

ED 374 409

CS 011 838

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 TITLE Information Recall of Four Newspaper Elements among Young Readers.
 PUB DATE Aug 94
 NOTE 26p.; Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication (77th, Atlanta, GA, August 10-13, 1994). Reduced and photocopied reproductions of newspaper front pages in the appendix may not reproduce clearly.
 PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS High Schools; High School Students; Layout (Publications); *Newspapers; *Reading Comprehension; Reading Research; *Recall (Psychology); *Text Structure
 IDENTIFIERS Illinois; Journalism Research

ABSTRACT

A study examined the ability of 204 students in nine Illinois high schools to process and recall information contained in four newspaper elements: story texts, graphics, index boxes and pullout quotes. Students were randomly assigned to read the front page of one of 20 newspapers and answer questions based on information in the stories. Students generally recalled information in pullout quotes most efficiently and information in graphics least efficiently. Overall, subjects did well when information was repeated in stories and other elements (such as pullout quotes). Graphics, on the other hand, may have been too complex for subjects to process efficiently. (Contains 22 references and three tables of data. Examples of three newspapers are attached.) (Author/RS)

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Information Recall of Four Newspaper Elements
Among Young Readers

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** Paper presented to the Newspaper Division at the annual convention of the
Association for Education in Journalism and Mass Communication, Atlanta, Ga.,
August 1994.

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CS011838

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Abstract

An experiment examined the ability of 204 high school students to process and recall information contained in four newspaper elements: story texts, graphics, index boxes and pullout quotes. Students generally recalled information in pullout quotes most efficiently and information in graphics least efficiently. Overall, subjects did well when information was repeated in stories and other elements (such as pullout quotes). Graphics, on the other hand, may have been too complex for subjects to process efficiently.

Information Recall of Four Newspaper Elements Among Young Readers

Many newspapers have changed their looks in recent years in order to attract new readers and keep old ones. More and more, those changes in appearance include the addition of graphics.

Newspapers had hoped that this "design revolution" (Utt and Pasternack, 1989) would especially attract young readers through the increased usage of visual elements. However, it is unclear how graphics and other visual elements affect the ability of young readers to recall information contained in them. Do graphics enhance readers' ability to recall information contained within them by combining textual information with visuals? And how does the processing of graphics information compare to the recall of information contained in other elements on the newspaper page?

Three elements used by newspapers will be examined here: graphics, pullout quotes and inside boxes. The ability of young readers to recall information contained in these three elements will be compared with knowledge recall of information contained in news stories.

The findings may have practical implications for editors. If young individuals are able to process information from certain design elements and are able to effectively recall this information at a later time, they may develop a reading habit because of the efficient nature of the newspaper to provide important information necessary for informed citizens. When young readers process information more efficiently, their satisfaction with the reading experience will be higher. Knowing how to increase reader satisfaction translates into stronger circulation figures because satisfied readers are more likely to return to newspapers for additional information in the future.

Previous research

Editors across the country are becoming increasingly concerned about the low levels of newspaper reading among younger members of the public. A recent survey by the Times Mirror Center for the People & the Press (1990), for example, found that 75 percent of respondents age 18 to 29 admitted that they had not read a newspaper the day before they were surveyed -- the highest percentage of any demographic category.

Newspapers have responded by attempting to attract young readers through the increased usage of visual elements, especially graphics. However, it is unclear if graphics are more efficient than other newspaper elements in providing readers with information that is easily processed and recalled at a later time. Regardless, communications scholars increasingly are focusing on the contents and functions of newspaper graphics.

Utt and Pasternack (1989) attributes the "design revolution" to "the constant parade of new graphics-related technologies, a greater concern among newspeople for appearance as well as content, and the trend-setting national daily, USA Today."

Utt and Pasternack claim that since the 1982 introduction of USA Today, design changes in American newspapers have been "perhaps more radical and far-reaching than in the previous half-century combined." They quote Carl Sessions Stepps' assertion that newspapers resisted the move toward more graphics until "the brash newcomer surged ahead and embarrassed everyone else into coming along too (Stepps, 1986)."

The early 1980s ushered in what Utt and Pasternack call the "homogenization period" of newspaper redesign. The introduction of the Standard Advertising Unit and the insertion of USA Today into all major markets caused newspapers to hire design experts to help them keep up with the rapid pace of change. They reported

that 75 percent of the papers they studied used wire service graphics and 80 percent used Macintosh computer systems.

Others scholars, such as Smith and Hajash (1988), also list USA Today among the top three factors prompting more graphics use. But their study found that other papers have not nearly matched the Gannett national paper in frequency of graphics use. They found that while USA Today averaged 1.3 graphics per page, the 30 dailies they studied averaged only one graphic for each 17 pages.

Almost half the graphics Smith and Hajash counted were maps. Weather maps accounted for a large number of Page 2 graphics. The second most frequently used type of graphic was the bar chart.

A large proportion of the graphics in dailies were found in the business section. Smith and Hajash said that finding, along with concentrations of graphics in sports and weather sections, reinforces the view that newspeople consider graphics best-suited for relaying statistical information.

Maps and other graphics were most frequently found in the upper corners of pages, and more often on the left hand page. Smith and Hajash said graphics seemed to be used like photographs and other display elements to anchor page corners.

Lack of color and other embellishments led Smith and Hajash to conclude that graphics were seen as basic communication tools rather than creative pieces. They also saw the lack of bylines on graphics as a sign that creativity was not seen as an important part of graphics use among newspeople.

To test the idea that computer technology and USA Today have led a "design revolution," Barnhurst and Nerone (1991) analyzed visual aspects of newspapers from 1885 to 1985. They found that the number of stories decreased and the number of graphics increased. The changes were gradual, without any drastic changes that could be linked to new technologies or new media competition. However, they

attribute the popular conception of a "design revolution" to an accelerated rate of change within the last 20 years.

In 1987, five years after USA Today hit the newsstand, Stone (1987) wrote that "evolution rather than revolution governs the newspaper design field." He believes change is usually slow and there are "laggards who simply refuse to give up their comfortable, customary ways." Stone quotes several studies showing that newspaper producers have long been concerned with improving their product's appearance.

Whatever the reasons, scholars and editors agree that graphics are playing an increasing role in newspaper composition. Academics and journalists also agree that more work needs to be done to maximize the benefits of visual components.

Speaking at a 1989 business writers and editors convention, Rob Covey, president of the Society of Newspaper Design and art director for U.S. News & World Reports, said, "We're seeing far too much graphics garbage." Graphics, he said, should "earn their place on the page by telling readers something visually that's not available from the body of the story itself (cited in Strugatch, 1989)." Covey offers a checklist for editors to apply to each graphic: use an active headline on the graphic; explain with a "nut graph"; keep it brief; raw data must make a point; credit the source of data; give artists bylines.

Several studies have looked at how graphics may help or hinder reader understanding. Tankard (1987) identified 10 pitfalls that he calls the "equivalent of the say-nothing lead." They include: the tilted graph; the stacked graph; the pseudo graph; the graph with little or no variation; the convention-violating graph; the bar graph with obscure bar ends; the buried line graph; the unnecessarily three-dimensional graph; the overly complex graph; and the multiple pie chart. He says these graphic problems are misleading, unclear, inaccurate or unnecessary.

Tankard says confusion is sometimes the result of newspapers trying to balance the need to inform with the needs to grab attention and to entertain. He

adds that many of the people drawing graphs for papers are trained in graphic design rather than statistics. That training, he says, may lead designers to attempt visual effects that clutter the graphic and confuse the reader.

Kelly (1989) argues that clutter does not necessarily lead to confusion. His study failed to prove that non-essential elements of graphics distracted readers and hindered comprehension of the data presented. Kelly's study was based on Tufte's "data-ink ratio" principle which stated that a large proportion of the ink in a graphic should provide "data-information (Tufte, 1983)." Kelly hypothesized that the presence of "non-data-ink" would reduce readers' abilities to recall pertinent information. Instead, he found error in recall was nearly the same for readers of graphics with low-ratio and high-ratio graphics. He concludes that the negative influence of "non-data-ink" on recall accuracy is questionable.

An experiment using bar charts (Ward, 1992) found that sidebar stories were more effective than graphics at aiding reader recall. To test his hypotheses, Ward showed groups of students either a story alone; the story accompanied by a related bar chart; the story and bar chart with shading and artwork; or the story and a sidebar story containing the same information found in the graphs. He found that the fewest recall errors occurred in the group that had seen the story and sidebar story.

Based on his findings, Ward recommends that journalists keep their graphics simple. A complicated graphic will lead readers to ignore the story. He also suggests adding a small block of text within graphics telling the readers what to look for. He admits, though, that his results cannot be generalized to apply to every situation. Factors such as reader interest level in a particular subject and reader demographics may make a difference, according to Ward.

A somewhat similar experiment using college students as subjects was conducted by Griffin and Stevenson (1992) to determine the effectiveness of graphics

in teaching readers about foreign news. Their findings indicate that reader knowledge nearly doubled over that of the control group when both text and graphics were used to report the same story. They also found that "background boxes" containing textual information were helpful to readers' understanding of stories.

Another graphic form that uses textual information is the pullout quote. These quotes, run in larger type than story texts, are similar to "background boxes" in that they also contain textual information which may help readers to understand accompanying stories.

Although research on pullout quotes is scant, a few studies have evaluated the use of quotes in body copy. One such study (Weaver, Hopkins, Billings and Cole, 1974) tested "textbook advice" about using quotes. Weaver et al. found that there were no significant differences between readers of stories with direct quotes and readers of stories containing paraphrases when asked to rate stories on accuracy, believability, informativeness, interest, conciseness, readability and colorfulness. They conclude that their findings contradicted the traditional wisdom regarding use of direct quotes.

Weaver et al. also found no significant differences overall in comprehension and retention of factual information. Beginning college students seemed to retain more factual information from direct-quote stories than did the upper-classmen. Those with more journalism experience tended to find direct-quote stories less believable than did less experienced students. Despite the few differences between subgroups, They acknowledge "there was no consistent difference across all subgroups," in story comprehension.

Subjects' evaluations of people in the stories did not differ significantly either. When quoted directly, however, people in the stories were rated as more dramatic and emotional than when they were paraphrased. The findings, while not

conclusive, do raise questions about the accuracy of "textbook advice."

In addition to graphics and pullout quotes, two other newspaper elements will be examined: index items and story texts.

Little research has been conducted on index items. Index items, both "inside boxes" and "teasers," appear to be an important front page element, since they help readers navigate through the newspaper by showing them where certain stories and sections are located. Newspapers also appear to be increasing their use and size of index boxes (see Wanta and Johnson, 1994, for example), but the readability of this element has not been investigated.

The readability of news stories, on the other hand, has a long history of research. Fowler (1978) and Fowler and Smith (1979) among others, have argued that stories are written in too difficult of a style, which hampers readers' ability to process and comprehend information. They warn that large segments of the population may become isolated if newspapers continue to be written above the reading level of many readers. However, Danielson and Dunn (1964) and Stempel (1981) found readability levels differ for different types of newspaper content.

The research question investigated here is: Which newspaper element produces the highest levels of knowledge recall: graphics, pullout quotes, index items or story texts?

Method

* Subjects: A total of 204 high school students in nine Illinois high schools participated. The students, mostly 18-year-old seniors, came from a variety of classes, including English, civics and government.

High school students were used to add to the validity of the results for a number of reasons. First, these individuals are more representative of the average newspaper reader than are college students, the typical subjects for scholarly

experiments, on a number of important demographic variables. For example, high school students obviously are lower in education level, an important consideration since the median years of school completed by U.S. citizens is 12.7 (Kominski, 1991).

The high school students in the study are also highly heterogeneous and come from a variety of backgrounds, an advantage which was further enhanced by the use of a wide range of high schools. Enrollments of students in the participating high schools ranged from 1,276 (Centralia High School) to 85 (Coulterville High School). In addition, this study purports to examine young readers' responses to newspapers. Thus, 18-year-old high school students form an appropriate sample.

* Treatments: Each subject read one of 20 newspapers that were collected from across the country. The newspapers were selected based on two criteria. First, some newspapers were selected because they received a large number of awards for page designs as determined by the Society of Newspaper Design (see Society of Newspaper Design, 1990). These newspapers typically also used graphics, pullout quotes and inside boxes more often than other newspapers. Second, some newspapers were selected because they were judged as one of the top newspapers in the country (see Merrill, Lee and Friedlander, 1990; and Editor & Publisher, 1983).

Editors from the 17 newspapers that were unavailable through a university library were contacted and asked to provide newspapers dated January 4 through 11, 1991, for use in a publications design class. The present study grew out of this class.

It should be noted that only one newspaper -- the Dallas Morning News -- declined to provide copies of its papers. It also should be noted that the New York Times and Washington Post were not included in the study because of a distribution problem. Table 1 lists the 20 newspapers and their respective circulations at the time of the study.

The January 10, 1991, edition of each newspaper was used in the study. The selection of January 10 was purposive: the topic of the lead story was the same in

each case (the failed meeting between U.S. Secretary of State James Baker and Iraqi Foreign Minister Tariq Aziz to avert war in the Persian Gulf), but the presentation of the lead story and other stories on the pages varied greatly. For example, some used some type of Gulf crisis graphic. Several used pullout quotes. Many used an inside box. Others ran stories dealing with such diverse topics as gang murders and high school girls' use of chewing tobacco. Examples of some of the pages used in the present study are included in an appendix.

Treatments, then, were actual newspaper pages that had been read earlier by thousands of readers. The pages were not altered in any way. Using actual newspaper pages was an important consideration. Many previous studies (for example, Griffin and Stevenson, 1992; Ward, 1992) used only one story and/or one graphic as their experimental treatments. While utilizing only one story and/or graphic allows researchers to isolate variables, the treatments are nonetheless artificial. We believe it is important that the treatments were as realistic as possible, so that subjects' ability to recall information could be compared across newspaper page elements.

Each subject within each participating class was randomly assigned to one of the 20 newspaper treatments. Subjects were instructed to read the front page of the newspapers for 20 minutes, then answer a quiz dealing with information contained in the stories and other elements on the page. All questions were short answer, since educators have criticized multiple-choice tests as being inaccurate measures of a student's knowledge.

* Time frame: The study was conducted in April and May of 1991, or two to three months after the Gulf War and a few months after the newspapers were published.

* Variables: Four knowledge recall scores were computed based on questions dealing with specific elements contained on individual pages. All subjects were

asked two questions dealing with quotations contained in news stories. Depending upon elements contained on pages included in the study, subjects were asked two questions dealing with sources of pullout quotes, and/or information contained in graphics and/or information contained in index items, including inside boxes and teasers.

Subjects were given zero to two points for each answer to the eight questions dealing with information on the newspaper front pages. If they answered a question correctly, they received a score of two. If they were within 10 percent on quantitative questions, they received a score of one. If they missed a question by more than 10 percent, or if they failed to answer the question, they received a score of zero.

For example, a question dealing with a graphic in the Atlanta Journal asked "Approximately how many Americans are killed each year by passive smoke?" The correct answer of 53,000 received a score of "2." An incorrect answer between 47,700 and 58,300 received a score of "1." An answer below 47,700 or above 58,300, or if the subject failed to answer the question at all, resulted in a score of "0."

Questions dealing with nominal answers, such as a question asking for a specific source of a quotation, was scored two for correct answers and zero for incorrect answers.

Because of the wide range of newspaper design styles, not every page contained all four of the design elements examined here: story texts, graphics, inside boxes and pullout quotes. Thus, if a newspaper page did not contain one or more of the elements, additional questions dealing with story texts were included to keep all questionnaires a similar length.

In addition, not every page that contained pullout quotes ran two quotes. In those cases, only one question was asked about pullout quotes. To maintain consistency, then, all knowledge recall measures were divided by the number of

questions dealing with each element. In this way, scores for all four knowledge recall measures potentially could range from 0 to 2.

* Statistical analyses: Since each newspaper ran different elements on its pages, only a few newspapers used story texts, graphics, pullout quotes AND inside boxes. However, every newspaper in the study used at least two of the elements. Therefore, to examine the subjects' ability to recall information in each of the four design elements, a series of T-Tests examined differences in knowledge recall scores across two elements at a time. A series of T-Tests, then, allowed us to utilize scores from all 204 subjects in the study. An ANOVA test of all four knowledge recall scores simultaneously would have been inappropriate because of problems of missing data for individuals who did not receive a knowledge recall score for an element that did not appear on their newspaper page.

While a series of T-Tests was the most appropriate statistical test of our data, multiple tests of data pose a serious problem. Utilizing a series of tests increases the likelihood that a statistical test will be significant simply by chance. Thus, the level of statistical significance for this study was raised from the usual level of .05 to a more stringent .01.

One additional potential shortcoming of the study should be noted. Some of the students may have been avid readers of stories dealing with the Gulf crisis, and thus may have been able to recall information about the war without reading the treatments. However, randomization of subjects into treatment groups should have lessened this problem.

Results

Table 2 lists the mean scores for the knowledge recall measures for all four of the page elements examined. As the results show, subjects were best able to recall

information from pullout quotes (mean = 1.281), followed by information from inside boxes and story text quotes. Subjects had the most trouble recalling information contained in graphics.

Table 3 details the results of the T-Tests comparing knowledge recall scores for two elements at a time. Four of the six T-Test comparisons reached the $p < .01$ level of statistical significance.

According to the results, the largest T-value was found in the comparison of pullout quotes and graphic information ($T = 5.16$). Subjects were able to recall information contained in the pullout quotes significantly better than information contained in graphics.

Pullout quotes also produced better recall than the other two elements in our study: story texts and index items. The results suggest that information in pullout quotes was recalled more efficiently than information in story texts and in index items.

One other significant difference was found. Information in index items was recalled more efficiently than information in graphics.

The difference in recall scores for index item information and story text quotes narrowly missed reaching the .01 level of statistical significance ($T = 2.22$, $p = .028$). The difference in recall of story text information and graphic information was not significant.

Discussion

This study attempted to examine the ability of young readers to process and recall information contained in four newspaper page elements: story texts, graphics, pullout quotes and index boxes. In general, subjects recalled information contained in pullout quotes better than the other three elements. Subjects were able to recall information in graphics less efficiently

The reason subjects were able to recall information in pullout quotes is obvious. Information in the quotes was redundant with information in the accompanying stories. Because it was repeated, readers saw it in two places and were able to recall information on the quotes better. This supports the finding of Griffin and Stephenson (1992), who found that knowledge recall was greatly enhanced when an accompanying element repeated information contained in a news story.

In addition, the reason editors use pullout quotes is because the quote is an important point made by a source in an accompanying story. Indeed, the mere appearance on a newspaper page may give cues to readers that the quote is worth remembering.

Thus, this finding may hold important implications for newspaper editors. Since readers are able to recall information in pullout quotes so efficiently, editors may want to consider expanding their usage. In addition, elements that are similar to pullout quotes -- for example, the "background boxes" examined in Griffin and Stevenson (1992) -- also may produce effective information recall. Thus, one way to attract young readers may be to provide summary information gleaned from news stories in a short and easy to process form.

The lack of recall of graphic information, on the other hand, is puzzling. It may be as Covey said, that there is "far too much graphics garbage (Strugatch, 1989)." In other words, the graphics here may have been done poorly. The graphics used by the newspapers in this study may have been overly complex, dealing with complicated aspects of the Gulf War. Thus, the graphics may have been atypical.

Subjects also were not able to recall information from story text quotes efficiently. This may be due to the difficulty in writing styles of news stories, as previous studies have found (see Fowler, 1978; Fowler and Smith, 1979). Had the stories been written more simply, the information contained in the stories may have fared better.

Finally, index item information was recalled relatively efficiently. This was especially surprising, given the fact that the subjects were told they would be reading only the front page. Inside sections, in fact, were not even provided to the subjects.

Regardless, one explanation for this finding seems especially plausible. Index items may have produced efficient recall because the subjects -- young readers -- were looking for items other than hard news stories on the front pages. Even though they were told that they would be reading only the front pages, they still read and remembered information contained in the index items. Here is where young readers found items that really interested them -- entertainment news, sports and features. Thus, this finding may be more of an indication of their interests than in their ability to recall information. Readers read, process and recall information that interests them.

Since the hard news in typical news stories did not interest the young readers in our study, they were forced to look elsewhere for information that interested them -- here, the index boxes.

Overall, while the findings here point to the inability of young readers to process and recall information contained in graphics, this is not to suggest that newspapers abandon or reduce their use of graphics. Rather, the findings here illustrate the need to improve graphics so that information contained within them can be more easily processed by readers -- especially young readers who are now avoiding the newspaper. By making graphic information easier to comprehend, newspapers may in turn make the reading experience for young readers more enjoyable.

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Table 1
Newspapers included in the study.

Newspaper	Circulation
1. Atlanta Constitution	316,793
2. Atlanta Journal	191,811
3. Baltimore Sun	343,609
4. Boston Globe	521,354
5. Chicago Tribune	721,067
6. Des Moines Register	207,126
7. Detroit Free Press	636,182
8. Norfolk (Va.) Ledger-Star	77,655
9. Los Angeles Times	1,196,323
10. Louisville Courier Journal	233,714
11. Miami Herald	428,931
12. Milwaukee Journal	265,461
13. Philadelphia Inquirer	519,895
14. St. Louis Post-Dispatch	382,381
15. St. Petersburg Times	353,130
16. San Francisco Examiner	136,346
17. San Jose Mercury News	278,676
18. Seattle Times	233,995
19. Syracuse Herald-Journal	93,449
20. Washington Times	97,188

Table 2
Overall means and ranges for knowledge recall measures.

Page element	Mean	Range
Pullout quote	1.281	0-2
Inside box information	1.017	0-2
Story text quote	0.815	0-2
Graphic information	0.554	0-2

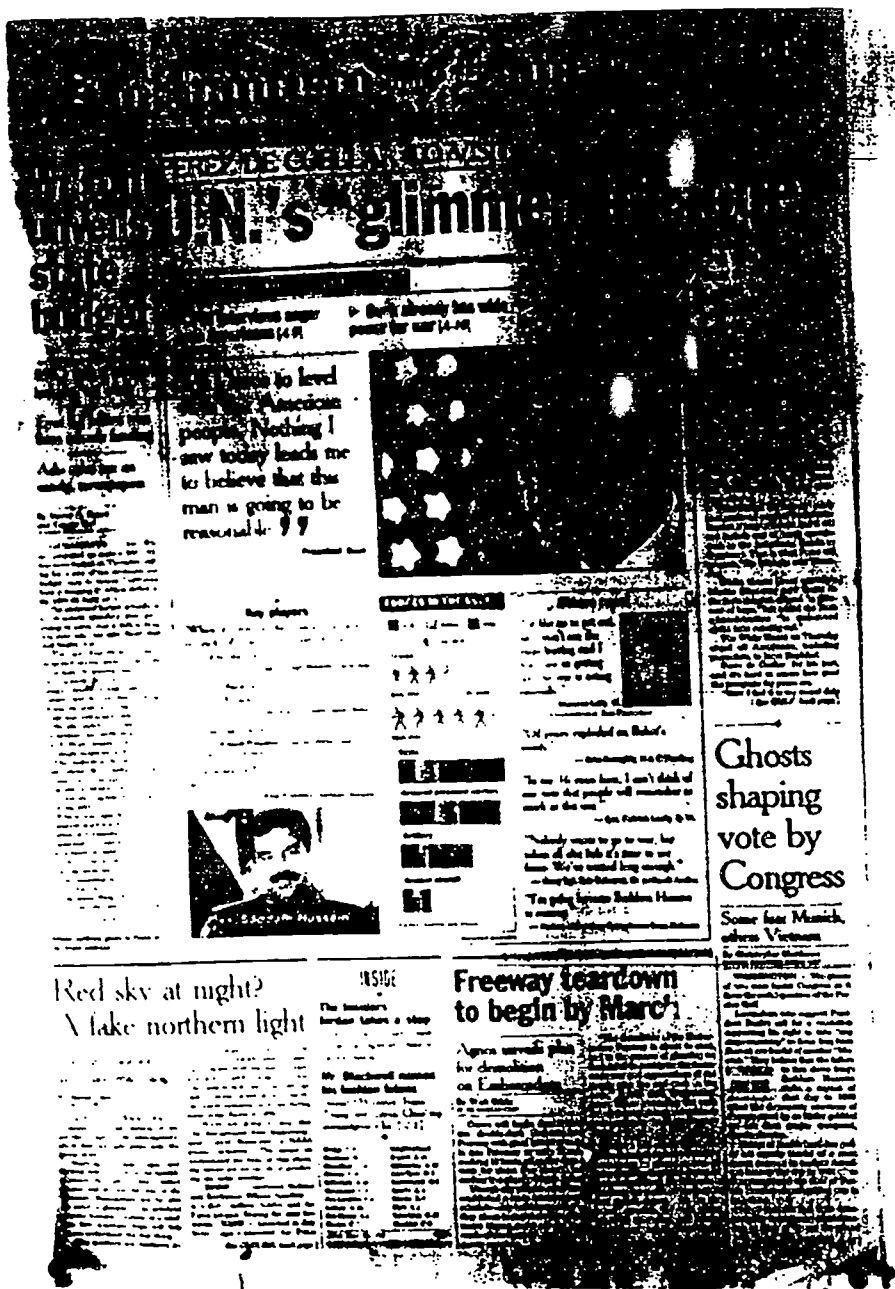
Table 3
T-Test results for comparisons of knowledge recall measures.

Comparison	Means	T-value	Sign.
Pullout quote- Graphic information	1.273 0.614	5.16	.000
Pullout quote- Story text quote	1.278 0.977	4.24	.000
Pullout quote Inside box information	1.279 0.977	2.76	.007
Inside box information Graphic information	1.078 0.533	2.72	.009
Inside box information Story text quote	1.052 0.820	2.22	.028
Story text quote Graphic information	0.721 0.577	1.05	.299

Appendix
Examples of newspapers included in the study



The Miami Herald: pullout quotes, index items, story texts



San Francisco Examiner: pullout quotes, graphics, index items, story texts



Washington Times: pullout quotes, graphics, story texts