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ABSTRACT

To explore the suggestion that subjects modulate their reading strategies in accordance with how they expect to be tested, several test expectancies (multiple-choice, true/false, essay, and cloze) were implemented in addition to a non-specific test expectancy as a control. Subjects were 124 students at Purdue University (Indiana). After reading three practice texts for which subjects were administered a test that was in line with their expectancies, subjects read and attempted to free-recall a fairy tale or an expository text. The only expectancy to significantly enhance recall relative to the intentional learning control was the essay expectancy, and this enhancement was limited to the expository text. Results were congruent with the hypothesis that subjects expecting an essay test perform more organizational processing of the text than do those expecting other test formats. The authors suggest that there was no increase in recall of the fairy tale due to the essay expectancy because subjects routinely perform organizational processing while reading a fairy tale. Regression analyses and recall data indicated that recognition test expectancies produced little change in reading strategy. Four tables present study data. A 28-item list of references is included. (Author/SLD)

TEST EXPECTANCY, STUDY STRATEGIES AND RECALL OF PROSE

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Running Head: Test Expectancy and Recall.

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ABSTRACT

It has been suggested that subjects modulate their reading strategies as a function of how they expect to be tested on the target material. To explore this issue, we implemented several test expectancies (multiple choice, true/false, essay, and cloze) as well as a condition that was given a non-specific test expectancy (an intentional learning control). After reading three practice texts for which subjects were given a test that was in line with their expectancy, subjects read and attempted to free recall either a fairy tale or an expository text. The only expectancy to significantly enhance free recall relative to the intentional learning control was the essay expectancy. Importantly, this enhancement was limited to the expository text and, further, to medium and high importance propositions of the expository text. These results were anticipated by the hypothesis that subjects expecting an essay test perform more organizational processing of a text than those expecting a recognition test or those not provided with a specific test expectancy. According to this hypothesis, there was no increase in recall of the fairy tale due to the essay expectancy because subjects routinely perform organizational processing while reading a fairy tale. Regression analyses of the reading times supported this assertion. Alternative explanations of the mnemonic effects of the essay-test expectancy were considered and found to be deficient in light of the current results. Additionally, the regression analyses, as well as the recall data, suggested that in general the recognition-test expectancies produced little change in reading strategy.

Test Expectancy, Study Strategies and Recall of Prose

A long-standing issue in the basic memory and educational psychology literatures is the extent to which learners modulate their study strategies as a function of how they expect to be tested. One line of research has been to factorially manipulate test expectancy (e.g., recall or recognition) with the kind of test administered (recall or recognition). For prose memory, the results are mixed (see Schmidt, 1983). As Schmidt noted, many of the studies employing this paradigm have been conducted in classroom settings where control of extraneous variables may be less than ideal; even so, when only experiments in well-controlled settings (i.e., laboratory rather than classroom contexts) are considered, the effects of test-expectancy are still not clearcut. Some studies have reported that test expectancy does not significantly affect either recall or recognition performance (Kulhavey, Dyer, & Silver, 1975; Rickards & Friedman, 1978), despite the fact that in one study students expecting recall studied the text longer than did students expecting recognition (Kulhavey et al, 1975).

Recently, in two carefully conducted experiments (e.g, various kinds of distractors were used for the recognition tests, recall was scored in several different ways), Schmidt (1983) also found that performance on a recognition test was similar regardless of whether subjects expected a recall or a recognition (multiple-choice) test. Recall performance, however, was better when subjects expected a recall rather than a recognition test. Based on these results, Schmidt concluded "that students may learn more when preparing for a short-answer or essay test then preparing for a multiple-choice test" (p. 179). Though consistent with his results, this conclusion must be considered preliminary in light of the previous failures to document such an advantage for essay-test relative to recognition-test expectancies (e.g., Kulhavey et al, 1975).

Moreover, and importantly for present purposes, no one theoretical explanation for the advantage of the recall over the recognition test expectancy was supported unambiguously by Schmidt's (1983) results. One reasonable hypothesis is that subjects performed some additional process in preparation for recall but not recognition . Given that this additional process enhanced recall performance but not recognition performance, one clear possibility is that subjects expecting recall organized the prose material more so than subjects expecting recognition (Schmidt, p. 175). Based on the idea that organization of prose material should involve emphasis on high-level, structurally important material, the just-mentioned hypothesis would anticipate that enhanced recall for subjects expecting a recall test relative to those expecting a recognition test should emerge primarily for important propositions. Unfortunately, Schmidt did not obtain this predicted selective advantage.

Other data also partially support the hypothesis that an essay (recall)-test expectancy induces more organizational processing than does a recognition- test (multiple-choice, true false tests) expectancy. Students expecting an essay test report that in general they are more likely to organize related material than students expecting a multiple-choice test (Terry, 1933). More directly, Simon and Ditrichs (1988) showed that sentence by sentence reading times were influenced (i.e., predicted) by passage-level variables (e.g., new argument nouns, sentence importance) more so for subjects studying for essay tests than for subjects studying for true-false tests, again implying that an essay-test expectancy induces more processing of the structural/organizational features of the text. An analysis of the notes taken by students in preparation for different tests, showed that students expecting an essay test were more likely to include items high in structural importance in the notes and to construct an outline than were students expecting multiple choice (Meyer, 1936; Rickards & Friedman, 1978). These qualitative differences in the content of the notes did not translate into significant differences in recall performance, however (Rickards & Friedman, 1978). In sum, though suggestive, none of these studies provides an integrated pattern of data to support the idea that essay-test expectancies promote more organizational processing of prose material than recognition-test expectancies and that these processing differences in turn produce better recall for learners expecting an essay test than for those expecting a recognition test.

The purpose of the present study was to build on the theoretical and empirical work outlined above. First, we attempted to collect more evidence demonstrating that prose recall is enhanced when the learner expects an essay test than when he/she expects a recognition test. This objective included a concern with delineating some boundary conditions on the test-expectancy effect in recall. Our second objective was to illuminate possible differences in study strategies as a function of essay versus recognition test expectancies. More specifically, using a converging approach that involved particular independent variables and dependent measures of on-line processing, we hoped to test the hypothesis that the recall advantage produced by an essay-test expectancy is due, at least in part, to the following: Subjects expecting an essay-test perform additional processing relative to those who expect other kinds of tests, and this additional processing is of an organizational nature.

Our experimental approach involved several main features. First, after Simon and Ditrichs (1988), we measured sentence by sentence reading time, and analyzed these reading times with multiple regression analysis as a method for capturing possible differences in study/reading strategy as a function of test expectancy. Second, in addition to implementing the usual test expectancies (essay, multiple choice, and true/false), we included an intentional-learning control that was given no specific test expectancy. Such a control allows one to ascertain, for instance, whether or not recognition-test expectancies actually produce additional or different processing from that performed by students who are not informed about a particular test format. That is, comparisons of essay versus recognition-test expectancies only provide information about relative differences in the two expectancies; it does not allow one to describe the particular kinds of processing and the possible mnemonic benefits that a particular test-expectancy per se might confer.

Third, we included a manipulation of text type. Some of the subjects were given an expository passage to study, and other subjects were given a fairy tale to study. This manipulation is important in a general sense because it may be that the effects of test expectancy obtained with one kind of material will not generalize to other materials (cf., Schmidt, 1983). More importantly for present purposes, this manipulation pertains critically to the theoretical ideas outlined above. Work by McDaniel, Einstein, and their colleagues have demonstrated that study or processing activities that encourage organizational processing of a text (e.g., sorting a randomly ordered set of sentences into a coherent text or outlining a text) do not enhance free recall of fairy tales but do enhance free recall of expository passages (McDaniel, Einstein, Dunay, & Stevens, 1986; Einstein, McDaniel, Owen, & Coté, 1990). Briefly, the explanation is that fairy tales normally invite organizational processing, consequently organizational processing induced by particular study tasks is redundant with the processing that subjects ordinarily perform on such texts.

In terms of the present concerns, the preceding ideas lead to a novel prediction. If the enhancement in recall for an essay-test expectancy is due to organizational processing, then this enhancement should be observed for subjects reading an expository text but not for subjects reading a fairy tale. Additional support for the organization hypothesis would be forthcoming if (1) the predicted enhancement in recall (for the expository passage) due to an essay-expectancy emerged primarily for sentences in the passage that are of moderate or high importance, and (2) passage level variables were more pronounced in accounting for reading times for the essay-expectancy groups than for the other test-expectancy groups.

There are theoretically illuminating predictions regarding possible effects of the recognition-test expectancies, as well. Students' self-reports suggest that students preparing for a recognition test will emphasize detail information (Terry, 1933). Schmidt (1983) reasoned that if such were the case, then students expecting a recognition test should perform well on a test emphasizing the exact wording or syntax of studied sentences relative to subjects expecting recall. He failed to find such an advantage for a multiple-choice expectancy group. It may be, however, that the increased attention to details is oriented more toward semantic analysis of the content rather than surface details such as syntax or the particular words used. Additionally, it could be the case that recall expectancy also induces attention to detail, and thus as mentioned above, the kind of processing induced by recognition expectancy is not easily uncovered when recall expectancy serves as the comparison.

The present design allowed a test of these possibilities. To ensure generality, both a forced choice (i. e., multiple-choice) and a yes/no (true/false) recognition expectancy were used. In terms of the text variable (fairy tale, expository text) included in our study, McDaniel et al (1986) and Einstein et al (1990) have shown that encoding/study manipulations that induce additional attention to details of a passage (e.g., deleting letters from the words and requiring subjects to provide the missing letters, or having subjects respond to embedded questions) produced significant increases in recall of fairy tales but not expository passages (relative to a read-only control). These results can be explained by assuming that expository texts, but not fairy tales, normally invite processing of detail (cf., Hammes & Petros, 1988). Accordingly, processing of details induced by study tasks is redundant with the processing ordinarily performed when an expository passage is encountered but not a fairy tale. Thus, if recognition-test expectancies induce attention to detail, then we would expect that the recognition-test expectancy groups would show enhanced recall, at least relative to the intentional-learning control (this group is given no information regarding the particular memory test), for a fairy tale but not a descriptive passage. Further, if recognition-expectancy induces more addition to detail, then sentence level variables should play a greater role in the regression analysis of the reading times for the recognition-expectancy groups than for the other groups. Alternatively, a failure to find this pattern would make it difficult to hold to the hypothesis just mentioned regarding the kind of processing induced by recognition expectancies.

Method

Subjects and Design

The subjects were 124 Purdue University students who participated in partial fulfillment of an introductory psychology course requirement. All subjects were native English speakers with normal or corrected vision. The design was a 2 x 4 between subjects factorial with text type (fairy tale, expository) and test expectancy (multiple choice test, true/false test, essay test, intentional-learning control) as factors. Sixteen subjects were assigned to each of the four experimental conditions with the expository text, and 15 subjects were assigned to each of the four conditions with the fairy tale.

Materials

Eight passages were used in the experiment, four fairy tales and four expository passages. The three tales used during the establishment of a particular test expectancy were entitled, "How a Grandson Rescues his Grandfather from Having to Eat in the Corner," "The Dog and the Wolf," and "The Child Sold to the Devil." The three expository passages used during the establishment of a particular test expectancy were entitled, "How Autumn Colors are Formed," "Nomads of the Desert," and "The Strange Way of the Spiders." These three passages were obtained from Levy (1981). These six passages were of similar length with a mean of 14.8 sentences (SD = 1.5).

The fairy tale and expository passage used to examine the test expectancy effect was a Russian story entitled, "The Just Reward" (in Guteman, 1945) and "Kanchenjunga: A Very Dangerous Mountain Range," respectively. Both of these passages have been used previously by McDaniel and associates (e.g., McDaniel et al., 1986; Waddill, McDaniel, & Einstein, 1988). The fairy tale comprised 17 sentences, 65 propositions and 387 words. The expository passage comprised 14 sentences, 62 propositions and 284 words. The propositional analysis was based on Kintsch's (1974) method of analyzing text meaning.

For each sentence in the "The Just Reward" and "Kanchenjunga: A Very Dangerous Mountain Range," a number of text variables were calculated for subsequent use in regression analyses of reading times. These variables included (1) the number of words, (2) the number of propositions, (3) the number of new argument nouns (those nouns in a sentence that introduce a person, a fact, location or concept in the passage for the first time), (4) word frequency, and (5) importance of each proposition to the overall meaning of the story. Our measure of word frequency for a sentence was modeled after a procedure used by Graesser and Riha (1984). First, we identified each noun, verb (excluding "is" and "are"), adjective, and adverb in the sentence. Second, we obtained word frequency estimates for each of the identified words using the Kucera and Francis (1967) norms. Third, we computed the natural logarithm of the frequency for each identified word, and then computed the average of these values for each sentence. The importance rating of each proposition was obtained in the following manner. Twenty subjects not associated with our experiment read each passage and rated, on a scale from 1 (not important) to 5 (very important), the importance of each of the propositions to the overall meaning of the passage. The proposition-importance value assigned to each sentence was the average importance of the propositions in the sentence.

For the fairy tale, the mean values per sentence for each text variable (with the standard deviation in brackets) were as follows: words = 22.7 (8.9), propositions = 3.8 (1.3), word frequency = 5.1 (0.8), proposition importance = 12.7 (5.6), and new argument nouns = 5.0 (1.3). The corresponding values for the expository passage were as follows: words = 20.3 (7.0), propositions = 4.4 (1.5), word frequency = 3.7 (0.7), proposition importance = 14.9 (5.7), and new argument nouns = 2.3 (1.2).

Three types of tests (multiple-choice, true/false, essay) were constructed for each of the three fairy tales and the three expository passages that were used to establish a particular test expectancy. For each multiple-choice test, there were 6 questions that focused on details in the passage. The format of the test included individual question forms (e.g., "How old was the grandson?") and sentence completion forms (e.g., "The old man's bowl cost __________"), with four plausible alternative responses (e.g., "3", "4", "5", "6"; "one shilling", "several shillings", "one pound", "nothing"; respectively). For each true/false test there were four statements -- 2 true and 2 false -- that addressed details from the passage (e.g., "The wife bought the old man a wooden bowl for a few shillings, for he had nothing else to eat from."). The essay test consisted of a single statement or question dealing with the general theme of the passage (e.g., "Describe why the husband and the wife cried in the story").

Procedure

Subjects were tested individually or in pairs. At the beginning of the experimental session, subjects were seated in front of a computer and informed that the purpose of the study was to investigate story comprehension. Subjects in the test expectancy conditions were informed that they would read a number of passages and that following each passage a test for the material in the passage would be administered. They were told that they would receive a true/false test, a multiple-choice test or an essay test, depending on the test-expectancy condition to which they were assigned. Subjects were informed that sentences in the passage would be presented one at a time on the computer screen, and they they should read each sentence at their normal reading speed, keeping in mind that they would receive a true/false, multiple-choice or essay test on the material in the passage. Subjects were instructed to make a key press after reading each sentence and the next sentence would be presented. Instructions to subjects in the intentional-learning control condition were similar to those described above for the test-expectancy conditions, except that subjects were told only that they might receive a test, with no mention made of a particular type of test.

When the subject indicated that the instructions were understood, a key press was made and the display on the computer screen informed the subject to proceed when he or she was ready. The title of the passage was presented first, followed by each sentence of the passage. The sentences were subject percent and the computer recorded the study times for each sentence. When the subject finished reading the first passage, they were told to solve math problems under the guise that we were interested in how many problems they could solve in 2 minutes. Following this distractor task, subjects in a test-expectancy condition were administered the appropriate test. In the case of the multiple-choice test, subjects were given a copy of the six multiple-choice questions and told to select the correct answer from those provided. In the true/false test condition, subjects were given a copy of the four statements and instructed to indicate whether the statement was true or false. In the case of the essay test, subjects were given a copy of the essay question and instructed to write their answer on a lined sheet of paper that was provided. Subjects in the intentional-learning control were simply informed that there was a short break before the next passage. After 2 minutes, test materials were collected and subjects informed that they would proceed onto the next passage. The procedure described above for the first passage was repeated for the second and third passages.

Following the third passage and the 2-minute test interval, subjects read the critical final passage, "The Just Reward" or "Kanchenjunga: A Very Dangerous Mountain Range." After reading the passage and performing the 2-minute distractor task, subjects were informed that they would receive a test that was different from the previous tests. All subjects were administered a free-recall test. They were told to write down as much of the passage that they had just read, writing down sentences as close to the original as possible and if they could not remember the exact words, they should write down parts of the sentence. They were given a sheet of lined paper on which to write down what they recalled. Upon completion of free recall, the subjects were debriefed. The experimental session lasted about 30 minutes.

Results

Practice Texts

Mean performances on the particular tests administered for each test-expectancy condition after each practice text are shown in Table 1. An informal examination of these means reveals that subjects generally improved their performance with increasing practice on the type of test expected. These data must be viewed cautiously, however, because the particular practice texts (and thus the particular test questions) were not counterbalanced across practice trials. For what it is worth, one-way analyses of variance (ANOVA's) with practice-test trial as a within-subjects variable were computed for each type of test (i.e, each test-expectancy condition) and text (expository, fairy tale). For all analyses reported in this paper, the rejection level was set at .05. For the expository text conditions, the improvement in performance across practice trials was significant for the multiple-choice test group and for the essay test group, $F(2, 30) = 6.85$, $MSe=.025$ and $F(2, 30) = 13.05$, $MSe = .054$, respectively (for the true-false test, $F = 2.36$). For the fairy tale conditions, the improvement was significant for the multiple-choice test. $F(2, 28) = 15.26$, $MSe = .012$ (for the essay test, $F = 1.05$, and for the multiple-choice test, $F < 1$).

Insert Table 1 about here

Target Text

Reading times. The average reading (or study) times per sentence as a function of passage type and test expectancy are displayed in Table 2. A 2 x 4 between subjects ANOVA indicated that subjects spent more time reading the expository text than the fairy tale in general, $F(1, 116) = 7.10$, $MSe = 2.80$. There was no main effect of test expectancy ($F < 1$), but test expectancy significantly interacted with passage type, $F(3, 116) = 3.36$, $MSe = 2.80$. Given the present concerns, this interaction was examined in terms of the influence of test-expectancy for each type of passage. For the expository text, pairwise comparisons (using Newman-Keuls) indicated that there was no reliable difference in reading time as a function of test-expectancy, whereas for the fairy tale the essay expectancy produced faster reading times than the multiple-choice expectancy. Thus, quantitative differences in processing times as a function of test expectancy were minimal.

Insert Table 2 about here

To determine if the dynamics of reading the text changed as a function of test-expectancy and text type, multiple regression analyses were performed. Following Simon and Ditrichs (1988), a separate regression analysis was computed for each test-expectancy condition on each text type. These analyses predict the reading time for each subject on each sentence as a function of six text-based characteristics of the sentence: WORDS, the number of words in the sentence; PROPOSITIONS, the number of propositions in the sentence; NOUNS, the number of new argument nouns in the sentence; IMPORTANCE, the mean importance rating of the propositions in the sentence; FREQUENCY, the log natural language frequency of content words (add footnote explaining); and ORDER, the serial order of the sentence in the passage. To remove between-subjects variability, each subject's reading time for each sentence was converted into a z score computed within each subject (cf., Johnson & Kieras, 1983). That is, the z scores were based on each subject's mean and standard deviation for sentence reading time. The variables were entered into the regression equation in a forward stepwise manner, with the analysis being terminated when the F to enter was less than 1.0, as suggested by Graesser and Riha (1984).

The results of these analyses are summarized in Table 3. This Table shows the predictors entered for which the associated coefficients were significantly different from zero, the step on which they were entered, and the increment in R^2 at each step. The coefficients for the final equation are displayed as well. Included are the standardized coefficients (or "beta" weights), which provide an index of the importance of each predictor independently of scale differences.

The final R^2 for each analysis is at least .41, indicating that almost half of the variance in reading time was accounted for in every group. In addition, for all analysis the number of words in a sentence accounted for more variance than any other single predictor, and the number of new argument nouns in a sentence was always a significant predictor. Importantly for present purposes, there were differences across the analyses as well.

Insert Table 3 about here

First, note the general differences as a function of text type. The predictors for the fairy tale always included the degree of importance of the propositions in the sentence (IMPORTANCE) and with one exception the order of the sentence, but never included the frequency of occurrence of content words. By contrast, for the expository passage frequency was a significant predictor half the time (and for the multiple choice expectancy its coefficient was greater than zero at $p < .10$), whereas sentence order was never a predictor. Moreover, though importance appeared as a predictor, the coefficient was negative indicating that reading time increased as importance decreased. Note that for the fairy tale the reverse was true: The coefficient was always positive meaning that reading time increased with increases in importance. This particular finding is consistent with Hammes and Petros (1988) analyses of lookback times for narrative and expository texts. They found that lookbacks for expository passages tended to focus on details, whereas lookbacks for narratives focused on higher-order (important) propositions.

Not only do the particular predictors tend to change across text types, but the presumed level of text processing at which these predictors operate may differ. Based on Simon and Ditrichs' (1988) analysis, the number of new argument nouns, sentence order, and importance can be classified as passage-level variables. That is, these variables are reflective of more macro-level processing (cf, van Dijk & Kintsch, 1983). On the other hand, number of words, frequency of content words, and number of propositions can be thought of as sentence-level variables, variables associated with micro processes. For the fairy tale, all of the macro-level variables play a role in predicting reading time, while only one micro-level variable (number of words) has a consistent influence on reading time. For the expository passage, all of the micro-level variables are associated with reading time in at least some of the groups, and some of the macro-level variables drop out. Thus, the present data are sensitive to and reveal differences in processing between a narrative and an expository passage, differences that are consistent with extant theoretical and empirical work in text processing (e.g., Britton, Graesser, Glynn, Hamilton, & Penland, 1983; van Dijk & Kintsch, 1983).

Finally, there are two important observations regarding the patterns as a function of the test expectancy. One observation is that for the fairy tale, the reading-time predictors changed little if at all as a function of the particular test expectancy. For the expository passage, test expectancy appeared to change the pattern of predictors more substantially, with three additional predictors emerging for the true/false and essay expectancy groups relative to the control.

<u>Recall</u>. The recall protocols were scored for number of propositions recalled. Initially, two scorers independently examined 20% of the protocols, disagreeing less than 3% of the time. Consequently, the remainder of the protocols was scored by one of the scorers, and the data are from that scorer. Table 4 presents the mean proportions of propositions recalled as a function of passage type, test expectancy, and proposition importance. Importance was determined by previously collected ratings of proposition importance based on a 5-point Lickert type scale with 1

indicating "not important" and 5 indicating "very important." For the fairy tale the 20 lowest rated propositions were considered of "low" importance, the 25 middle rated propositions were considered of "medium" importance, and the 20 highest rated propositions were considered of "high" importance. For the expository passage the division was 20, 22 and 20 propositions for the low, medium, and high categories respectively.

The data were submitted to a preliminary 4 X 2 ANOVA with test expectancy and text type as factors. The fairy tale was recalled significantly better than the expository passage, $F(1, 116) = 279.15$, $MSe = .007$. There was a main effect of test expectancy, $F(1,116) = 4.49$, $MSe = .007$, that was qualified by a marginally significant interaction between test expectancy and text type, $F(3, 116) = 2.59$, $p < .06$. To examine the influence of test expectancy for each text type, we performed separate 4 X 3 mixed ANOVA's for each text, this time including the within-subjects variable of proposition importance (low, medium, and high).

For the expository passage, recall of higher importance propositions was better than that of lower importance propositions, $F(2, 120) = 18.23$, $MSe = .005$. More importantly, there was a significant main effect of test expectancy, $F(3, 60) = 3.54$, $MSe = .009$, and a significant interaction between test expectancy and importance level, $F(6, 120) = 2.23$, $MSe = .005$. To clarify these effects, specific comparisons based on the theoretical expectations outlined in the introduction were conducted. In particular, comparing the essay expectancy group with each of the other expectancy groups for each importance level showed that the essay expectancy produced significantly higher levels of recall than any of the other test expectancies for medium and high importance propositions (smallest $F(1, 120) = 4.00$, $MSe = .005$). There was no significant improvement, however, due to essay expectancy for low-importance propositions (largest $F(1, 120) = 1.44$). An additional set of comparisons showed that neither of the recognition test expectancies significantly improved recall relative to the control.

A 4 X 3 mixed ANOVA (test expectancy and importance level) for the fairy tale data also showed the usual levels effect (recall improving as the importance of the proposition increases), F

(2, 112) = 60.16, MSe = .009. There was a significant effect of test expectancy, F (3, 56) = 3.10, MSe = .030, but no significant interaction (F (6, 112) = 1.82). Examination of the lower panel of Table 4 indicates that the test expectancy effect is due to lcwer levels of recall after a multiple choice expectancy than after the other test-expectancy conditions. This effect is probably an artifact, however, of scheduling constraints. For scheduling purposes all subjects were allowed a half hour to finish the experiment. Unfortunately, some subjects in the multiple-choice group who read the fairy tale took longer to complete the task (e.g., see reading times in Table 2) than in the other groups, and they had not quite completed recalling the tale at the end of the session. Thus, it is almost certain that their recall scores are artificially lower. To confirm this claim, we scored only the first 39 of the 65 propositions of the fairy tale (consisting of 12 low importance, 15 medium importance, and 12 high importance propositions). Recall for these propositions was equivalent across groups (with the mean for the essay expectancy at .38, and the mean of each of the other groups at .37). These values are virtually identical to the proportion recalled for the complete passage, except in the case of the multiple-choice expectancy. For this group the proportion recalled for the initial part of the passage was higher than that when the complete passage was considered. These data imply that if the multiple-choice expectancy subjects had had the time to record their recalls, they would have performed as well as the other groups. At any rate, the finding of major importance is unequivocal. An essay-test expectancy did not improve recall for the fairy tale relative to a non-specific expectancy (control) or to a recognition expectancy (true/false). (With multiple-choice expectancy subjects dropped from the ANOVA, F(2,42) < 1 for the test-expectancy effect.)

Insert Table 4 about here

Subsidiary Experimental Conditions

The results thus far are in line with the idea that subjects expecting an essay test performed additional organizational proc ssing that improved recall of an expository passage but not of a fairy tale. There is a possible alternative explanation of the results, however, that does not appeal to qualitative differences in study processes as a function of test expectancy. It could be that subjects found the essay test to be relatively difficult but found the recognition tests not to be very demanding. Consequently, essay-expectancy subjects simply studied "harder", i.e., were more attentive while studying (though the essay expectancy did not produce longer reading times, it still could be the case that more effort per unit of time was expended). This account would explain the absence of positive effects of an essay expectancy for recall of the fairy tale in the following way. For the fairy tale, performance on the practice essay tests was high even on the first practice trial (see Table 1). Thus, subjects may have found the essay tests to be relatively easy for the fairy tale, with the result being that they did not feel the need to increase their study efforts.

To contrast this "effort" account with the organizational interpretation, we implemented an additional recall-test expectancy condition. Our objective was try to select a test-expectancy that would be perceived by subjects as challenging but would not suggest to subjects an organizational study strategy. For this purpose, we used a fill-in-the-blank test expectancy. Because this kind of test requires recall, it avoids the possible problem with the recognition expectancy that subjects may view recognition as relatively easy. More importantly, we piloted the fill-in-the-blank questions for the practice trials to ensure that they were challenging enough so that subjects could not achieve high levels of performance. Presumably this would induce subjects to study the text harder, and on the effort account this should result in enhanced free recall performance on the target text both for a fairy tale and an expository text.

In contrast, on the organizational account increased free recall should obtain only to the extent that the expected test induces organizational study strategies. Fill-in-t e-blank questions do not put a premium on organizing the propositions in the text, and consequently should not induce subjects to engage in more organizational processing during studying. Accordingly, there should be no benefit of a fill-in-the-blank expectancy for free recall of the target texts.

Subsequent to completing the main experiment, we ran the fill-in-the-blank expectancy condition (for ease of exposition this will be labeled the cloze test) with 16 subjects in the fairy tale group and 16 in the expository group. The method was identical to that described in the Methods Section, including sampling subjects from Purdue introductory psychology classes and using the same experimenter. Cloze tests were developed for each of the three practice narratives and each of the three practice expository texts. Each cloze test contained some sentences from the particular practice text with some of the words removed from the sentences and replaced by blanks. For all cloze tests there were 25 blanks to fill in. In scoring the cloze tests, 2 points were awarded for a correct verbatim answer and 1 point was awarded for an answer that preserved the meaning of the target word.

Mean performance on the practice tests are in Table 1. It can be seen that for both the fairy tale and the expository groups that performance on the cloze tests were well below 100% accuracy. Thus, these tests proved challenging for the subjects.

Target Text Performance. Turning to performance on the target text, the mean sentence reading times suggest that the cloze-test expectancy stimulated subjects to increase or change their study activity on the text relative to the control (non-specific expectancy) subjects. For the fairy tale, reading time was significantly slower for the cloze expectancy than for the control (7.53 s vs. 6.54 s, respectively), $F(1,29) = 4.17$, $MSe = 1.84$. For the expository text, there was no significant difference in reading time, though the cloze expectancy times were nominally slower (8.02 s vs. 7.75 s). Regression analyses (paralleling those performed for the other experimental conditions) indicated that with the cloze expectancy the significant predictors of reading time for the fairy tale were (in order of entry): WORDS, NOUNS, and PROPOSITIONS. Note that significant predictors for the control condition that are presumably associated with organization aspects of the text (IMPORTANCE, ORDER) dropped out under the cloze-test expectancy. For the expository text, the predictors with significant coefficients were WORDS, NOUNS, IMPORTANCE, and PROPOSITIONS, with the latter two predictors having negative coefficients. These latter two predictors were not significant for the control condition. In sum, in line with the assumptions outlined earlier, the reading time data are consistent with the idea that the cloze expectancy increased (for the fairy tale) or changed study processes, but did not induce studying that emphasized organizational processing.

The mean proportion recall is shown in Table 4. These scores were compared to the control performance with a three-factor mixed ANOVA, with test expectancy and text type as between-subjects factors and proposition importance as a within-subjects factor. There were no significant effects involving test expectancy (largest $F(1,59) = 1.77$ for the main effect of test expectancy). Nevertheless, to parallel the analyses performed for the other groups, we conducted a separate ANOVA for each text type. Again, there were no significant effects involving test expectancy (largest $F(1,29) = 2.91$ for the main effect of test expectancy in the expository-text condition).

Discussion

A primary objective of this study was to examine the theoretically appealing but not well supported hypothesis that subjects expecting an essay test are more likely to engage in organizational processing of a text than subjects expecting either a recognition test or a non-specified memory test, and that this increased organizational processing benefits subsequent recall for the text. The present data support and extend this hypothesis with a convergence of processing and recall patterns that up to now has not been obtained.

Recall was improved by an essay expectancy, but not uniformly. There were two important limitations to the improvement in recall, both of which were predicted by the preceding hypothesis. First, an essay test expectancy did not produce improvement in free recall for a fairy tale. Theories of text processing are generally agreed that fairy tales normally invite organizational processing due to story schemata or causal structure that is embedded in fairy tales (Thorndyke, 1977; Trabasso & van den Broek, 1985; van Dijk & Kintsch, 1983). The present analysis of the study-time data support this theoretical claim that fairy tales normally invite organizationally-based processing. The regression analyses indicated that reading times were most influenced by variables thought to be related to overall structural and organizational characteristics of the text: proposition importance, new argument nouns, the order in which the sentence appeared. Moreover, these predictors appeared for the intentional-learning control, as well as for the recognition expectancy subjects and the essay-test expectancy subjects. A further point is that the organizational processing invited by fairy tales appears to be sufficient for free recall. This claim is based on research showing that encoding tasks that require additional organizational processing such as reordering a scrambled version of the fairy tale or outlining the fairy tale do not produce significant increases in free recall of a fairy tale (McDaniel, et al., 1986; Einstein, et al., 1990). Consequently, hypothesized increases in organizational processing due to an essay expectancy would not be expected to improve free recall for a fairy tale. This is the pattern obtained.

On the preceding analysis, there are still two possible influences of an essay expectancy on subjects' studying of a fairy tale. One is that the essay expectancy produced no changes in processing the fairy tale relative to what a subject would ordinarily do. The idea here is that the expectancy would not change processing because the reader normally performs organizational processing on a fairy tale. The other idea is that the essay expectancy would produce increases in organizational processing in addition to that normally invited by the fairy tale. The multiple regression analyses unfortunately do not clearly inform this issue. The coefficient associated with the IMPORTANCE variable was of nominally greater magnitude for the essay expectancy group than for any of the other groups, perhaps suggesting that those with an essay expectancy were paying more attention to the structure of the information in the fairy tale than subjects not expecting an essay test. Comparisons of the IMPORTANCE coefficients between the essay expectancy group and the other groups failed to meet standard significance levels, however, except for the cloze group ($F(29) = 2.26$). Moreover, there were no significant differences between the coefficients of the other passage-level variables (NOUNS, ORDER). As indexed by the present measures, then, the essay expectancy did not produce reliable changes in processing the fairy tale.

The second important aspect of the essay-expectancy effects was found with the expository text. There was improvement in free recall due to the essay expectancy, however, this improvement was selective. Medium and high importance propositions were recalled better than in the other expectancy conditions, but low importance propositions were not recalled better. As outlined in the Introduction, this is the pattern that would be expected if an essay test expectancy promotes studying that emphasizes organization.[1]

The study time data generally support the implication that subjects expecting an essay test processed the expository passage differently than those subjects not expecting an essay test. There were no significant differences in the amount of time spent on the passage as a function of test expectancy, but there were qualitative differences in how study time was influenced by the text-predictor variables. Study times were associated with a more complex set of text variables for subjects expecting an essay expectancy than for intentional learning subjects or for subjects expecting a multiple choice test. This general pattern (as well as the recall results) parallels previous findings with an expository passage that used notetaking as an index of study strategies (Rickards & Friedman, 1978). The amount of notes taken did not differ across multiple-choice and essay test expectancy subjects, but the nature (content) of the notes differed such that subjects expecting an essay test recorded sentences of higher importance to the passage than those subjects expecting a multiple-choice test. Similarly, for the present study-time data, proposition importance was significantly associated with study time in the essay expectancy group but not the intentional learning control or the multiple-choice expectancy group. The implication of this finding is not straightforward, however, as importance was negatively related to study time.

Perhaps, this reflects the fact that it was hard to relate the elements of the text together in a coherent framework (as evidenced by the fact that recall is relatively low and the text is not as veridically reconstructed as is a fairy tale when subjects are required to order sentences that are presented in a randomized order, McDaniel et al, 1986), and consequently subjects in the essay expectancy attended more to less important information in their efforts to organize the material. Aside from being post-hoc, this explanation loses force when the regression analysis of the true-false expectancy group is considered. This group showed the same pattern of predictors as did the essay expectancy group, including a significantly negative coefficient for proposition importance, yet their recall level was not as high as that of the essay-expectancy group. Thus, the study time analyses apparently did not completely capture the putative differences in processing that underlie the recall effects, though the fact remains that there were changes in the kind of studying performed after an essay expectancy than after either the control or the recognition expectancies.

Alternatives to the hypothesis that increased organizational processing is responsible for increases in recall due to an essay expectancy fare less well in accounting for the current pattern of results. One idea that has been considered is that subjects expecting to be tested on something other than recall feel "double-crossed", and so are less motivated to perform well than subjects who expect to be tested on recall (Neely, Balota, & Schmidt, 1982). Two results counter this double-crossing hypothesis. First, the essay-expectancy group is also mislead in that they expect cued recall but are given free recall on the final test. Of course, it could be argued that this discrepancy is less extreme than for the other expectancy groups, and therefore produces less motivational deficits. Still, on this view recall differences ought to be observed for the fairy tale, and that was not the case. Thus, the present data bolster previous refutations of a simple motivational explanation of recall benefits due to a recall expectancy (e.g., Schmidt, 1983).

A second alternative hypothesis is that the observed increases in recall due to an essay expectancy reflect retrieval-practice effects. On this view, when subjects receive practice study/test trials prior to the target trial (as in the present study), the recall-expectancy group gains some skill in executing recall retrieval operations, whereas those given recognition tests or no tests (the control) do not (Neely & Balota, 1981). This hypothesis does poorly (1) in accounting for the absence of improvement in fairy tale recall due to the essay-expectancy, and (2) in explaining why the benefits in recall for the expository passage were limited to medium and high-importance propositions.

Another idea is that subjects expecting recall (e.g, an essay test) encode a greater number of context-item relations than do subjects expecting recognition tests (Schmidt, 1983). The context-item relations would presumably aid retrieval processes in free recall. This explanation can handle the failure to find increases in recall due to the essay expectancy with the fairy tale. The use of contextual (environmental) cues in free recall appear to be minimized when other, more effective internal cues (e.g, organizational information) are present (McDaniel, Anderson, Einstein, & O'Halloran, 1989). As discussed earlier, the current study-time data as well as previous work suggest that fairy tales afford organizational processing. Thus, the increases in context-item encodings produced by an essay-expectancy would not necessarily be manifested when recalling well-organized material such as a fairy tale. But this account runs into difficulty when considering that recall of the expository passage was boosted by an essay expectancy only for high and medium importance propositions. A priori, one would expect an effect due to increased contextual cues to be fairly general across all text elements, or perhaps to be even more robust for the less important elements that are not as well integrated into the macrostructure of the text representation.

A final alternative is that subjects view recall tests as more difficult than recognition tests, and accordingly they simply study harder when faced with a recall test. This hypothesis is not unlike the organizational hypothesis, but differs in that it suggests that differences in studying are primarily quantitative rather than qualitative. The absence of differences in overall study time does not preclude this possibility as total time may not be indicative of effort per unit of time (cf, Tyler, Hertel, McCallum, & Ellis, 1978). Nor does the absence of mnemonic effects of an essay expectancy for the fairy tale preclude this possibility as additional effort may be unnecessary for achieving memory representations needed to support good recall of narrative text (cf., Fletcher & Bloom, 1988; van Dijk & Kintsch, 1983). The results of the cloze expectancy condition argue most strongly against the effort hypothesis. In this condition subjects also expected a recall test, yet there was no significant improvement in free recall for this group relative to the recognition-expectancy or control groups. One might note that for the expository passage, the cloze expectancy produced marginally better recall than the control group, leaving open the possibility of an influence of increased effort due to expecting a hard recall test. But such an influence, if present, was manifest for less important propositions and not important propositions; this is the reverse of that obtained with an essay expectancy. Accordingly, the data converge nicely with the account detailed at the outset: when faced with a test that benefits from organizational processes (e.g., an essay test), students will try to better organize the information presented in the text.

The present study also bears on the issue of whether or not expecting a recognition test induces different text processing strategies than a non-specific test expectancy (intentional learning). Most previous studies have not included an intentional learning control to allow such comparisons, however, one idea is that learners may try to memorize details in preparation for recognition tests (Terry, 1933). The study time analysis for the multiple choice expectancy yielded predictors and associated coefficients that were nearly identical to those found in the intentional learning control, and the multiple choice expectancy also did not significantly benefit recall relative to the control. Effects of the multiple choice expectancy might have emerged if the test task better matched the expectancy, though Kulhavey et al. (1975) reported only a nominal increase in performance when comparing a multiple choice expectancy to a no-expectancy control on both cued-recall and multiple choice questions. It may be that many students, based on their academic experiences, adopt a multiple-choice expectancy when not given a specific test expectancy. Alternatively, perhaps students either do not believe that a multiple-choice test warrants any modulation in their general processing strategies or cannot effectively modulate their strategies. Theorists have speculated that subjects have greater difficulty generating efficient encoding strategies in anticipation of a recognition test than in anticipation of a recall test (Connor, 1977).

In contrast, the true/false expectancy did produce additional predictors of study time for both the fairy tale and the expository passages, and these predictors were associated with sentence level features of the text (word frequency, number of propositions). These apparent processing changes were not enough to influence recall, however, even in the fairy tale. This is a telling finding because increased focus on details induced by other manipulations (letter deletion or embedded questions) improves recall of a fairy tale (Einstein et al, 1990; McDaniel et al, 1986). Thus, a true/false test expectancy does not appear to greatly improve attention to details. This conclusion is supported by a parallel finding with categorized word lists. A yes/no recognition test expectancy (reinforced by three practice trials) did not improve free recall for these materials, relative to other expectancies (Jacoby, 1983), even though more item-specific processing induced by other tasks improves recall of categorized lists (Einstein & Hunt, 1980).

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FOOTNOTE

1. It is unclear why Schmidt (1983) failed to find selective recall advantages according to proposition importance due to a recall expectancy. One salient difference between Schmidt's experiment and ours is that in his experiment subjects were not given practice study/test trials. Other aspects of metamemory like comprehension monitoring are known to benefit from practice trials that give first-hand experience with the particular memory task (Glenberg, Sunocki, Epstein, & Morris, 1987). Thus it is possible that the influence of test-expectancies on subjects' study strategies will depend, at least in part, on the degree to which prior practice is administered.

Table 1

Mean Proportions Correct on the Practice Tests

		Test Expectancy			
Passage Type	Passage Number	Multiple Choice	True/False	Essay	Cloze[a]
	1	.64	.61	.49	.28
Expository	2	.69	.69	.72	.27
	3	.88	.75	.91	.43
	1	.69	.77	.85	.52
Fairy Tale	2	.77	.98	.93	.37
	3	.69	.92	.90	.41

[a] See Subsidiary Experimental Conditions section in text.

Table 2

Mean Reading Time Per Sentence[a]

Passage Type	Test Expectancy			
	Control	Multiple-Choice	True/False	Essay
Expository	7.75	6.86	7.04	7.79
Fairy Tale	6.54	7.40	6.55	5.74

[a] Reading time in seconds.

Table 3

Regression Analyses on Reading Times[a]

Step		Control	Multiple-Choice	True/False	Essay
		Test Expectancy			
		Expository Passage (N = 224)			
1	Variable	WORD	WORD	WORD	WORD
	Final Coefficient[b]	.100(.701)	.096(.672)	.114(.804)	.098(.688)
	R^2	.573	.564	.494	.335
2	Variable	NOUNS	NOUNS	IMPORTANCE	NOUNS
	Final Coefficient	.105(.122)	.098(.114)	-.944(-.268)	.195(.226)
	R^2	.582	.573	.528	.370
3	Variable			FREQUENCY	FREQUENCY
	Final Coefficient			.248(.165)	.312(.208)
	R^2			.542	.389
4	Variable			PROPOSITIONS	PROPOSITIONS
	Final Coefficient			-.152(-.255)	-.168(-.282)
	R^2			.551	.401
5	Variable			NOUNS	IMPORTANCE
	Final Coefficient			.133(.154)	-.566(-.161)
	R^2			.566	.414

Table 3 (Continued)

		Test Expectancy			
		Control	Multiple-Choice	True/False	Essay
Step		Fairy Tale (N = 255)			
1	Variable	WORD	WORD	WORD	WORD
	Final Coefficient	.059(.530)	.059(.531)	.052(.471)	.046(.409)
	R^2	.368	.380	.346	.325
2	Variable	IMPORTANCE	IMPORTANCE	IMPORTANCE	IMPORTANCE
	Final Coefficient	.288(.177)	.219(.134)	.239(.147)	.449(.276)
	R^2	.392	.419	.380	.410
3	Variable	NOUNS	PROPOSITIONS	NOUNS	NOUNS
	Final Coefficient	.188(.244)	.065(.088)[c]	.130(.169)	.131(.169)
	R^2	.421	.434	.391	.420
4	Variable	ORDER	NOUNS	ORDER	ORDER
	Final Coefficient	.032(.159)	.131(.170)	.044(.215)	.043(.211)
	R^2	.439	.441	.415	.445
5	Variable			PROPOSITIONS	
	Final Coefficient			.092(.123)	
	R^2			.425	

[a] For the analyses reading times were z-transformed.

[b] The standardized (i.e., beta) coefficients are in parentheses.

[c] Coefficient not significantly different from zero, $p > .19$.

Table 4

Mean Proportions of Propositions Recalled as a Function of Test Expectancy, Passage Type, and Importance

		Test Expectancy				
Passage Type	Proposition Importance	Control	Multiple-Choice	True/False	Essay	Cloze[a]
	High	.11	.13	.13	.18	.11
	Medium	.11	.08	.13	.19	.17
Expository	Low	.05	.08	.08	.08	.09
	Mean	.09	.09	.11	.15	.12
	High	.46	.38	.46	.49	.49
	Medium	.43	.25	.37	.37	.44
Fairy Tale	Low	.30	.24	.25	.28	.32
	Mean	.39	.29	.36	.38	.41

[a] See Subsidiary Experimental Conditions section in text.