The impact of formal schemata on L3 reading recall

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Rhetorical structure refers to a complex network of relationships and the way the underlying ideas are organized within a text. This study was conducted to see whether explicit instruction of descriptive and causative text organization positively affected L3 reading recall. 240 Turkish students of EFL who had Persian as their second language were assigned to two groups (experimental and control) controlled for language proficiency with only the former receiving instruction in rhetorical organization. Comparison of pre-test and post-test written recall data showed that explicit instruction had a positive effect on L3 reading recall. It was also noted that the amount of L3 reading recall was a function of the type of rhetorical organization of reading texts.

Keywords: Formal Schemata; Reading; Recall; L3

1. Introduction

Reading comprehension can be seen as a process that depends for success on the interaction of text and reader characteristics. An important, but often neglected, aspect of this process concerns the effects of rhetorical organization of texts on readers' comprehension and recall (sharp, 2002). Tracing the rhetorical development of a text has to do with the process whereby the writer, given the raw material, has selected from it, organized it and given it coherence, until it suits his purpose. As such, it seems useful for readers to be able to analyze text structure; if they can identify the principle by which the text has been organized and see how the ideas within the text hang together, it is easier to interpret difficult sentences. Readers who cannot do this may find the text is very much like a jigsaw puzzle in which the parts can be identified but the way they fit together is fuzzy, is never organized (Nuttall, 1996). It was hypothesized in this study that explicit rhetorical organization instruction positively affects reading recall.

2. Background

Etymologically, a rhetor is a public speaker whose characteristic art is that of addressing courts of law and popular assemblies (Dixon, 1971). Rhetoric was traditionally defined as the art of public oratory (O'sullivan, Hartley, Saunders, Montgomery, and Fiske, 1994). What has been given in many

sources as the definition of rhetoric almost supports this classical notion of rhetoric. For example, in Asher and Crystal (1992), and O'Sullivan, et al. (1994), rhetoric is defined as the art of oratory or persuasive speaking. A new look at rhetoric in the post-audiolingual era of the 20th century resulted in a redefinition of the term. For instance, Flower (1993) considered new rhetoric as not just a tool for communication or persuasion but as a process of social individual meaning-making.

The emergence of the new rhetoric was most probably due to the problems of written discourse which had been overlooked in the 1950's and early 1960's when two main trends in the study of rhetoric gained force: generative rhetoric and contrastive rhetoric. Generative rhetoric developed under the influence of Transformational Generative Grammar (TGG) as a reaction against the organicist position that claimed that a difference in form always entailed a difference in meaning (Malmkjar, 1991). Conversely, TGG argued that one common deep structure, for example, was shared by an active sentence and its passive version. Later, generative rhetoric lost its significance and gradually developed into a new branch of linguistics called text linguistics which gave birth to what is now known as contrastive rhetoric. Contrastive rhetoric emerged from the hypothesis that different languages reflect differences in the habitual patterns of thought of their speakers (Malmkjar, 1990). Kaplan (1966) (cited in Maftoon, 1979, p. 13) believed:

> Each language and each culture has a paragraph order unique to itself and . . . part of the learning of a particular language is the mastering of its logical system . . . in the teaching of paragraph structure to foreign students, whether in terms of reading or in terms of composition, the teacher must be himself aware of these differences and he must make these differences overtly apparent to his students.

This indicates that explicit instruction can help foreign language learners to master reading and writing. Since 1966, several studies sought to investigate the probable effects of rhetorical organization on L2 readers' comprehension. Smith (1994), for example, noticed that readers resorted to a number of strategies or deliberate conscious plans to process textual information. Along the same lines, Feng (1998) noticed that these strategies (e.g., previewing text, using headings and sub-headings, reading, evaluating, and understanding) enabled L2 readers to interpret printed information more quickly and efficiently. In yet another study, Sharp (2002) noticed that readers' social and cultural values also influenced comprehension; as a result, a text might be interpreted differently by different people.

One of the earliest studies of the effect of rhetorical organization on reading comprehension was conducted by Mann and Thompson (1988). They

concluded that recognition of rhetorical relation of a text which is the basis of its coherence was essential to understanding the text. The rhetorical relations that Mann and Thompson (1988) introduced embodied the writer's intention in the text and the effect that the writer expected of the readers. Mann and Thompson (1988) clearly demonstrate readers' crucial task in interacting with the text to comprehend it.

Later in 1997, Caverly recommended that foreign language teachers should teach the specific reading techniques based on the principles of text organization to aid readers' comprehension of text (Caverly, 1997). Along the same lines, Richards and Renandya (2002) argued that efficient reading required the reading teacher to raise students' awareness of main ideas in a text as well as their ability to explore the organization of text. They noticed that formal aspects of language and genre structure contribute to reader's developing comprehension and inferencing abilities. Richards and Renandya concluded that awareness of text structure is a critical aspect of reading comprehension and that learners who are aware of text structure have better comprehension abilities.

According to McCarthy (1991) readers' awareness of text structure could help them discern text content in shorter time. McCarthy's study was conducted in the context of schema theory which claims that new knowledge can only be processed in relation to existing knowledge frameworks or schemata. McCarthy noted the existence of two kinds of schemata: (a) content schemata, and (b) formal schemata. Put another way, content schemata refer to background knowledge of the content area of the text, and formal schemata refer to background knowledge of the rhetorical organizational structure of the text (Carrell, 1988). According to Carrell, a reader’s failure to activate the needed schemata may be either due to the lack of appropriate schemata as anticipated by the writer, or due to the lack of enough cues in the text to be used in activating those schemata. One of the reasons for the former case is that "the schemata are specific to a given culture and are not part of a particular reader’s background knowledge" (Carrell, 1988, p. 240). The latter case leads, however, to the conclusion that readers' should at least possess some level of language proficiency to be able to use the cues in the text to activate the relevant schemata.

Carrell (1987) argued that it was possible to test for the effects of formal schemata by keeping the content of a text constant, varying the rhetorical organization, and having comparable groups of subjects process each different rhetorical pattern. At least two such studies have been conducted in ESL reading, one with narrative text and one with expository text. Carrell (1984b) investigated the effects of a simple narrative formal schema on reading in ESL and found differences among ESL readers in the quantity and

temporal sequence of their recall between standard and interleaved versions of simple stories. Quantity of recall was enhanced when the story's rhetorical organization conformed to a simple story schema—one well-structured episode followed by another. When stories violated the story schema, the temporal sequencing of readers' recall tended to reflect the story schematic order of presentation in the story. With expository prose, Carrell (1984a) investigated the effect of four different English rhetorical patterns on the reading recall of ESL readers of various native language backgrounds. Using text in which identical content information was structured in four different expository patterns, that study showed that the more tightly organized patterns of comparison, causation, and problem/solution generally facilitated the recall of specific ideas from a text more than a more loosely organized pattern called collection of descriptions.

It should be noted that no study has, to the researchers' knowledhe, addressed the effect of formal schemata on L3 reading recall. As such, the current was conducted to determine if formal schemata had any facilitative or debilitative effect on L3 reading recall.

3. METHOD

3.1. Participants

It was hypothesized in this study that explicit rhetorical organization instruction positively affects reading recall. To test this hypothesis, the researcher compared two subject groups' (i.e., a control and an experimental group) recall of a descriptive and a causative text.

Based on their scores on the PET proficiency test, two homogenous groups of subjects (i.e., experimental and control) were sampled from a population of Turkish EFL students who had Persian as their second language. Each group consisted of 120 participants. Their scores on the proficiency test were submitted to an independent samples t-test with an alpha level of .01. The results indicated the experimental group (M=61.50, SD=10.80) did not differ from the control group [M=62.70, SD=12.58; t(238)=0.792, p=.4291]. The magnitude of the difference in the mean was not noticeable (Eta squared=.002).

Each group, then, received a recall test as the pre-test. The experimental group (EG) received two weeks of instruction, and the control group (CG) received no instruction. Finally, the same recall test was administered to both groups as the post-test. The design of the study can be schematically represented as follows:

	Pre-test	Treatment	Post-Test
Experimental Group (EG)	**Yes**	**Yes**	**Yes**
Control Group (CG)	**Yes**	**No**	**Yes**

The passages for recall were typical of reading materials generally found in Carrell's experiment of rhetorical organization. In order to control the structure and content of the information while investigating the effects of discourse type, two versions of a single passage were selected for recall. The text was "the loss of body water" taken from Carrell (1984a). The researcher did not present the topic of the text to the participants because the effect of text structure varies depending on the extent of readers' knowledge of the topic of the text. Each version contained identical content information. Both texts had clear organizational patterns. The texts were written according to two general semantic relations between propositions: A collection of description and causation (See the Appendix).

3.2. Instrumentation

The main instrument used for data collection was an intermediate recall test (i.e., reproduction of information test); this was used as both the pre-tests and the post-test. It should be noted that both participant groups were given the same recall texts (i.e., causative and descriptive texts presented in the Appendix).

For the pretest, both groups were given the passages, were given enough time to read each passage, and were then asked to recall the passages. After the pre-test, only the experimental group received two weeks of explicit instruction on rhetorical organization. To this end, units 8 and 10 from *Advanced Writing* (Birjandi, Alavi, and Salmani Nodoushan, 2003) which focus on descriptive and causative rhetorical organization respectively were used. Moreover, the descriptive and causative rhetorical patterns of a few articles such as Carrell (1987), and Sharp (2002) were analyzed and discussed in the classroom. The control group, however, did not receive any instruction. The same passages (see the Appendix) were again used for the post-test. Both EG and CG received the post-test.

3.3. Procedures

The groups were told to read the texts they were given, in the order in which the texts had been stapled together, taking as much time as they needed to understand and remember the texts. The texts had been stapled together in such a way as to make sure that in each of the EG and CG groups, half of the participants read text A before text B and the other half read text B before

text A. This was done as a counter-balancing strategy to control for carry-over effect across texts. The participants were told that they would be asked to write what they could remember of the texts of recall immediately. They were not allowed to make any written notes. The texts of recall were collected from them individually as they finished reading. Although reading time was individually controlled by each subject, as a group they took approximately 15 to 20 minutes to read each text. After the texts were collected, regular classroom procedures of recalling started without referring back to the contents of the texts. In eliciting their recall, participants were given recall booklets consisting of two stapled sheets of paper. At the top of each page was the number of each text intended as a recall cue. Subjects were asked to write their recall of each text, writing as much idea units and as exactly as they could remember of each text. They were told to write as well as they could, but not to be overly concerned with their writing. It was emphasized that the researcher was interested in how well they understood and remembered the texts as they read them, not in how well they could write them down. As with reading time, writing time was subject-controlled. They were asked to write a recall of each text in English, paying attention to the semantic content as well as the order of propositions in each text. However, as a group, they spent approximately 20 to 30 minutes writing their recalls of the two texts. The same procedure was repeated for the post-test.

The subjects were asked to write down everything they could remember from the text, using their own words. They were asked to only write in complete sentences and not just to list isolated words or ideas. They were to try to show in their own writing how the ideas from the text were related to each other. The identical information in two text versions was reduced to a total of 21 idea units—based on Carrell (1984). Each recall was scored for presence or absence of the 21 idea units. In other words, the participants' recall protocols were coded on a 0-21 basis--based on the 21 idea units identified Carrell's study.

The use 'recall protocols' was justified on the grounds that they indicate something about the readers' assimilation and reconstruction of text information and therefore reflected comprehension (Gambrel, Pefeiffer and Wilson, 1985). This requires that the text be divided into idea units. An idea unit is the smallest number of words necessary to express a thought idea. The participant reads the text and his/her recall is measured and compared with the number of units in the original text. Comprehension is therefore measured by the amount of information in the recall. Recall scoring requires the presence or absence of the gist of the text content.

The researcher examined the overall rhetorical organization of the recall and classified it as either meeting the definition of the two original text types

(collection of descriptions and causation) or not. The requirement of a collection of description type was a group of descriptions about a topic, where the descriptions were collectively organized. Recalls were classified as causation if the structure consisted of an antecedent and a result. In order to score the result of the comprehension test, the researcher scored each recall in terms of whether it showed the reader had understood the passage or not, using the following scale to measure the overall comprehension of the passage.

0 point:	The subject does not understand the passage
.5point:	The subject understands the passage in general. He/She, however, does not understand the whole passage
1 points:	perfect comprehension of the passage

Recall protocols of the subjects were scored by making use of a loose criterion of recall. According to this criterion EFL readers would not be penalized for their vocabulary and grammatical shortcomings. Sentences in each protocol were matched with sentences in the original text that conveyed the same idea. For each subject, each sentence in the original text was then assigned one point. All sentences in the text that were not assigned one point were then assigned 0 point. Nor did the researcher assign any points in cases where information in the protocol was incorrect or too vague to be identified with any one sentence in the text.

4. Results

4.1. SPANOVA results for recall of descriptive texts

A Mixed Between-Within Subjects Analysis of Variance (also known as SPANOVA) (See Pallant, 2001) was conducted to analyze the effect of two different types of treatment (i.e., implicit instruction vs. no instruction) on participants' recall of texts with descriptive rhetorical organization. This was done to see if there were main effects for each of the independent variables (i.e., main effect for subject groups and main effect for time), and also for their interaction—to tell if the change in recall over time was different for the two groups.

It was necessary to check for *Homogeneity of intercorrelations*—to see if for each of the levels of the between-subjects variable (i.e., treatment) the pattern of intercorrelations among the levels of within-subjects variable (i.e., time) were the same. To test this assumption, Box's M statistic with the more conservative *alpha* level of .01 was used with the hope that the statistic would not be significant (i.e., that the *p* level would be greater than 0.01). In other words, Box's M statistic tests the null hypothesis that the observed covariance

matrices of the dependent variables are equal across groups Table 1 displays the result and indicates that this assumption was met (*Sig.*=0.152).

Table 1.
Box's Test of Equality of Covariance Matrices

Box's M	5.329
F	1.760
df1	3
df2	10195920.000
Sig.	.152

Design: Intercept+Treatment
Within Subjects Design: Time

A look at the Multivariate Tests table also indicated that there was a change in participants' recall of descriptive texts across time. The main effect for time was significant. There was also an indication that the two groups were different in terms of recall across time. The main effect for the interaction between time and type of treatment was also significant. These findings are indicated by Wilks' Lambda values and the associated probability values given in the column labeled *Sig.* in Table 2.

Table 2.
Multivariate Tests

Effect		Value	F	Sig.	Partial Eta^2
Time	Pillai's Trace	.414	168.296(b)	.000	.414
	Wilks' Lambda	.586	168.296(b)	.000*	.414(*)
	Hotelling's Trace	.707	168.296(b)	.000	.414
	Roy's Largest Root	.707	168.296(b)	.000	.414
Time * Treatment	Pillai's Trace	.494	232.100(b)	.000	.494
	Wilks' Lambda	.506	232.100(b)	.000*	.494(*)
	Hotelling's Trace	.975	232.100(b)	.000	.494
	Roy's Largest Root	.975	232.100(b)	.000	.494

Computed using alpha = .01 (Exact statistic, Design: Intercept+Treatment, Within Subjects Design: Time)

Based on the values in the Wilks' Lambda's part of the "Multivariate Tests" table (See table 2 above) it was found that there was a statistically significant change in descriptive recall as a result of treatment. The value for Wilks' Lambda for time was 0.586, with a *Sig.* value of .000 (which means $p<.0001$). Because the p value was less than .01, it was concluded that there was a statistically significant effect for time. This suggested that there was a change in descriptive recall across time; technically speaking, it showed the effect of treatment on recall of texts with descriptive rhetorical organization. The value for partial Eta squared for time was 0.414. Using the commonly used

guidelines proposed by Cohen's (1988) (0.01=small effect, 0.06=moderate effect, and 0.14=large effect), this result suggested a very large effect size for time.

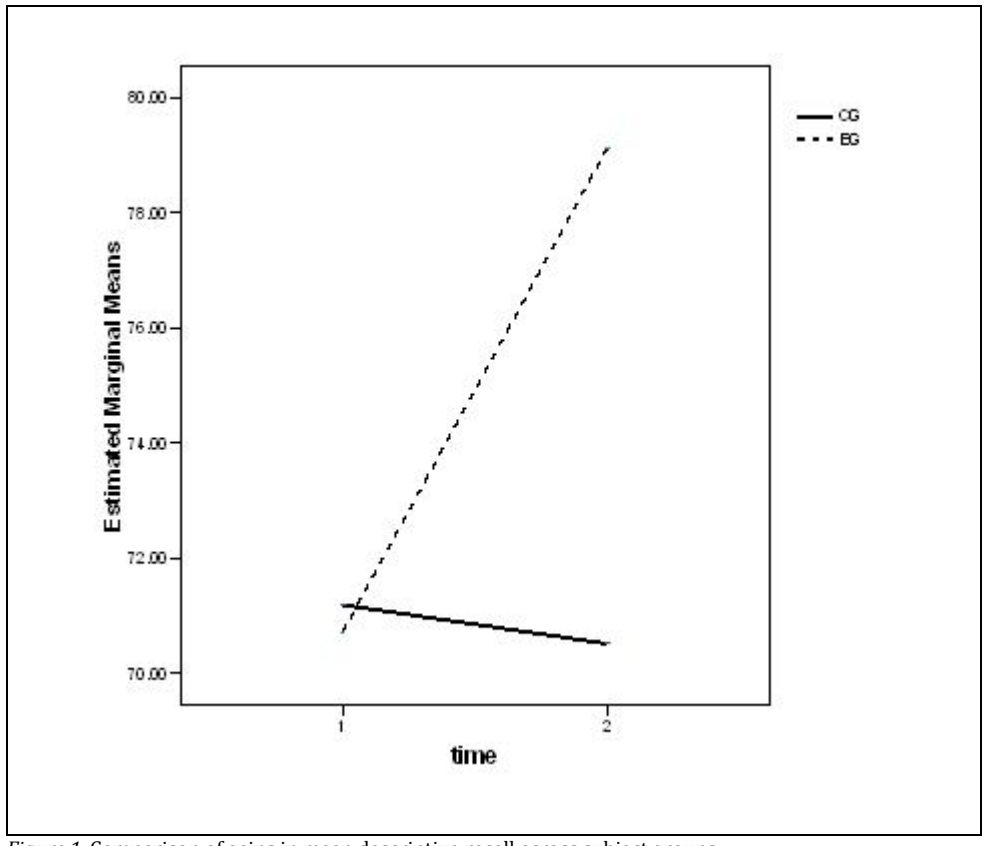

Figure 1. Comparison of gains in mean descriptive recall across subject groups.

Furthermore, the value for Wilks' Lambda for time-treatment interaction was 0.506, with a *Sig.* value of .000 (which means $p<.0001$). Because the p value was less than .01, it was concluded that there was a statistically significant effect for time-treatment interaction. The partial Eta squared value for the interaction effect was 0.494. This suggests a very large effect for time-treatment interaction. This means that there was not the same change in participants' recall of texts with descriptive rhetorical organization over time for the experimental versus control groups. In other words, gain in recall score for the EG group was not statistically the same as that for the CG group. Figure 1 visualizes this difference in gains in descriptive recall across subject groups. As figure 1 indicates, the EG group showed a much greater gain in recall score than the CG group. Table 3 presents the descriptive statistics for the two treatment groups across time.

As table 3 indicates, the pre-test mean for CG was 71.19 while the post test mean was 70.51; the pre-test mean for EG was 70.71 whereas the post test mean was 79.12. The mean change was mathematically small but it was checked for statistical significance; to this end, it was vital to take look at the data displayed in Table 4 below.

Table 3.
Descriptive Statistics for Treatment Groups across Time

	Type of Treatment	Mean	Std. Deviation	N
Pre-test Score	Control Group	71.1905	10.74326	120
	Experimental Group	70.7143	10.77514	120
Post-test Score	Control Group	70.5159	11.27034	120
	Experimental Group	79.1270	10.60640	120

Table 4.
Tests of Between-Subjects Effects

Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta^2
Intercept	2550000.425	1	2550000.425	11341.143	.000	.979
Treatment	1985.308	1	1985.308	8.830	.003	.036
Error	53513.133	238	224.845			

Transformed Variable: Average; Computed using alpha = .01

As table 4 indicates, the Sig. value for treatment was statistically significant (*Sig.*=0.003). The Sig. value was less than the alpha level of 0.01. It was, therefore, concluded that the main effect for group was significant. That is, there was a significant difference in gains in recall for the two groups (those who received explicit instruction and those who received no instruction). The effect size of the between-subject effect also supported this finding; the Eta-squared value for treatment (or group) was 0.036. This indicates a moderate effect size.

4.2. SPANOVA results for recall of causative texts

Another Mixed Between-Within Subjects Analysis of Variance was conducted to analyze the effect of two different types of treatment (i.e., implicit instruction vs. no instruction) on participants' recall of texts with causative rhetorical organization. This was done to see if there were main effects for each of the independent variables (i.e., main effect for subject groups and main effect for time), and also for their interaction—to tell if the change in recall over time was different for the two groups.

Table 5.
Box's Test of Equality of Covariance Matrices

Box's M	103.475
F	34.178
df1	3
df2	10195920.000
Sig.	.015

Design: Intercept+Treatment
Within Subjects Design: Time

Here again, it was necessary to check for *Homogeneity of intercorrelations*—to see if for each of the levels of the between-subjects variable (i.e., treatment) the pattern of intercorrelations among the levels of within-subjects variable (i.e., time) were the same. To test this assumption, Box's M statistic with the more conservative *alpha* level of .01 was used with the hope that the statistic would not be significant (i.e., that the *p* level would be greater than 0.01). Table 5 above displays the result and indicates that this assumption was met (*Sig.*=0.015).

Table 6.
Multivariate Tests

Effect		Value	F	Sig.	Partial Eta^2
Time	Pillai's Trace	.295	99.675(b)	.000	.295
	Wilks' Lambda	.705	99.675(b)	.000*	.295(*)
	Hotelling's Trace	.419	99.675(b)	.000	.295
	Roy's Largest Root	.419	99.675(b)	.000	.295
Time * Treatment	Pillai's Trace	.229	70.643(b)	.000	.229
	Wilks' Lambda	.771	70.643(b)	.000*	.229(*)
	Hotelling's Trace	.297	70.643(b)	.000	.229
	Roy's Largest Root	.297	70.643(b)	.000	.229

Computed using alpha = .01 (Exact statistic, Design: Intercept+Treatment, Within Subjects Design: Time)

A look at the Multivariate Tests table also indicated that there was a change in participants' recall of causative texts across time. The main effect for time was significant. There was also an indication that the two groups were different in terms of recall across time. The main effect for the interaction between time and type of treatment was also significant. These findings are indicated by Wilks' Lambda values and the associated probability values given in the column labeled *Sig.* in Table 6.

Based on the values in the Wilks' Lambda's part of the "Multivariate Tests" table (See table 6) it was found that there was a statistically significant change in descriptive recall as a result of treatment. The value for Wilks' Lambda for time was 0.705, with a *Sig.* value of .000 (which means $p<.0001$).

Because the *p* value was less than .01, it was concluded that there was a statistically significant effect for time. This suggested that there was a change in causative recall across time; technically speaking, it showed the effect of treatment on recall of texts with causative rhetorical organization. The value for partial Eta squared for time was 0.295 which suggested a very large effect size for time.

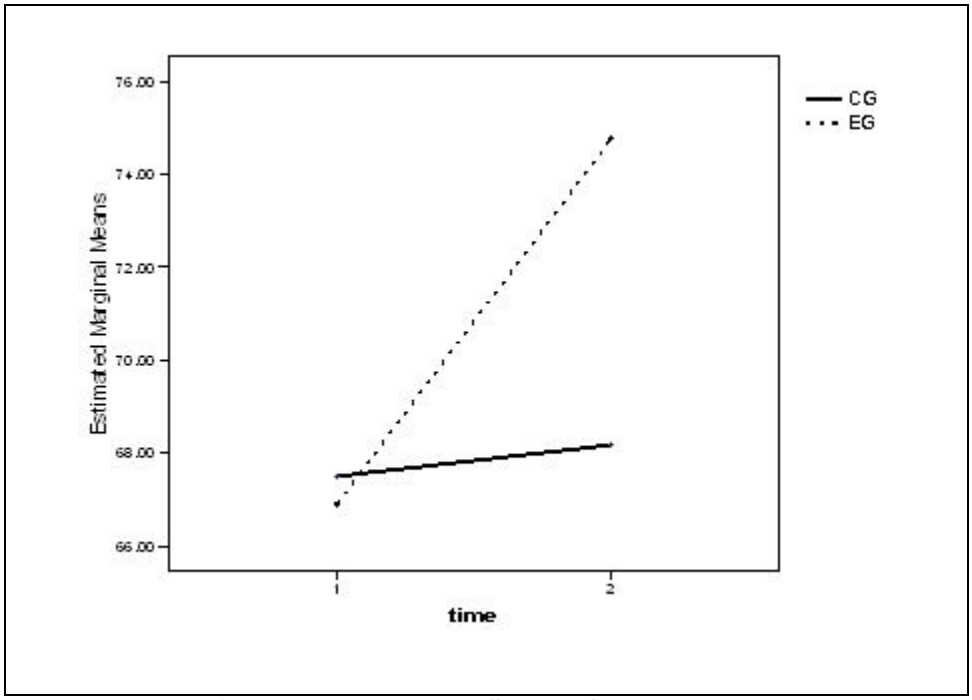

Figure 2. Comparison of gains in mean causative recall across subject groups.

Furthermore, the value for Wilks' Lambda for time-treatment interaction was 0.771, with a *Sig.* value of .000 (which means $p<.0001$). Because the *p* value was less than .01, it was concluded that there was a statistically significant effect for time-treatment interaction. The partial Eta squared value for the interaction effect was 0.229. This suggested a very large effect for time-treatment interaction. This means that there was not the same change in participants' recall of texts with causative rhetorical organization over time for the experimental versus control groups. In other words, gain in recall score for the EG group was not statistically the same as that for the CG group. Figure 2 visualizes this difference in gains in descriptive recall across subject groups.

As figure 2 indicates, the EG group showed a much greater gain in recall score than the CG group. Table 7 presents the descriptive statistics for the two treatment groups across time.

Table 7.
Descriptive Statistics for Treatment Groups across Time

	Type of Treatment	Mean	Std. Deviation	N
Pre-test Score	Control Group	67.5000	11.90136	120
	Experimental Group	66.9048	10.84916	120
Post-test Score	Control Group	68.1746	13.41175	120
	Experimental Group	74.7619	10.48746	120

As table 7 indicates, the pre-test mean for CG was 67.50 while the post test mean was 68.17; the pre-test mean for EG was 66.90 whereas the post test mean was 74.76. The mean change was mathematically small but it was checked for statistical significance; to this end, it was vital to take look at the data displayed in Table 8.

Table 8.
Tests of Between-Subjects Effects

Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta^2
Intercept	2307545.399	1	2307545.399	9131.708	.000	.975
Treatment	1077.145	1	1077.145	4.263	.040	.018
Error	60141.629	238	252.696			

Transformed Variable: Average; Computed using alpha = .01

As table 8 indicates, the Sig. value for treatment was not statistically significant (*Sig.*=0.04). The Sig. value was bigger than the alpha level of 0.01. It was, therefore, concluded that the main effect for group was not significant. That is, there was not a significant difference in gains in recall for the two groups (those who received explicit instruction and those who received no instruction). The difference was, however, significant at the less stringent alpha level of 0.05. This means that explicit instruction positively affects recall of causative texts. The effect size of the between-subject effect also supported this finding; the Eta-squared value for treatment (or group) was 0.018. This indicates a small effect size.

5. Discussion and recommendations

Analyses of the data revealed that the experimental group outperformed the control group in the recall of both descriptive and causative texts because the experimental group underwent detailed instruction in rhetorical organization. This finding has certain implications for language teaching as well as materials development.

Teachers and university instructors will benefit from the results of this and other similar studies. They can present their content materials based on the results of such studies to facilitate the comprehension and recall of the idea units covered; in other words, if it happened that the outcome of this research revealed any significant difference between the amounts of idea units recalled from passages with different rhetorical organizations, text preparation and content presentation should follow the findings by providing readers with texts in such orders of rhetorical organization which enhance later retrieval of the idea units. Moreover, the difference observed in the recall of descriptive vs. causative texts has implications for how they should be sequenced in reading classes. Description texts which were found to be significantly easier for recall can be placed before causative texts in reading text books.

6. Conclusions

Language is such a complex phenomenon that nobody is able to cover its every aspect. Specifically, in the case of recall in relation to rhetorical organization there is still a dearth of research. Further research into this topic should, therefore, consider using larger samples and rhetorical organizations beyond the two patterns studied here. Moreover, this study did not account for whether male readers are more talented in recall or females; this can, therefore, be another line of research. A similar study can even be carried out to investigate the effect of rhetorical organization on ESP or high school students. Finally, since the present study was limited to reading recall, it would be interesting to conduct a similar experiment with other skills, such as writing and listening.

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APPENDIX

Text A: Collection of descriptions

Several aspects of the body loss water will be discussed. First, athletic coaches frequently require wrestlers, boxers, judo contestants, and football team members to lose body water so that they will attain specified body weights. These specified weights are considerably below the athletes' usual weights

Second, the loss of body water sustained by a 150-pound individual each day is three pints of water.

Third, the loss of body water cause damage to cardio-vascular functioning, which limits work capacity. More specifically, a loss of 3% of body water damages physical performance and a loss of 5% results in heat exhaustion. Moreover, a loss of 7% of body water cause hallucinations. Losses of 10% or more of body water result in heart stroke, deep coma, and convulsions; if not treated, death will result.

Text B: Causation

It is true that athletic coaches frequently require wrestlers, boxers, judo contestants, and football team members to lose body water so that they will attain specified body weights.

As result, tragedies are unwittingly caused by the coaches who require this loss of body weight in these situations. These tragedies occur due to the fact that the loss of body water cause damage to cardio-vascular functioning, which limits work capacity. More specifically, a loss of 3% of body water damages physical performance and a loss of 5% results in heat exhaustion. Moreover, a loss of 7% of body water cause hallucinations. Losses of 10% or more of body water result in heart stroke, deep coma, and convulsions; if not treated, death will result.