 5.** Identify and use top level rhetorical structure.
Step 6. Make a time line, if necessary.

Meyer's technique of prose analysis was chosen to analyze the texts that were used in this study, in order to generate the corresponding diagrammatic semantic structures for the texts. Because the procedure yields only one graph that depicts a hierarchical array of the ideas in a passage objectively (without the analyst's provision of top-level subsuming macro-propositions to generate the hierarchy) it was considered to be the most adequate to produce the diagrams and the list of propositions for scoring the recall protocols.

3. Research on the role of word diagrams in reading comprehension

The basic tenet that supports research on the role of diagrams in reading comprehension is that a topical diagram performs an organizational function on the new material in a reading selection by clearly identifying the main ideas and directing attention selectively on them. Rothwell (1974) expands the above by specifying that the organizing function is realized by the easily visualized display of the sequential or hierarchical development of the author's logic. In these experiments subjects are provided with schematic aids in the form of diagrammatic organizers that show the super-/subordinate relationships among the ideas in the text. The effects of diagrams have generally been contrasted to the effects of prose advance
organizers, or pictorial organizers on reading comprehension scores. The results obtained tend to favor the organizing potential of diagrams, but the comparisons are somewhat confusing. Thus, further research has always been recommended by the authors.

Christensen and Stordhal (1955), for example, hypothesized that the provision of some organizing system should facilitate the recall of reading materials. They manipulated 36 different combinations of pre-reading outlines, underlining, pre- and post-prose summaries, and two types of heading in a pre-/post-test design. No significant results were obtained when reading comprehension scores were analyzed. With a different statistical approach, however, significance might have been detected.

Glynn and Di Vesta (1977) conducted a study in which both the time of presentation of an indented word diagram (before/after reading the passage) and the structure of the reading (logical/scrambled) were orthogonally manipulated. The reading selection used was a non-narrative, descriptive-expository type of text constructed on the basis of one of Bower et al.'s (1969) conceptual hierarchies. (Bower's study is discussed in section 5 of this chapter.) The pre-reading or advance diagrammatic organizer was found to significantly facilitate factual recall. A logically sequenced text and the same diagram used as a post-reading or retrieval outline interacted to
significantly enhance inferential reading tasks ($p < .05$).
Overall, the recall of specific facts was superior to that of general facts ($p < .001$), implying an experimental demand to be accurate, according to experimenters' own interpretation. The absence of organizational aids resulted in a generalized inhibition of productive inferences in the control group, in accordance with the theory and also with pedagogical intuitions.

In another study by Rothwell (1974) subjects were blocked in three reading ability levels and were presented with four different kinds of outlines or diagrams, namely, paragraph outline, indented outline, keyed outline, and boldface emphasis in the printed page. While there was a significant increase in the time spent in the task for those subjects who actually used the aids (many students reported having discarded the aids) comprehension of main ideas was found to be significantly increased by the use of the indented type of diagram. The keyed diagram, in turn, significantly reduced the time invested in the reading. In addition, according to the subjects' reports, outlines generally increased the perceived reading ease of the more difficult of the two expository passages used in the experiment. In general, the aids proved more effective for the high school juniors of high and superior reading ability.
Extending Rosenblatt's (1975) study, Hall (1976) examined the effects of non-prose organizers on the comprehension of a narrative passage. She provided either a pictorial aid or a schematic organizer in the form of a word diagram, prior to the reading of the selection. The study concentrated on below-average readers in ninth grade. The group using the pictorial advance organizer performed significantly better than the control and the diagram group in this order. These results conflict with those obtained by Rosenblatt (1975) who obtained enhanced performance with schematic or diagrammatic aids. He contrasted the latter with prose advance organizers, however, so that the comparison between these two studies is not completely valid.

Kuhn and Novak (1969) manipulated advance prose organizers illustrated by diagrams, presented one week before and immediately prior to the actual content learning session. The retention scores were significantly higher for the advance organizer plus diagrammatic aid group (p < .01). Weisberg (1970) also hypothesized that "more visual media for the organization" of information should produce more learning than highly abstract verbal media. Therefore, he compared the scores of groups using prose advance organizers, maps of the ocean floor, and graphs to aid the learning of an Earth Science unit. He found that the map facilitated the task the most, that the graph was almost as efficient as the map, and that the verbal aid did not
contribute significantly to the learning task. All differences were detected at $p < .05$. His results are likely to be confounded by a teacher-effect uncontrolled variable, however, because the learning event took place in a tutorial environment.

In a somewhat similar situation, Baker (1974) also obtained a significant increase in learning and retention by providing structured overviews prior to the reading of the materials. Structured overviews consisted of a combination of lecturing and schematic aids in this study.

Bowman (1975), on the other hand, was not able to support his hypothesized facilitating effects of structured overviews or word diagrams, even when instruction on how to use these aids accompanied the diagrams in some conditions. Performance on factual-verbatim and inferential items of a multiple-choice reading comprehension test was not significantly higher for the undergraduates using the diagrammatic organizer.

More in the line with the levels of processing theory, (Craik and Lockhart, 1972), Arkes, Schumacher, and Gardner (1976) set up an experiment in which the variable of interest was the kind of activity associated with a reading task. In accordance with the theory and with pedagogical intuitions, the tasks that required longer and deeper interaction with the materials did double the recall. These tasks were outlining and copying.
A study outlining the role of organizing skills in reading success was done by Johnson (1974). He found that even within the same block of poor readers, those who are high subjective organizers score higher in inferential reading tasks than low subjective organizers as measured by Bousfield's scale. The ability to organize new material is thus shown to make the difference in poor readers' comprehension scores.

4. Research on the Locus of the Effect

In connection with the alleged organizing, facilitative effect of diagrammatic organizers on the comprehension and retention of new material, a question about the locus of the effect also arises: Does the influence of the organizing power of schematic overviews have its effect when they function as advance organizers, or is their potential realized after the reading of the text has taken place, when they function as organizing retrieval devices instead? Gagné and Wiegand (1970) addressed this question by examining the effects of a superordinate verbal context (topic sentence) provided as either a learning or a retrieval aid. The results obtained indicated that the topic sentence improves the recall of facts when it was presented after the reading and immediately before the retention test.

Using diagrams or word outlines, Glynn and Di Vesta (1977) also obtained significantly enhanced performance on
the inferential items of a reading comprehension test when a retrieval diagram and a logically organized passage were presented. Conversely, the advance word diagram produced higher scores in factual recall when used in conjunction with either logical or scrambled sequences. It would seem then that retrieval diagrams facilitate learners' elaborations on the material.

Barron and Stone (1974) studied the effects of student-constructed graphic organizers on reading comprehension measures. The graphic organizers consisted of an arrangement of terms related to the major concepts in the passage in schematic form. The scores of the group constructing its own graphic organizer after the reading were significantly higher ($p < .05$) than those of the group using the experimenter-made diagram. In turn, there were no significant differences in performance between the latter group and the control group using no organizer at all. It is clear, however, that the students' involvement in the construction of their own word diagram after reading, as opposed to students using an experimenter-generated advance graphic organizer is a variable that is confounding the results. The depth of processing of the material is substantially different for each group as demonstrated by Arkes, Schumacher and Gardner (1976) in a study discussed in section 3 of this chapter.
5. **Research on Mental Representations of Discourse**

Another area of research supplying theoretical support to the present study is one in which different theories on the psychological reality of mental layouts is examined. As Handel, London and DeSoto (1968) comment, the "ordering of elements in thinking is so commonplace that it is easy to overlook the question of how it is accomplished"; "...even in abstract reasoning tasks people rely on internal spatial constructions as thought models" (p. 351). Thus, results obtained through varied experimental manipulations have consistently pointed to the existence of central organizing principles that regulate the construction of memory traces for verbal materials.

Huttenlocher (1968), for example, proposes that reasoning processes in three-term series problems correspond to the setting up in the subject's mind of spatial arrangements that are memory representations of verbal descriptions read to him; e.g., "Tom is taller than Sam, and John is shorter than Sam." It has been found that both the time required to answer questions on the verbal descriptions, and the error probabilities are dependent on the kind of presentation used. Problems stated negatively or starting in the middle rather than at one of the end terms are more difficult to process. There seems to be evidence to argue not only for the psychological reality of these mental diagrams—in fact, subjects themselves
claim that they do arrange the items in a mental space, but also for a clear preference for the setting up of rightward and/or downward mentally ordered sequences. Handel et al. (1968) and Huttenlocher (1968) have described the physico-spatial properties of these mental diagrams very thoroughly. The principles regulating the allocation of items to different places in mental space tend to make the mental layout more easily imaged and might, in a sense, be also regulating the establishment of mental schema that are the memory for the ideas in a passage.

Other work with word lists by Bower, Clark, Lesgold and Winzenz (1969) also demonstrates the facilitating effects of presenting the lists in already organized hierarchies displayed in tree form. In fact, recall was from two to three times higher with the hierarchically structured presentation than with random-order presentations. This evidence led Bower et al. to contend that the provision of structured retrieval schemas was sufficient to produce such impressive enhancement of recall. In previous experiments the provision of category labels for the list had increased recall by only 13%. It is apparent that the tree-boxed form of the diagram showing the class-inclusion relationships by means of subordinate nodes helped boost the recall of the word list. Bower (1972) adds that the "subject could efficiently use a conceptual hierarchy as a retrieval plan, beginning his recall at the top node
and unpacking it recursively from the top down" (p. 116). This approach to the problem connects his results to Handel et al.'s (1968) explanation of a downward preference (as opposed to upward preference) when dealing with conceptual layouts.

This concept of gradual downward unpacking of nodes of nested categories is also related to Grimes' "staging" concept, in which the nodes are represented by the succeeding episodes in a story. Staging is, in turn, the guiding principle in the labeling of rhetorical relations in Meyer's procedure. (Both Grimes and Meyer's ideas were discussed in section 2 of this chapter.)

As Greeno (1973) comments in his review of studies on the structure of memory, it seems as if by now it has been quite well determined that the memorial representations for information acquired through reading or listening have properties that are not only independent from the linguistic features of the input, but that also take on forms that vary according to the nature of the input and the conventional frames within which the discourse is approached. Pylyshyn (1973) adds to the above by defining memory representations as symbolic descriptions of what is known. These descriptions contain highly abstracted and interpreted propositional knowledge that "is not very different from the kind of knowledge asserted by a sentence (p. 7)."
Bransford and Franks (1971), Barclay (1973), Bransford, Barclay and Franks (1972) have proposed that related items of information are integrated into a single unified whole in the subject's cognitive structure, which may or may not be physically describable. The subject is thus seen as the "constructor" of his/her comprehension of sentences or passages. In this constructive process, the prior knowledge of the world and the organization of this knowledge in cognitive structure are seen as having a crucial bearing. Innumerable studies have supported the basic tenets of this theory, such as those by Bartlett (1932), Dooling and Lachman (1971), Sachs (1967), Kintsch and Monk (1972), Johnson, Bransford and Solomon (1973). This work is illustrative of the saliency of the role played by contextual and cultural clues on the comprehension process.

An even higher-level approach has been formulated by Grimes (1972), Crothers (1970), Fredericksen (1972), Kintsch and Van Dijk (1975), Kintsch (1977), Van Dijk (1977), Rummelhart, Lindsay and Norman (1972), who conceive of the text material as being the input for the laying out of mental networks of concepts and relations. It is further proposed that these networks are dependent upon and integrated into even higher-level networks of analysis that have been called frames, schemes, or macro-structures (Van Dijk, 1977).

It is easily seen that whatever the level of analysis at which one starts or finishes the study of memory
representations, the dominating principle is hierarchical organization. Furthermore, that organization is apparently realized by mental representations that more often than not share the spatio-visual characteristics of word diagrams. The provision of such structures is thus considered not only an aid for comprehension but also a probe on the features attributable to mental layouts.

Summary

The review of the literature on the role of non-pictorial organizational aids in reading comprehension processes indicates that many relevant questions are still to be formulated and investigated in the field of foreign language learning. The existing evidence in native-language reading tasks supports the idea that aids in the form of diagrammatic organizers or word outlines should facilitate comprehension in a foreign language by providing a schema in which the sequential or logical development of the ideas in the passage are inserted and easily analyzed along perceptual lines. Hypothetically, the facilitating effect would be realized through the visual features of diagrammatic organizers. A question about the locus of the effect is also posed and an exploration on the reading versus a retrieval function of these aids is proposed. On the basis of the existing evidence, it seems reasonable to propose that the provision of diagrammatic organizers should facilitate foreign language learners' comprehension.
tasks after reading a descriptive-expository text, given the imperfect knowledge of the linguistic information that they have. Indeed, the provision of a device that shares the quasi-perceptual features of mental layouts should result in increased comprehension.
CHAPTER III
RESEARCH DESIGN AND PROCEDURES

Population

The population consisted of students enrolled in Spanish 102.01 at The Ohio State University during the Winter Quarter of 1979. Many of these students were fulfilling the Arts and Sciences requirement of 20 hours of a foreign language. The majority of these students were freshmen and their ages ranged from 18 to 22 years. All of them were in the classroom track program (as opposed to the individualized track) and were receiving conventional classroom instruction for five periods a week mainly from Graduate Teaching Associates. The basic text used in all the 102 sections was La Lengua Española, Second Edition, by Castells and Lionetti; New York, Charles Scribner's and Sons, 1978.

Sample

The sample consisted of 12 sections of 102.01 students enrolled at The Ohio State University during the Winter Quarter of 1979. The sample was representative of the population in all relevant ways, such as class size, age
range of the students, proportion of male/female students, and kind of instructor. Twelve intact classes were randomly selected and assigned to each of the four treatment conditions in the study. The size of the sample was 161 students. Sixty percent of these students were females.

Research Design

The study was a one between-one within groups partial hierarchical design (Kennedy, 1977, pp. 520-530) in which variable A was the time of presentation variable; variable B was the classroom variable; and variable C was the type of diagrammatic organizer variable. Variable A had two levels as described below:

1. Reading organizer, presented with the passage, available for reference during the reading only.
2. Retrieval organizer, presented after reading the passage, before answering the recall test. Not available for reference during reading or testing.

Variable B was made up of the twelve intact classes randomly nested into the two levels of the A variable in order to control for classroom effects. Variable C had two levels, namely:

1. Indented diagrammatic organizer, and
2. Boxed diagrammatic organizer.

There was one dependent variable in the study: a recall measure of reading comprehension, as measured by a summary
of the passage written in English by the subjects.

Figure 2 below illustrates the design of this study:

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Figure 2. Time of Presentation by Type of Diagrammatic Organizer by Classroom

Materials

It was agreed with both the Chairman of the Department of Romance Languages and Literatures and the Coordinator of the Spanish courses that the experiment would not interfere in any way with ongoing instruction. Furthermore, the experiment was structured so that it would contribute to student learning in accord with the departmental course syllabus and the goals of the Spanish 102 program. Hence, the reading passages used were designed so that they would conform to the linguistic and instructional restrictions imposed by the basic text. Careful control of the vocabulary and structures used in the experimental materials was exercised, and the experimental events took place during the periods allotted to general reviews of the
materials covered in the instructional process.

Text

The text used in the experiment was a 450-word, encyclopedia-like passage on "Las clases sociales en el Imperio Inca" ("Social Classes in the Inca Empire") adapted by the researcher from several cultural readers. The text is assumed to resemble and represent those commonly found in elementary Spanish textbooks. No title was provided to the students in order to control for the organizing effects that titles and headlines have on comprehension (Dooling and Lachman, 1971). A minimal number of lexical items was glossed in the right margin, a technique also used in the basic text of the course. (The full text appears in Appendix B).

The text was written so that students in Spanish 102 could read it in an average time of 15 minutes. A descriptive, encyclopedia-like rhetorical mode was chosen for the reading passage. This kind of discourse consists mainly of simple, declarative sentences. According to Crothers (1972, p. 248) there is a "frequent recurrence of the same semantic concepts exemplified by diverse individual members" in these texts. These properties result in texts that are comparatively easier to grasp as a whole because of the unequivocal development of one central topic into its connected, branching, supporting concepts. The advantages become more apparent when contrasted with narratives,
for which different cultures seem to have different conventional super-structures as demonstrated very early in the study of memory for discourse by Bartlett (1932). The risk of distortions is thus even higher when Indian legends or tales are used, because these have been constructed on the basis of conventional super-structures different from Western-culture story super-structures. Even for ordinary narratives there always exists the need to interpret literary transformations appropriately in order to understand the series of complications and resolutions created by the author. In sum, an expository-descriptive type of text was chosen in order to control for the literary-interpretative skills necessary for reading stories.

**Diagrammatic Organizers**

In all four experimental conditions, either of two types of diagrammatic organizers was used to comprise the levels of the diagrammatic organizer variable. A basic diagram or the text's content structure was first constructed by using Meyer's (1975) procedure described in Chapter II. This procedure was preferred to others because it was felt to be the most objective to apply in a two-language situation, in which readers would be reading a passage in a foreign language, to recall it later in their native language.

Meyer's procedure makes use of Grimes' (1972) semantic grammar of propositions (a grammar that describes the
semantic relationships between propositions in discourse) and of Fillmore's (1968) case grammar (which labels the roles of arguments in sentences). Meyer's procedure in its present form is the result of several years of empirical refinement and simplification (Meyer 1973, 1975a, 1975b), so that in her later studies (reported in her 1975 book) the predictions based on the structure of prose, as described by her basic diagram, were experimentally confirmed. This is not the case with Crother's and Fredericksen's procedures, which yield two diagrams that have failed so far to describe accurately the reader's memory for a reading selection. On the other hand, Kintsch's (1974, 1977a, 1977b) system has also been extensively used by his students and research team and has yielded very important empirical evidence for the study of memory for text. The procedure is used for generating texts of equivalent structure, however, which is not the methodological purpose of diagram construction in the present study. Meyer's diagram is referred to as the content structure of the passage, and it shows both the subordination of the ideas in the text and their interrelationships. (The texts' content structures can be found in Appendices A and B).

In order to have a further control for subjectivity in the construction of the text's content structure, a second person was trained by the researcher in the use of
Meyer's technique. This person was knowledgeable in the field of linguistics but had not had experience in discourse analysis. Two top-level diagrams were obtained (one made by the linguist and the other by the researcher), and these were subsequently analyzed jointly in order to clarify any differences that might have appeared in their construction. Only one minor difference was found, which was easily resolved. In addition, another linguist supervised the breaking down of the text propositions.

Two versions of the basic diagram were then constructed by the experimenter. The first was a diagrammatic organizer laid out in indented form like the traditional topical outlines. The second diagrammatic organizer was laid out in a tree, box-and-arrow form, corresponding to a more easily visualized diagram. These types of diagrams were selected because they stand on the extremes of the classification scale proposed in section 1 of Chapter II. Furthermore, both types of diagrams have been found to increase comprehension of written discourse in studies by Rothwell (1974) and Glynn and Di Vesta (1977) who report on the indented type; and by Rosenblatt (1975) who analyzed the effects of the boxed type on comprehension. (These studies were reviewed in section 3 of Chapter II). Both diagrams contained the same top level propositions taken directly from the text base obtained after analyzing the passage through Meyer's procedure. Therefore, both
diagrams differ only in format. (Both diagrams are presented in Appendix B).

The tree diagram was constructed by enclosing the superordinate propositions of the passage in boxes corresponding to the nodes of the tree. The boxes were then connected by means of arrows that represent the rhetorical relations connecting the superordinate propositions in the passage.

The two types of diagrammatic organizers were distributed randomly to the subjects and presented either with the reading passage (as a reading organizer) or after the reading (as a retrieval aid).

Specifically, subjects within level 1 of the time of presentation variable randomly received one of the organizers attached to the two-page reading passage. Fifteen minutes were allotted to reading the passage and studying the diagram, after which time all materials were collected and the criterion measure subsequently applied.

Subjects in level 2 of variable A were randomly given one of the organizers after they had read and returned the passage to the instructor. These subjects were given three minutes in which to study the organizers. Then, the organizers were collected before administering the criterion measure.

Time allotments were made on the basis on the results of the pilot study, and also on the researcher's previous
experience with in-class reading assignments and diagram study.

Instrumentation

The criterion measure described below was used to assess recall knowledge after the subjects had read the passage and studied the diagrams.

Recall Measure: The students were allowed a maximum of 15 minutes to write (in English) a summary of the passage after they had read it and studied the diagrams. Students were instructed to recall as accurately as possible the main information or ideas in the passage, the supporting explanations, illustrations, or secondary facts mentioned in the passage. This summary was considered a recall measure of reading comprehension, and it was tallied for the total number of idea-units in it.

Scoring the Recall Measures

Summaries were scored with the aid of the passage's content structure. Any particular summary was scored for the presence of idea-units of the content structure in it. Idea-unit is the global term used by Meyer to signify both content units (actual information from the text) and relationship units (rhetorical relations between the content units). The researcher scored all the summaries, but, in order to control for systematic bias in the scoring process, a second scorer was obtained and trained in the use of the
content structure for scoring the protocols. Fifty summaries were selected at random and scored by this second scorer. Interscorer reliability was then calculated by means of a Pearson Product-Moment correlation and it was .98.

For scoring the recall protocols, a copy of the passage's content structure was placed by the summary and each idea-unit recalled was located in the content structure and counted as present. Because the content of the passage was factually informative, it was very seldom necessary for scorers to judge whether or not particular idea-units were present in a protocol. If a content unit was recalled, it was counted independently from whether or not it was recalled in the correct relationship to other content units in the passage. Rhetorical relations, which relate content units to other content units in the passage, were not counted, however, unless they were recalled in correct relationship to the corresponding information.

In scoring summaries, spelling errors in English were disregarded. The few intrusions found usually consisted of the inclusion of the Spanish conqueror's name in the recalls, with the names Cortés and Pizarro being mentioned about equally.

The content structure of the passages was found to be extremely useful and reliable for scoring the recall measures. It was also fairly easy to train the second scorer on how to use the content structure diagram for scoring
subjects' protocols. The scoring process itself was tedious and time-consuming, however, and the scorers soon discovered that they were unable to do more than six summaries at a time.

Data Collection

Dependent variable data, which consisted of summaries of the reading passage, were collected in one 45-minute period and it was received by the researcher immediately after the experimental session.

Pilot Study

A pilot study was conducted in four Spanish 102 classes in order to:

1. conduct tests of significance on the data obtained to determine the language (English or Spanish) in which the organizers should be written.

2. refine experimental procedures; determine appropriate length of the reading passage; examine the clarity of instructions; and consider the plausibility of treatment and measurement conditions given the in-class time restrictions.

The text used in the pilot study, "Principales actividades de los Chibchas," was edited in consultation with the Spanish 102 program director. The text was an encyclopedia-like descriptive passage, adapted to meet the grammar and vocabulary restrictions of the 102 level. For
this reason, it was not possible to use in the pilot study the same text designed for the main study; "Las clases sociales en el Imperio Inca" was written in accordance with another set of topical and linguistic restrictions valid for the time when the main experiment was conducted. Both reading selections are similar, however, in that their content structure is hierarchically organized following the attribution-collection-specific chain that is fairly common among descriptive passages. Both the passage and its content structure can be found in Appendix A.

Variable A, the time of presentation variable, consisted of two levels in the pilot study, as in the main study:

1. Organizer presented with the reading passage.
2. Organizer presented after collecting the reading, before administering the test.

Variable B, classrooms, was nested in levels of A. Specifically, two classes were nested at random into each of the two levels of A.

Variable C, the language of the organizer variable, consisted of two levels in the pilot study, with versions of a boxed diagrammatic organizer in:

1. English, and
2. Spanish

Figure 3 below illustrates the design of the pilot study:
Two versions of the same boxed tree diagram, one in English and one in Spanish, were thus constructed to make the two levels of variable C. This variable was included in the pilot study in order to make a decision on more objective grounds on what language was going to be used in the organizers of the main study.

The boxed diagram was constructed by the experimenter by enclosing the superordinate propositions of the passage in boxes corresponding to the main nodes; the latter were subsequently connected by arrows that showed the rhetorical relations among superordinate propositions in the passage. Both the English and the Spanish versions of the tree diagram contained exactly the same propositions.

One dependent variable was used in the pilot study to test recall knowledge of the reading passage. The recall measure was a 10-minute summary written in English by the subjects, after reading the selection, regardless of the

Figure 3. Time of Presentation by Language of the Organizer by Classroom
language used in the organizer. The recall measure was scored by tallying total number of idea-units recalled by the subject in his/her summary. The content structure obtained by applying Meyer's procedure of text analysis to the passage was used as a template or criterion in scoring the idea-units. All materials used in the pilot study can be found in Appendix A.

Four Spanish 102 classes were selected at random from the population, and subsequently assigned randomly to one of the two levels of the time of presentation variable (variable A). A total of 64 students participated in the study. The four instructors were individually approached by the researcher, and the procedures and time schedule for the experiment were carefully explained to them. The instructors cooperated fully, and on January 16, 1979 they administered the treatments according to the following schedules:

**Condition 1**: Organizers used as reading aids.

15 minutes Students received a copy of the passage along with one of the diagrammatic organizers distributed at random. Students were instructed to read the passage and study the organizer.

10 minutes The passages and organizers were collected, students were instructed to write a summary of the passage in English, recalling as much information as they could from the reading
Condition 2: Organizers used as retrieval aids.

15 minutes Students received a copy of the passage and were instructed to read it.

3 minutes Passages were collected, and the two types of diagrammatic organizers were passed out at random to the students. Students were instructed to study the organizer.

10 minutes Organizers were collected, and students were instructed to write a summary of the selection in English, including as much information as they could possibly recall on the passage.

For both conditions, instructors made certain that students put their names on all materials used, so that the summaries could be coded appropriately. Instructors understood the importance of this step, because in both conditions the organizers were passed out at random.

The researcher tallied the summaries, and the data were submitted to an appropriate analysis of variance using the SOUPAC Balanova 5 program that can deal with mixed designs. The design appears in Figure 3 in this chapter, and the results of the statistical analysis can be found in Appendix A. No significant differences were detected on the criterion measure between levels of the language of the organizer variable, nor between levels of the time of presentation variable. The main effect for class was
significant at the .05 level; this effect was not followed up by other tests, however, because it did not interact with the variables of interest. Intrascorer reliability was .99 and was calculated by a Pearson Product-Moment correlation.

On the basis of the information collected in the pilot study, some modifications were considered for the main study:

1. Because the instructors indicated that many students had asked for a few extra minutes for writing their summaries, the time schedule was modified to allow a maximum of 15 minutes for writing the recall measure.

2. Because no significant differences in the language of the organizer variable were detected on the criterion measure, it was decided to construct the diagrammatic organizers for the main study in Spanish. The reason for this decision was based on the need for more information on student performance in the foreign language, the framework in which this study is inserted.

3. Because the design of the study was effective in controlling for classroom effects, it was decided to retain the same design for the main study.

According to the instructors' opinions, general procedures seemed appropriate and were therefore not changed for the main study.
General Procedures: Main Study

At the beginning of the Winter Quarter of 1979, Spanish 102 instructors were contacted during the first regular 102-level meeting. The researcher explained the general purpose of the study to them and was assured of their cooperation. General procedures and the instructors' role were also explained to them on that occasion. The reading experiment was scheduled for February 15, 1979. Students did not receive any prior instructions, however, nor did instructors receive the materials until the day of the experiment. Contacts at a personal level with the instructors emphasized the importance of keeping a relaxed atmosphere during the experiment and of adhering to the instructions and the time schedule. Both the Chairman of the Department of Romance Languages and the Human Subjects Review Committee of The Ohio State University approved the experiment.

Twelve intact classes were chosen randomly from the population and were assigned at random to one of the two levels of the time of presentation variable. A random numbers table was used for the selection and assignment of classes to treatments. Each instructor received a packet of materials, which contained the passages and diagrammatic organizers, and an instruction sheet. The experiment proceeded smoothly, and instructors returned the materials to the researcher as soon as each of their
sessions was over. Students were told that they would not be graded, thus ensuring their free participation in the experiment. (Instruction sheets are included in Appendix B).

Careful coding of the summaries by the researcher followed their reception from the instructors. The code contained a complete identification of the subject according to his/her corresponding number within the sample (1 to 161), his/her placement in one of the levels of the A variable (1 or 2), the number of the classroom within the two levels of A (1 to 6), the type of the organizer used [indented (1) or boxed (2)], and another corresponding number depending on his/her placement within the halves of each class. The same coding system was used in the computer cards. It may be convenient to clarify at this point that, as a result of the random administration of one of the two types of organizers in each level of A, each class was split into two groups, one using the indented organizer and the other using the boxed organizer. This division of the classes into two groups was designed to further control for classroom effects.

Time Schedule of the Experiment

The schedules for the two main conditions of the study were as follows:

**Condition 1:** Organizers used as reading aids.

15 minutes Students read the passage and studied the
diagrammatic organizer attached to it that had been distributed to them at random. Passages and diagrams were collected.

15 minutes Students wrote a summary of the passage.

**Condition 2: Organizers used as retrieval aids.**

15 minutes Students read the passage. Passages were collected.

3 minutes Students studied one of the organizers distributed at random. Organizers were collected.

15 minutes Students wrote a summary of the passage.

**Statistical Analysis**

The data collected were subjected to an analysis of variance (ANOVA) appropriate for the one between-one within groups partial hierarchical design used in the study. This analysis is an option of the Balanova program of SOUPAC and takes into account the nesting of one of the variables (classrooms) into the two levels of the A variable (time). Scores for total number of idea-units were entered for the recall measure.

Time of presentation of the organizers and type of organizers served as independent variables. Classroom effects were controlled for by nesting classes equally into the two levels of the time of presentation variable.
All data were analyzed by the Instruction and Research Computer Center at The Ohio State University, using the SOUPAC, Balanova 5 program. The following null hypotheses were tested:

1. $H_0$: There will be no significant difference attributable to variation in the time of presentation variable on a recall measure of reading comprehension.

2. $H_0$: There will be no significant difference attributable to variation in the classroom variable on a recall measure of reading comprehension.

3. $H_0$: There will be no significant difference attributable to variation in the type of diagrammatic organizer variable on a recall measure of reading comprehension.

4. $H_0$: There will be no significant interaction between the type of diagrammatic organizer and the time of presentation variable on a recall measure of reading comprehension.

5. $H_0$: There will be no significant interaction between the type of diagrammatic organizer variable and the classroom variable (nested within levels of the time variable) on a recall measure of reading comprehension.
Summary

The central objective of this study was to test whether the top content structure of a passage provided to readers in the form of a diagrammatic organizer affects comprehension of the passage. Determination of the locus of the effect was also sought. Because the foreign language learner is faced with materials that are generally unfamiliar and difficult to process, it was hypothesized that aid in the form of diagrammatic organizers provided from the outside should facilitate his/her processing of the information and enhance comprehension.

In this exploratory study, two kinds of diagrammatic organizers were presented either with the reading passage, or after the students had read the reading selection and before they completed the criterion measures. The organizers were selected because they stand on the extremes of a visuo/spatial continuum.

Research in native language discourse comprehension lent both theoretical support and a basic methodology to conduct this study.
CHAPTER IV
RESULTS

Introduction

A one between-one within-groups partial hierarchical design (see Kennedy, 1977, pp. 520-30) was used in this study to assess the effects on reading comprehension of two types of diagrammatic organizers presented at different times during an experimental session. These organizers were presented to subjects as reading aids, either with the reading text or after the text had been read and collected. Reading comprehension was tested by means of a recall measure.

In this study, the Time of Presentation variable consisted of two levels:

1. Reading organizer, presented with the passage and available for reference during the reading only.
2. Retrieval organizer, presented after reading the passage, not available during reading or testing.

The Type of Organizer variable also consisted of two levels:

1. Indented diagrammatic organizer.
2. Boxed, tree diagrammatic organizer.

Classrooms were built into the design as a third factor in order to control for classroom effects. Six classrooms were nested within each of the two levels of the time of presentation variable. Each class was in turn randomly divided into two groups, one experiencing the indented organizer and the other the boxed organizer.

Operational definitions of the levels of the variables can be found in Chapter I.

The instrument used to generate response measure was a 15-minute summary written in English by the subjects. The criterion measure was used to assess recall knowledge after reading a stimulus passage in Spanish. The text's content structure appearing in Appendix B was used as the criterion for counting total number of idea-units present in each subject's protocol. Interscorer and intrascorer reliabilities, calculated by Pearson Product-Moment correlations, were found to be .98 and .99, respectively.

An analysis of variance appropriate for the design of the study was performed on the total idea-unit recall scores. The unweighted means method was used by the computer program in this analysis, even though cell frequencies were unequal and disproportionate. In effect, although an attempt was made to obtain equal or proportionate cell frequencies by assigning six classes to each treatment, the need to use intact classes of varying size
(ranging from 5 to 21 students) precluded equal Ns for all 24 groups. A least squares approach, which should also be considered in such a case, is not feasible with this ANOVA that handles the nesting of a random variable within the levels of the main factor.

The computer program used in the analysis was the SOUPAC, Balanova 5 program (1). SPSS (Statistical Package for the Social Sciences) was the program used to make the reliability tests, and to obtain weighted cell means and standard deviations.

The results of this analysis are discussed in this chapter. Findings are discussed in relation to the five null hypotheses tested in this study. A summary of findings and conclusions can be found in Chapter V.

The following subsections are contained in this chapter:

1. Description of the data collected on the recall measure.
2. Discussion of the results of the analysis of variance for the recall measure.

1. Description of the Data

An examination of the descriptive statistics of this study, presented in Tables 1 and 2, reveals a 10-point

(1) SOUPAC was developed at the Computing Services Office of the University of Illinois at Urbana-Champaign, Urbana, Illinois 61801.
difference between the levels of the main factor, Time of Presentation. In effect, the mean for the reading condition ($A_1$) is 54.90 (S.D. 18.85), whereas the mean for the retrieval condition ($A_2$) is 65.20 points (S.D. 25.10). The highest mean score was obtained by the students using the boxed organizer in the retrieval condition: 68.06. The grand mean for the sample was 60.91 points.

These statistics are presented in Tables 1 and 2. Table 1 presents weighted cell means and standard deviations on the recall measure, and Table 2 presents a summary of weighted means and standard deviations of main-effects on the recall measure.

When comparing the overall means for the two levels of the Type of Organizer factor, a smaller difference of 6.5 points can be observed. The mean for the Indented group was 57.71, and the mean for the Boxed group was 64.22. A more pronounced gain of 12 points is seen when comparing the means of the groups using the indented organizer in the reading condition (50.51; S.D. 19.20) and in the retrieval condition (62.57; S.D. 25.78). A smaller difference is observed between the reading-boxed group and the retrieval-boxed group, whose means were almost 9 points apart (59.14 and 68.06, respectively).

In summary, a tentative examination of descriptive statistics across the levels of the two main variables clearly shows that the higher means occurred in the
<table>
<thead>
<tr>
<th>Time of Presentation</th>
<th>Classes (A)</th>
<th>Classes (B)</th>
<th>Type of Diagrammatic Organizer</th>
<th>(C)</th>
<th>Totals</th>
<th>(D)</th>
<th>(E)</th>
</tr>
</thead>
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<td>n = 8</td>
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<td>Ag</td>
<td>82</td>
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<tr>
<td></td>
<td></td>
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<td>S.D. 17.10</td>
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<td>S.D. 20.28</td>
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<tr>
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<td>mean 73.50</td>
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<td>S.D. 17.06</td>
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</tr>
<tr>
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<td>5(n=19)</td>
<td>n = 10</td>
<td>n = 9</td>
<td>Totals</td>
<td>85.37</td>
<td>17.06</td>
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<td>S.D. 17.06</td>
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<td></td>
<td>6(n=8)</td>
<td>n = 4</td>
<td>n = 4</td>
<td>Totals</td>
<td>85.37</td>
<td>17.06</td>
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<td>mean 73.50</td>
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<td>S.D. 27.23</td>
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<td></td>
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<td>S.D. 17.06</td>
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<td></td>
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</tr>
<tr>
<td>Totals A2</td>
<td>(n=94)</td>
<td>n = 49</td>
<td>n = 45</td>
<td>n = 94</td>
<td>Totals</td>
<td>85.37</td>
<td>17.06</td>
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<tr>
<td></td>
<td></td>
<td>mean 62.57</td>
<td>mean 68.06</td>
<td>S.D. 25.70</td>
<td>S.D. 24.30</td>
<td>S.D. 25.10</td>
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<tr>
<td>Totals</td>
<td>12(n=161)</td>
<td>n = 82</td>
<td>n = 79</td>
<td>n = 161</td>
<td>Totals</td>
<td>85.37</td>
<td>17.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mean 57.71</td>
<td>mean 64.22</td>
<td>S.D. 22.04</td>
<td>S.D. 20.28</td>
<td>S.D. 23.21</td>
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Table 2

Summary of Weighted Means and Standard Deviations of Main Effects on the Recall Measure

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<th>Time of Presentation (A)</th>
<th>Classes (B)</th>
<th>Type of Diagrammatic Organizer (C)</th>
<th>A Totals</th>
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<td></td>
<td></td>
<td>Indented (C₁)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Boxed (C₂)</td>
<td></td>
</tr>
<tr>
<td>Reading (A₁)</td>
<td>n = 6</td>
<td>n = 33</td>
<td>n = 67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mean 50.51</td>
<td>mean 59.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S.D. 19.20</td>
<td>S.D. 17.75</td>
</tr>
<tr>
<td>Retrieval (A₂)</td>
<td>n = 6</td>
<td>n = 49</td>
<td>n = 94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mean 62.57</td>
<td>mean 68.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S.D. 25.78</td>
<td>S.D. 24.30</td>
</tr>
<tr>
<td>C Totals</td>
<td></td>
<td>n = 82</td>
<td>n = 161</td>
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<td></td>
<td>mean 57.71</td>
<td>mean 60.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S.D. 22.04</td>
<td>S.D. 23.21</td>
</tr>
</tbody>
</table>
Table 3
ANOVA of Recall by Time of Presentation, Type of Diagrammatic Organizer, and Classrooms

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<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
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<tr>
<td>Between</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A (Time)</td>
<td>1</td>
<td>2,864.7597</td>
<td>3.86</td>
</tr>
<tr>
<td>B/A (Classes)</td>
<td>10</td>
<td>742.1968</td>
<td>1.54</td>
</tr>
<tr>
<td>Within</td>
<td>149</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Type)</td>
<td>1</td>
<td>533.3724</td>
<td>0.80</td>
</tr>
<tr>
<td>A x C</td>
<td>1</td>
<td>276.7921</td>
<td>0.41</td>
</tr>
<tr>
<td>B x C/A</td>
<td>10</td>
<td>742.1968</td>
<td>1.40</td>
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<tr>
<td>S/BC/A (Subjects)</td>
<td>137</td>
<td>480.2796</td>
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</tr>
<tr>
<td>Total</td>
<td>160</td>
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</tr>
</tbody>
</table>
retrieval condition for both kinds of organizers.

2. Results of the Analysis of Variance

Examination of the results of this analysis reveals no significant F ratios. The unit of analysis in this test was classrooms. The method of unweighted means, which assumes equal cell frequencies was used in this analysis. Table 3 contains the results of the ANOVA on the count of total number of idea-units in the summaries written by the subjects. Tables 1 and 2 present weighted means. A discussion of the findings in relation to the null hypotheses tested follows.

Hypothesis I: There is no significant difference attributable to variation in the Time of Presentation variable on a recall measure of reading comprehension. This hypothesis must be retained since the examination of the analysis of variance performed on the recall measure revealed a non-significant F-ratio for this main effect. Perhaps significance might have been found with a larger N because the data show a 10-point difference between the weighted means of the reading organizer group (54.90) and the retrieval organizer group (65.20). (See Table 2).

It should be mentioned at this point that the ANOVA performed on the data was not a simple three-way analysis of variance—which does yield a significant F for this effect—but an appropriate test that distributes degrees
of freedom differently, in order to account for the nesting of the random variable, Classrooms, within the levels of the main factor. This makes significance more difficult to attain. Another analysis of variance made by collapsing over the classroom variable and using subjects as the unit of analysis, also yields significant differences beyond the .05 level. Such analysis is not justified in this case, however, because classroom effects were significant at the .15 level (p < .129).

Hypothesis II. *There is no significant difference attributable to variation in the Type of Diagrammatic Organizer variable on a recall measure of reading comprehension.* This hypothesis must be retained. For this group of students, the type of diagrammatic organizer used did not yield significantly different idea-unit mean counts. An examination of Tables 1 and 2 seems to indicate that the time of presentation affects recall more noticeably than the type of diagram used. (See discussion for hypothesis I above). Because the information contained in the diagrams was exactly the same, the layout of the aids appears to be irrelevant for comprehension. In effect, the overall difference in means between the Indented (57.71) and Boxed (64.22) groups failed to be significant. Specifically, students using the boxed diagram scored 9 points higher in the reading condition, and 6 points higher in the retrieval condition on the average, as an examination of
Hypothesis III: There is no significant difference attributable to variation in the Classroom variable on a recall measure of reading comprehension. This hypothesis must be retained because the F ratio for classroom main effects is not significant at the .10 level. This may mean that both the design and the experimental procedures effectively helped in controlling for classroom effects. Because the effect is significant at the .15 level, however, further analyses are not justified in a conservative approach to the analysis of variance. Perhaps a larger N or more proportionate cell frequencies could have diminished the probabilities of significance for this factor.

Hypothesis IV: There is no significant interaction between levels of the Time of Presentation and the Type of Organizer variables on a recall measure of reading comprehension. This hypothesis must also be retained, because the F tests of interaction failed to be significant. It should be noted, however, that both diagrams were more effective in the retrieval condition ($A_2$), with an advantage of 5.5 points for the boxed kind. The gain for the indented organizer was of 12 points; the gain for the boxed was of almost 9 points. The mean of the students using the boxed organizer
as a retrieval aid (condition $A_2$) was the highest: 68.06. 
(See Figure 4 below).

Figure 4. Treatment-Group Weighted Means for 
Recall Measure. Type of Organizer 
By Time of Presentation.

Hypothesis V: There is no significant interaction between 
levels of the Type of Organizer variable and of the Classroom variable on a recall measure of reading comprehension. 
This hypothesis must be retained because an examination of 
the analysis of variance reveals no significant $F$ ratio for 
this interaction. This means that classes as such did not 
perform significantly differently, when using one type of 
organizer as opposed to the other. In fact, experimental 
arrangements were designed expressly so that this inter­
action would not obscure the main effects under study.

In summary, the data of this study analyzed by means 
of a conservative approach fails to substantiate significant 
differences among classes with regard to the treatments
involving Time of Presentation and Type of Organizer. Classes were used as the unit of analysis and an appropriate ANOVA was performed on the data.
CHAPTER V
SUMMARY, CONCLUSIONS AND IMPLICATIONS

Overview

This study examined the effects of two types of diagrammatic organizers on a recall measure of reading comprehension in beginning college Spanish. The schematic aids were presented at two different times in a reading sequence to two groups of students.

There were two independent variables in the study: Time of Presentation and Type of Diagrammatic Organizer. The Time of Presentation variable consisted of two levels: 1) reading organizer, available for reference during the reading; 2) retrieval organizer, presented after collecting the passage, not available during reading or testing. The Type of Diagrammatic Organizer variable consisted of two levels: 1) indented diagrammatic organizer; 2) boxed, tree diagrammatic organizer. Classrooms were also built into the design as a third factor, in order to control for classroom effects.

A one between-one within-groups partial hierarchical design was used in the study and an appropriate ANOVA was performed on the data. The 161 students that participated
in the study were enrolled in twelve 102 Spanish classes during the Winter quarter of 1979 at The Ohio State University.

There were two treatment conditions in the experiment. In condition $A_1$ (reading organizer condition) students were randomly given a booklet with the reading passage and either type of diagrammatic organizer to be used as reading aids. In condition $A_2$ (retrieval organizer condition), subjects read the passage, which was collected after fifteen minutes. Then students were provided at random with either type of diagrammatic organizer to be used as retrieval aids. All materials were collected before students wrote the recall summaries. Fifteen minutes were allotted for passage and diagram reading in the first condition. Subjects in the second condition were also allowed 15 minutes for passage reading, but were given three extra minutes for diagram study. All subjects were given 15 minutes to write a summary of the passage. This summary was used as a recall measure of reading comprehension. The recall measure was the dependent variable in the study.

**Summary of Findings**

A review of the findings indicates no significant differences between treatment group means beyond the .05 level. A brief discussion of the findings with respect to the research questions investigated follows.
Question 1: What are the effects of two selected types of diagrammatic organizers used as comprehension aids on a recall measure of reading comprehension in beginning college Spanish?

Although there is a difference of 6.5 points between the overall means of the groups using either type of organizer, this fails to be significant. The mean score for the students using the indented type of organizer was 57.71, whereas the mean for those using the boxed type was 64.22. This failure in obtaining significance can be attributed to at least three reasons:

1. It seems possible that the novelty of the boxed organizer and its conciseness prompted the students to write more concise and therefore shorter summaries.

2. For twelve subjects (7.5% of the sample), the perceived demand for structure and conciseness became overt because they abandoned connected prose in their summaries for a telegraphical, spatially organized resume that tended to duplicate the original boxed diagram. Although these summaries contained most of the main or superordinate ideas in the passage, the scores on total number of idea-units were very low because secondary ideas and rhetorical relations were not included.

3. The difference in means between the two conditions
may also be considered an indication on the irrelevance of the type of aid used in conjunction with the time of presentation. An examination of treatment-group means reveals a difference of almost nine points in favor of the boxed type used as reading aid, but of only six points when used as retrieval aid. This leads us to question 2.

Question 2: What are the effects of the time of presentation of the diagrammatic organizers on a recall measure of reading comprehension in beginning college Spanish? Do the word diagrams exert their facilitative effect when used as reading aids or as retrieval aids?

The data from this study did not produce definite evidence on the locus of the effect of diagrammatic organizers used as reading comprehension aids. There is a 10-point difference between the means of the reading condition (54.90) and of the retrieval condition (65.20), however, which might be indicating that this effect should be explored again in other experimental efforts. Although the difference failed to be significant when analyzed by means of a conservative approach to the analysis of variance, the 10-point gain may perhaps be explained by the following reasons:

1. The schematic overviews contribute informational cues only once the reader has constructed a general meaning structure of the passage. The
organizing potential of the diagrams may there­fore be realized when the reader already has a certain amount of information in his cognitive structure by facilitating the setting up on memory of a more comprehensive, final mental schema to be used when writing the recall measure.

2. In the reading condition, because the readers were reading in a foreign language, the provision of the organizer along with the reading passage may have seemed superfluous to them and was therefore disregarded as a reading aid.

3. Because reading a passage in a foreign language imposes special demands on the reader's attention, the latter may have been saturated by too much information at one time in the reading condition. This possible explanation does not refer to time restrictions, however, since only two students in the sample were unable to finish the reading in the time allotted. Rather, it is related to limits on the attention and memory span of sub­jects performing a memory task. Subjects in the retrieval condition may have thus profited from renewed attention powers aroused by the mere change in activity, in a release-from-proactive­inhibition manner. (See Wickens, 1972).
In summary, the results of this study seem to indicate that the provision of diagrammatic organizers affects reading comprehension in some ways, but the differences fail to be significant. In fact, a conservative analysis of variance of the recall data did not yield significant F ratios for the main effects under study, nor for interactions. A more liberal approach, however, using subjects as the unit of analysis, did yield significant effects for the two main variables.

Recommendations for Further Research

The present study examined only two of all possible questions on the role of schematic verbal aids in foreign language comprehension and learning. Future studies should explore other important questions related to individual differences among the users of outlines; the role of schematic aids in listening comprehension, and vocabulary and paradigm learning; the effects of diagrammatic organizers on the comprehension of different age groups and different academically or non-academically oriented learners; the role of diagrams on the comprehension of other types of texts, such as narrations and stories; and the effects of structured overviews of this kind on the comprehension of other foreign languages. More research on these or other related research topics should help educators to form a more complete idea of the kind of aid
necessary for each reading task in a foreign language. Because mean differences were statistically significant when using a more liberal approach to the analysis of variance (see Chapter IV), a replication of this same study using a larger sample and a control group is strongly recommended in order to explore the possible effects produced by the same schematic aids used as retrieval aids as opposed to reading aids.
Appendix A. Pilot Study

1. Reading Passage
2. Content Structure
3. Diagrammatic Organizers
4. ANOVA Table
Los chibchas eran un grupo de indios que vivían en Colombia y que formaron una rica cultura agraria. No alcanzaron el grado de civilización extraordinario de otros grupos indios como los mayas y los aztecas, porque las cordilleras separaban a las tribus y hacían difícil la administración política; las tribus tenían organizaciones independientes. Sin embargo, los chibchas tenían varias actividades bastante interesantes.

Dos jefes o reyes de las dos regiones más grandes de Colombia dirigían las tres actividades más importantes: la guerra, la religión y la administración política. Había un jefe en el sur del país (el zipa) y otro en la región central (el zaque).

La guerra y la conquista eran la actividad más importante para los chibchas, porque eran la base del poder de los jefes principales. Las tribus chibchas vivían en varios pequeños estados y unos pocos de éstos eran independientes. Entonces, el zipa o el
zaque querían dominar a estas tribus independientes y había guerra. Los soldados eran profesionales y formaban un grupo bastante importante.

La segunda actividad importante era la religión; los chibchas tenían muchas leyendas y muchos dioses. Los jefes, que eran como dioses, eran personas muy especiales en las ceremonias*. Las ceremonias eran muy largas y los sacerdotes* ofrecían sacrificios* humanos a los dioses. Los sacerdotes estaban a cargo de enseñar a pequeños niños que después eran las víctimas* de estos sacrificios. Cuando los chibchas tenían un nuevo jefe había una ceremonia muy interesante: los sacerdotes lo cubrían de oro y lo llevaban a una ceremonia especial en un lago.

La tercera actividad importante era la actividad política. Los jefes también trabajaban mucho en estas actividades, porque era difícil y peligroso administrar tantos pequeños estados que estaban en diferentes regiones inaccesibles.
Otras actividades secundarias que alcanzaron cierta importancia entre los chibchas fueron las actividades artísticas*, el cultivo de la tierra y la educación de los nuevos jefes.

Los artistas chibchas eran notables y tenían técnicas* de gran perfección* para trabajar el oro y las esmeraldas que Colombia produce. Ellos usaban moldes* de tierra y hacían objetos de oro más bonitos que en otros países; estos objetos también impresionan por su tamaño tan pequeño. La cerámica chibcha también era bastante buena, pero no tan bonita como el trabajo en oro y cobre. Además, los chibchas construyeron edificios, palacios* para los jefes y templos con columnas que medían más de diez metros de alto.

La mayor parte de la población trabajaba la tierra. Cultivaban mucho maíz de diferentes variedades* y también muchas frutas y tabaco. Los métodos de cultivo eran bastante avanzados. No tenían muchos animales y, en general, no comían mucha carne.
La educación de los nuevos jefes era importante, porque los consideraban semi-dioses. Los jóvenes vivían en templos por largos años y tenían una vida muy difícil; por ejemplo, los sacerdotes no les permitían ver el sol.

Otras actividades de los chibchas eran la extracción de oro y sal de las minas para sus trabajos artísticos y para cambiarlos por otras cosas.
LOS CHIBCHAS

CONSTITUENCY IDENTIFICATION

ERAN UN GRUPO DE INDIOS

ESTAN VIVIENDO EN COLOMBIA

LA VIDA EN VARIOS PEQUEÑOS ESTADOS INDEPENDIENTES

PARA FORMAR UNA RICA CULTURA AGRARIA

EXPLANATION

ADVERSATIVE

NO ALCANZARON EL GRADO DE CIVILIZACIÓN EXTRAORDINARIO

SOLUCIÓN COLABORAR CON OTROS GRUPOS INDIOS

COMO LOS MAYAS, COMO LOS AZTECAS

COLECTION

FORCEN LA FORMACIÓN DE NUEVOS ESTADOS INDEPENDIENTES

LAS CORDILLERAS SEPARABAN A LAS TRIBUS

LAS CORDILLERAS HACIAN DIFÍCIL LA ADMINISTRACIÓN POLÍTICA

ENTonces, COLECCIÓN, CONSECUENTE

TENÍAN A LAS TRIBUS

LAS ORGANIZACIONES INDEPENDIENTES DE LOS ESTADOS INDEPENDIENTES

UNOS POCOS ESTADOS

DURÍAN A LOS JEFES

RELATIVOS A LAS REDES CIVIL-DIÓSES

ÍRREGULAR LAS DOS REGIONES MÁS GRANDES DE COLOMBIA

COLECTION: EL ZAQUE

EN EL SUR

EL ZAQUE

EN LA REGIÓN CENTRAL

LAS TRES ACTIVIDADES MÁS IMPORTANTES

ASIGNACIÓN DE VARIAS ACTIVIDADES BASTANTE INTERESANTES

RELATIVOS A LA GUERRA Y LA CONQUISTA ERAN LA MÁS IMPORTANTE,

PORQÜE ERA LA BASE DEL PODER

EN LOS JEFES PRINCIPALES

EL ZAPATO O EL ZAQUE QUÍN DEN DOMINAR.
A patient

WE CAN AS

plement

LATER

FUNCTION

latter

•collection

LAS BONITAS

collection

QUE IMPRESIONAN

For their size

THE CERAMIC CIRCULAR WAS ALSO QUITE GOOD

advective

THAT IS NOT THAT GOOD

such as the work in gold and silver

Besides constructions

patient

buildings

temples

object

objects of gold

benefactive

FOR THE CHIEFS

THE CHIEF TEMPLES WERE MORE THAN TENS METERS HIGH

EL CULTIVO DE LA TIERRA

object

collection

PATIENT

THE LAND

agent

THE MAJOR PART OF THE POPULATION

CULTIVABAN

specific

collection

MAIZE

attraction

DIFFERENT VARIETIES

MANY FRUITS

TAX

AN

patient

TASTE OF CULTIVATION

advective

collection

THEY DID NOT HAVE MANY ANIMALS

they did not eat much meat

THE EDUCATION OF THE NEW CHIEFS WAS IMPORTANT

causal

BECAUSE THEY CONSIDERED THEM SEMI-DIOSES

causal

LIVE A DIFFICULT LIFE

adversative

collection

NO ALLOWED THEM TO SEE THE SUN

which allowed them to live

THE TEMPLES
FOR LARGOS AÑOS
OTRAS ACTIVIDADES ERAN
specific
collection
LA EXTRACCIÓN DE ORO
LA EXTRACCIÓN DE SAL
latter
collection
PARA SUS TRABAJOS ARTÍSTICOS
PARA CAMBIARLOS POR OTRAS COSAS
former
LAS MINAS

Key: Capitalised words = content words from the text
Capitalised words
*with dashed = words from the text serving underlining
as lexical predicates
Small case words = roles
Underlined small
case words = rhetorical predicates
Pilot Study: Boxed Diagrammatic Organizer in English

AGRARIAN CULTURE
several activities;
tribes separated by
mountains;
many small states

TWO CHIEFS
semi-gods
conquerors
administrators

RELIGION
semi-god chiefs;
human sacrifices;
long ceremonies;
priests

WARFARE
conquer independent states;
dominate several tribes;
professional military

AGRICULTURE
good methods;
most people cultivated
land;
many varieties of corn

ART
techniques of great
perfection;
worked gold, emeralds
ceramics;
palaces, temples

POLITICAL ADMINISTRATION
very difficult;
organized into
small states

EDUCATION OF CHIEFS
very strict rules;
lived in temples
Pilot Study: Boxed Diagrammatic Organizer in Spanish

CULTURA AGRARIA
- varias actividades
- cordilleras separaban tribus
- varios pequeños estados

DOS JEFES
- semi-dioses
- conquistar
- administrar

RELIGION
- largas ceremonias
- jefes semi-dioses
- sacrificios humanos
- sacerdotes

GUERRA
- conquistar tribus
- independientes
- dominar varios estados
- soldados profesionales

ADMINISTRACION POLÍTICA
- muy difícil
- organización en pequeños estados

ACTIVIDADES ARTÍSTICAS
- técnicas de gran perfección
- trabajaban oro, esmeraldas, cerámica, palacios, templos

CULTIVO DE LA TIERRA
- trabajaba mayoría población
- buenos métodos
- variedades de maíz

EDUCACION DE LOS JEFES
- muy difícil
- vivían en templos
APPENDIX A

Table 4
ANOVA of Recall by Time of Presentation, Language of the Organizer, and Classrooms

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (Time)</td>
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<td>0.4069</td>
</tr>
<tr>
<td>B/A (Classes)</td>
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<td>5,012.2178</td>
<td>6.8083*</td>
</tr>
<tr>
<td><strong>Within</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Language)</td>
<td>1</td>
<td>22.6644</td>
<td>0.0405</td>
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<tr>
<td>A x C</td>
<td>1</td>
<td>519.7008</td>
<td>0.9287</td>
</tr>
<tr>
<td>B x C/A</td>
<td>2</td>
<td>559.6124</td>
<td>0.7601</td>
</tr>
<tr>
<td>S/BC/A (Subjects)</td>
<td>56</td>
<td>736.1909</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05
Appendix B. Main Study

1. Reading Passage
2. Content Structure
3. Top Level Structure
4. Diagrammatic Organizers
5. Instruction Sheets
Main Study Reading Passage

"La clases sociales en el Imperio Inca"

La cultura quechua o inca era la más importante en la América del Sur cuando llegaron los españoles en el siglo XVI. Los indios quechuas tenían una civilización muy avanzada y grandes conocimientos de ingeniería, comunicaciones, economía y estadística*. La organización del Estado era muy eficiente*, porque el emperador tenía poder* absoluto y dirigía el trabajo de todos los grupos sociales. En el Estado Inca, cada clase social tenía funciones* bien específicas* y su magnífica organización hizo posible el gran progreso de esta cultura.

El Inca o emperador, y su familia, formaban la clase más importante del imperio. Ellos vivían en la capital, el Cuzco. El Inca administraba el Estado y su poder era absoluto. Los edificios públicos, las minas de oro, las plantaciones y la tierra eran de los Incas. Además, el Inca recibía una gran parte de todas las cosechas como tributo*. Sin embargo,
el Inca también tenía que ayudar a toda la gente del imperio según su clase social y sus necesidades. El Inca también tenía que dirigir la construcción de edificios y caminos y defender* el imperio. El sistema de caminos y la existencia de sólo una lengua oficial para todo el imperio ayudaban al Inca a administrarlo. Hoy todavía hay algunos caminos.

Otra clase muy importante era la clase de los sacerdotes*, porque tenía gran influencia en las decisiones políticas y en la educación. El jefe máximo* de esta clase era también el Inca, pero el Gran Sacerdote o jefe religioso era un hermano suyo y vivía en el Cuzco. Los sacerdotes no tenían la obligación de trabajar la tierra; su principal obligación era adorar* al Sol y administrar los templos.

La tercera clase social de importancia era la de losnobles o jefes de las tribus que los Incas dominaban. Estos nobles tenían que viajar al Cuzco varias veces al año y después aplicar* la política del Inca en las regiones del imperio.
Además de estas tres clases altas, había tres clases menores: la de los soldados, la de los empleados del Estado y la de los campesinos.

Los soldados* estaban a cargo de defender el imperio. Además, tenían la función de controlar el trabajo de los empleados y de los campesinos.

El éxito* del sistema de administración del imperio fue posible gracias a los empleados del Estado. Ellos estaban a cargo de medir y contar toda la producción, la cosechas, los animales y la tierra. Cada año, los empleados dividían la tierra para los campesinos y, después de cada cosecha, ellos dividían una parte para el Inca, una parte para el dios Sol y una parte para los campesinos. Para contar, ellos usaban un sistema de nudos* y cables muy notable, porque los quechuas no sabían escribir.

Los campesinos o "comuneros" formaban comunidades de familias que vivían en grupos. Todos trabajaban juntos la tierra, como en una cooperativa, pero recibían del Estado sólo una parte de la cosecha. Todos los campesinos, hombres y mujeres, tenían la
obligación de trabajar la tierra por veinticinco años, entre los 25 y los 50 años. Muy pocos campesinos tenían tierra propia*; sólo cuando el Inca se las daba a cambio de un servicio muy extraordinario. Hoy en día, hay muchos indios quechuas que todavía viven en comunidades y trabajan juntos.

Otros grupos los formaban los mensajeros* o chasquis, los maestros y los historiadores.

El trabajo de todos estos grupos, además de la eficiente organización del Estado, hizo posible el gran progreso de esta cultura que los españoles destruyeron* desgraciadamente.
Las clases sociales en el imperio Inca

El emperador tenía poder absoluto, antecedente
Porque el emperador controlaba el trabajo de todos los grupos sociales, antecedente
Porque cada clase social tenía funciones bien específicas, antecedente

Tres clases altas
La que llena el estado inca

Familia
El Inca

Poder era absoluto, equivalente
administraba

Poseía (en las)

Minas de oro
Plantaciones

El Inca

Recibía

Gran parte de las cosechas
Gran parte de la producción

El Inca

Tenía que ayudar a

Con la gente

Tenía que dirigir

La construcción

Tenía que defender de otros indios hostiles

Les daba tierra a los campesinos, consecuente
A cambio de un servicio extraordinario, consecuente

Era también el Jefe máximo
LA CLASE DE LOS SACERDOTES ERA OTRA CLASE MUY IMPORTANTE. COVARIANCIA, CONSECUENCIA.

Los sacerdotes eran la clase religiosa predominante del Imperio Inca. El templo del Sol, ubicado en Cuzco, fue el centro religioso más importante. Los sacerdotes se encargaban de administrar los templos y de trasladar al sol para que tuvieran que trabajar la tierra. No tenían gran influencia en las decisiones políticas, pero eran importantes en la educación.

La tercera clase social de importancia en el imperio eran los nobles. Los jefes de las tribus eran quienes viajaban al Cuzco varias veces al año para aplicar la política del Inca después de las regiones del imperio.

Había tres clases menores. Los soldados estaban a cargo de defender el imperio y controlar el trabajo de los campesinos. Los empleados del estado hicieron posible el éxito del sistema de administración del imperio. Covarianza, consecuencia.

La clase de los empleados del estado, covarianza, antecedente.

Los campesinos dividían la tierra, la cosecha, los animales y la tierra para los dioses. Los empleados del estado hacen posible el éxito del sistema de administración del imperio. Covarianza, consecuencia.

Antecedente.
PARA CONTAR

95

UN SISTEMA ESTADÍSTICO NOTABLE

PARA CONTAR

INSTRUMENT

LOS MUESTRAS Y CABLES

LOS CAMPESINOS

EQUIVALENTE

HISTORIADORES

URGANIZACION DEL ESTADO INCA ERA MUY EFICIENTE, COVARIANCIA.

SU MAGNÍFICA ORGANIZACIÓN, COVARIANCIA, ANTECEDENT

HIZO POSIBLE EL GRAN PROGRESO DE ESTA CULTURA, COVARIANCIA.

CONSEQUENTE

LA ORGANIZACIÓN DEL ESTADO INCA ERA MUY EFICIENTE, COVARIANCIA.

CONSECUENTE

LA CULTURA QUECHUA ERA LA MÁS IMPORTANTE

LA CULTURA INCA ERA LA MÁS IMPORTANTE

CONSTITUYENTE IDENTIFICACIÓN

LOS INDIOS QUECHUAS

ATRIBUTIÓN

ATRIBUTIÓN

HABÍAN UNA CIVILIZACIÓN MUY AVANZADA

HABÍAN GRANDES CONOCIMIENTOS DE

EXPLICACIÓN

HISTORIADORES

ESTADÍSTICA

COMUNICACIONES

EQUIVALENTE

LA EXISTENCIA DE SOLO UNA LENGUA OFICIAL

EL SISTEMA DE CAMINOS

ATRIBUTIÓN

ATRAVÉSARON AL INCA A ADMINISTRAR EL IMPERIO

EVIDENCIA

NO HAY TÍTULOS DE NIÑOS CAMINOS INCAS

VIVEN EN COMUNIDADES HAHÍAN UNA CIVILIZACIÓN MUY AVANZADA

TRABAJAN JUNTOS HAHÍAN UNA CIVILIZACIÓN MUY AVANZADA

NO SABÍAN ESCRIBIR

NO SABÍAN ESCRIBIR

EN LA REGIÓN DEL SUN
Key: Capitalized words = content words from the text
Capitalized words with dashed underlining = words from the text serving as lexical predicates
Small case words = roles
Underlined small case words = rhetorical predicate
Figure 5

Top Level Structure of the Main Study Passage: "Las clases sociales en el imperio Inca."

The organization at the top of the content structure of this passage consists of a result relationship between complex propositions stating information about the features contributing to the success of the Empire and a complex proposition stating information about the Empire itself.

The antecedent-consequent rhetorical predicates of the top structure of this passage are hypotactic, because they are not of equal weight. Paragraphing and signalling indicate that the author centered the passage on the antecedent's development, which branches down into a series of specific, collection, attribution rhetorical predicates.
I. ORGANIZACION DEL ESTADO

-muy eficiente porque:
el Inca tenía poder absoluto y
controlaba el trabajo de todos
-las clases sociales tenían funciones específicas

II. INCA (emperador)

-administraba el Estado
-poseía tierras y edificios
-recibía cosechas como tributo

SACERDOTES

-influencia en la política y en la educación
-adoraban al Sol

NOBLES

-aplicaban la política del Inca

III. SOLDADOS

-defendían el imperio
-controlaban el trabajo

EMPLEADOS DEL ESTADO

-median y dividían la producción y la tierra

CAMPESINOS

-vivían en comunidades
-cultivaban la tierra
MAIN STUDY: BOXED DIAGRAMMATIC ORGANIZER

ORGANIZACIÓN DEL ESTADO

muy eficiente porque:
el Inca tenía poder absoluto y
controlaba el trabajo de todos;
las clases tenían funciones específicas

INCA
(emperador)
administraba el Estado;
poseía tierras y edificios;
recibía cosechas como tributo

SACERDOTES
influencia en la política
y en la educación;
adoraban al Sol

NOBLES
aplicaban la política
del Inca

SOLDADOS
defendían el imperio;
controlaban el trabajo

EMPLEADOS DEL ESTADO
median y dividían la
producción y la tierra

CAMPESINOS
vivían en comunidades;
cultivaban la tierra
CONDITION 1: INSTRUCTION SHEET

To: Spanish 102 Instructors
From: Angela Labarca
Ref.: Experiment in Reading Comprehension

Instructions for students

Please tell your students that this is a reading exercise, not a test. Tell them to read the passage carefully and that you will be giving them some questions on an informal quiz after they read. Point out to them that it is to their benefit to read the passage as carefully as time allows because it will help indicate to them how they can expect to do on the reading sections of the exams. Finally, tell them that it might be a good idea to look first at the diagram and then read.

Time schedule for the experiment

1. Give out the reading and the attached diagram at random. Instruct students to put their names on the booklets immediately. Give students 15 minutes to read the diagram and the passage in silence. Collect everything.

2. Instruct students to write IN ENGLISH a summary of the passage, writing down as much information as they can possibly remember. Give them 15 minutes to do this. Make sure they put their names on the papers again. Collect them.

3. Please return passages, diagrams, and summaries to me. Use the same envelope. If you wish, attach a note with your comments or impressions.

If you wish to do so, you can tell the students that the exercise is part of a study on reading comprehension being done in the Department. Tell them that they will get their scores as soon as possible.

Thank you all for your cooperation. Your help is very much appreciated. MUCHAS GRACIAS.
CONDITION 2: INSTRUCTION SHEET

To: Spanish 102 Instructors
From: Angela Labarca
Ref.: Experiment in Reading Comprehension

Instructions for students

Please tell your students that this is a reading exercise, not a test. Tell them to read the passage carefully and that you will be giving them some questions on an informal quiz after they read. Point out to them that it is to their benefit to read all the materials as carefully as time allows because it will help indicate to them how they can expect to do on the reading sections of the exams.

Time schedule for the experiment

1. Give out the reading. Give students 15 minutes to read. Collect it.

2. Give out the diagrams at random: One for each student. Instruct students to put their names on the diagrams immediately. Give them 3 minutes to study the diagrams. Collect them. Make sure students put their names on them.

3. Instruct students to write IN ENGLISH a summary of the passage, writing down as much information as they can possibly remember. Give them 15 minutes to do this. Make sure they put their names on the papers again.

4. Please return passages, diagrams, and summaries to me. Use the same envelope. If you wish, attach a note with your comments or impressions.

If you wish to do so, you can tell the students that the exercise is part of a study on reading comprehension being done in the Department. Tell them that they will get their scores as soon as possible.

Thank you all for your cooperation. Your help is very much appreciated. MUCHAS GRACIAS.
BIBLIOGRAPHY


Bowman, J. D. "The Effects of a Cognitive Organizer with and without Accompanying Directions for Its Use as a Facilitator of Reading Comprehension." Ph.D. dissertation, 1975. ERIC #ED 126493


