How Verbalizers and Visualizers Process the Newspaper Environment

By Andrew L. Mendelson and Esther Thorson

This article addresses the question of how people process news photographs and news stories as a function of their scores on 2 scales designed to measure 2 "cognitive styles" called visualizing and verbalizing. Although newspaper practitioners believe news photos enhance the newspaper reading process, research has not demonstrated a clearly positive impact. Education theory about visualizing and verbalizing suggests these 2 individual-specific indicators may explain why news photos sometimes help and sometimes hinder. The results show that high visualizing scores did not enhance recall of stories or photos or even enhance story interest. In contrast, high verbalizers found all stories more interesting and recalled both stories and photos better than low verbalizers. The results are discussed in terms of cognitive style theory and its role in how people process visual and verbal news information.

In any medium that involves both images and text, the question of how the two kinds of information are used by the information processor is critically important. In the newspaper business, it is believed that news photographs aid news processing in a variety of positive ways. Although the support for this assumption is mixed in the social science literature (e.g., Mendelson, 1999, 2001; Mendelson & Thorson, 2003; Wanta & Roark, 1994; Zillmann, Gibson, & Sargent, 1999), research on how people learn from written materials and images assumes that newspaper stories and photos are the same for everyone. Education theory regarding text comprehension, however, suggests that homogeneity of reader processing is not likely.

There is significant evidence that individual differences in personality and cognitive styles have an impact on how variables in the environment affect learning (e.g., Cronbach & Snow, 1977; Lesser, 1971; Snow, 1989). In education, "learner characteristics" refers to the range of concepts, including cognitive skills and strategies, demographics, and, of interest in this article, "cognitive styles" (Miron, Bryant, & Zillmann, 2001; Peeck, 1993). One style that is particularly relevant to media studies is individuals' relative predisposition for learning from visual material (i.e.,

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the extent to which they are visualizers) and predisposition for learning from verbal material (i.e., the extent to which they are verbalizers). This article looks at the impact of the content relationship between photos and text and reader interest in the story topic and then asks how people's "visualizing" and "verbalizing" cognitive styles influence their response to the photo-text environment. This study builds the case that people whose cognitive style is more image focused will show a positive impact of news photos and that people whose cognitive styles are more word focused will rely more on the text. The approach borrows heavily from education theory to explain how photos and text in a newspaper create "different" environments for different people. We suggest that "cognitive styles" give media researchers an important new way of looking at responses to mass media messages.

We begin by examining the literature on cognitive styles, specifically visualizing and verbalizing, and then examine key theoretical concepts from education and media literatures that have been shown to affect text comprehension: the effect of picture presence, the congruency or fit between pictures and texts, and the effects of reader interest in the topic of the text. These literatures are considered when articulating hypotheses about the effects of high levels of visualizing and verbalizing on processing news stories and photographs. The resulting hypotheses are tested in an experiment that varies presence of photographs and their congruity (or fit) with the text and the interestingness of the story, as well as visualizing and verbalizing scores.

Literature Review

Visualizing/Verbalizing Cognitive Styles and Learning

A cognitive style is an individual's typical and consistent approach to acquiring, processing, and organizing information (Jonassen & Grabowski, 1993; Riding, Burton, Rees, & Sharratt, 1995). Kogan (1971) defined cognitive styles as "individual variation in modes of perceiving, remembering and thinking, or as distinctive ways of apprehending, sorting, transforming and utilizing information" (p. 244). Jonassen and Grabowski (1993) stated: "We all differ in how we interact with our environment, extract and perceive information from it, and reflect and organize the knowledge that we have acquired" (p. 173).

Cognitive styles are sometimes considered to be a subset of personality in that a style is a fixed characteristic of an individual (Jackson & Lawty-Jones, 1995). Cognitive styles differ from learning strategies, which are defined as ways used to cope with situations and tasks (Riding & Sadler-Smith, 1992).[1] Styles also differ from abilities, which refer to levels of skill. Of particular interest in this article are

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[1] In media research, scholars have examined "viewing styles" or "patterns of behavior involving choices that in some way or another affect attention to and learning from television" (Miron, Bryant, & Zillmann, 2001, p. 157). Examples are children attending constantly to the television screen and children who tend to look up only from time to time (see also Bryant, Zillmann, & Brown, 1983; Lesser, 1974). Although viewing styles do relate to learning, this is a distinct concept from learning styles.

the cognitive styles of visualizing and verbalizing.[2] High verbalizing is characterized by being word oriented, showing high fluency with words, preferring to read about ideas, and enjoying word games. High visualizing is characterized by being image oriented, preferring to be shown, and enjoying visual games like jigsaw puzzles (Jonassen & Grabowski, 1993; Riding & Ashmore, 1980; Riding & Douglas, 1993; Riding & Sadler-Smith, 1992).[3]

Most of the early studies defined visualizers and verbalizers as being at opposite ends of a single continuum. More recently authors have begun to examine the two as separate and independent concepts. No longer are people considered to be either visually or verbally predisposed, but rather to show variation in both concepts.

One of the earliest studies to compare the impact of visualizing and verbalizing (Marks, 1973) found that people who were better at visualizing mental images were more accurate in recall of information contained in 15 color pictures than people who were less able to visualize images. Marks relied on the Vividness of Visual Imagery Questionnaire, made up of 16 descriptions of scenes people were supposed to visualize. For each situation, the participant rated how vivid the scene was.

Moving beyond measures of imagery ability, another early index of visual and verbal cognitive styles was Richardson's (1977) Verbalizer-Visualizer Questionnaire (VVQ), a 15-item survey placing the two cognitive styles on a single dimension. Richardson developed the VVQ out of earlier work by Paivio (1971) who had developed an 86-item Ways of Thinking questionnaire. Though the VVQ has been examined for test–retest reliability (Spoltore & Smock, 1983; Stevens, Rapp, Pfost, & Johnson, 1986; and Warren & Good, 1979), this scale has seldom been employed, as there have been many criticisms of the conceptualization of the VVQ for placing the verbalizer and visualizer as opposite ends of a continuum, as will be discussed below (Antonietti & Giorgetti, 1998; Green & Schroeder, 1990; Parrott, 1986, Sullivan & Macklin, 1986).

Riding (Riding et al., 1995) also developed a scale that placed verbalizing and imaging (Riding's term for visualizing) as the ends of a single continuum. Riding's scale, called the Cognitive Styles Analysis (CSA), although used extensively in his research (e.g., Riding et al., 1995; Riding & Douglas, 1993; Riding & Sadler-Smith, 1992), has not been used by other authors because it is proprietary and difficult to acquire.

More often researchers have argued that the two dimensions are independent of each other. It is possible that some people are predominantly one type or the

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[2] Researchers have examined a number of different cognitive styles that affect processing of information (e.g., field independence and dependence, Witkin et al., 1977; holistic and analytic processing, Riding & Sadler-Smith, 1992; reflective and impulsive processing, Holman, Snowman, & Deichmann, 1979). For those unfamiliar with the research on cognitive styles, the thorough review in Kogan (1971) is useful.

[3] The concept of visualizer-verbalizer learning styles is similar to the concept of visual literacy, though the latter concept is closer to an ability, as many scholars define visual literacy as the learned ability to understand and interpret visuals (e.g., see Barry, 1997; Scott, 1994; Williams, 1996). Other authors, such as Messaris (1994), do not conceive of visual literacy as a learned ability, but more as an innate trait found in everyone based on the biology of the brain and eyes.

other, but still others are a blend. Every person has a predisposition for both visualizing and verbalizing. McGrath et al. (1989) conducted a factor analysis on Richardson's VVQ and came up with a two-factor solution: verbal fluency and vividness of visual imagery. Edwards and Wilkins (1981) also found two independent factors rather than a single dichotomous scale for the VVQ. Schroeder (1989) found that the visual and verbal dimensions of the VVQ were essentially independent, not negatively correlated, as would be expected from an opposite ends of a continuum.

Kirby, Moore, and Schofield (1988) developed a new set of three scales, a verbal dimension, a visual dimension, and a dream vividness dimension, each scale tapping a different learning style with 10 true–false questions. As a validity check, the factors identified by Kirby et al. (1988) correlated appropriately with ability measurements. The verbalizer score correlated with verbal proficiency (a test of vocabulary, verbal reasoning, and analogies), and the visualizer score was correlated with spatial visualization ability. The visualizer and verbalizer subsets were correlated slightly positively with the opposite ability task. The authors argued that this was because of the positive correlation of the verbalizer and visualizer subsets and the positive correlation of the two ability scores.

To compare the effects of visualizing and verbalizing styles on learning, Riding and Ashmore (1980) had children either read a short passage about or examine a picture of canal barges. Children with higher verbalizing scores recalled best when they read the short passage. Children with higher imaging scores fared better when they learned from the picture. Similar results were found in Riding et al. (1995).

In a study examining how people with different cognitive styles approach a similar task (Casey, Winner, Hurwitz, & DaSilva, 1991), college students copied a complex figure, then redrew the figure again from memory. High visualizers were more accurate in reproducing the figures than verbalizers.

Verbalizing and visualizing styles were used to examine efficiency in map reading ability (Schofield & Kirby, 1994). Using Kirby et al.'s (1988) scales, the authors demonstrated that visualizing and verbalizing could act independently of each other. Although a person's verbal style did not predict speed of locating a position on the map, higher visualizing was positively related to speed at this task. This study provides evidence that certain tasks call upon only one aspect of a person's predisposition for visual and verbal information.

The evidence supports the idea that people differ in their predisposition to learn from verbal and visual information. Some people make little use of images, relying mostly on verbal material, whereas others learn better from visual material and not from verbal material. Still others may be equally good at learning from words or pictures. Further, the research suggests that visualizer and verbalizer styles interact with different tasks to produce learning.

In their recommendations for how teachers can best teach to students' preferred processing styles, Jonassen and Grabowski (1993) stated that in order to "capitalize on the preferences of a visual student and challenge a verbal student," teachers should utilize instructional conditions featuring "images, pictures, graphs, or charts" (p. 197). Likewise, these authors suggested using nonillustrated texts to best reach verbal students and challenge visual ones. Many of the same skills in

education surely apply to processing media messages—learning from words and photos, reading charts and graphs, and so on. To examine the relationship between visualizer and verbalizer cognitive styles and processing newspaper information, we varied the presence and fit of the photos seen and the interestingness of the story read, variables that have been shown to affect text comprehension. These variables will be elaborated on in the following sections.

Effects of Picture Presence on Text Comprehension

In education research, the presence of pictures (usually line illustrations) has been shown to increase the understanding of text passages when the accompanying photos are relevant to and redundant with the text (Levie & Lentz, 1982; Levin, 1989; Levin & Berry, 1980; Willows & Houghton, 1987). Levie and Lentz (1982), in their review of this research, found that in the vast majority of comparisons (85%), "illustrations facilitate learning the information in the written text that is depicted in the illustrations" (p. 213). This is especially the case when the learning tests focus on concrete, spatial information, the type that is easily portrayed pictorially, rather than information about abstract processes (Dwyer, 1978; Levie & Lentz, 1982).

Several media studies have also examined the effect of the presence of news photographs on learning story information. In a series of experiments (David, 1998), news photographs were shown to improve free recall of the topic of small text passages when compared to the passages seen alone. This was especially the case for concrete rather than abstract news items. The concreteness or abstractness of the news items was determined by having participants in a pilot test rate stories on an imagery scale. Similarly, Mendelson and Thorson (2003) showed that photo presence led people to rate news stories with a photo as more interesting than those without a photo.

Stone (1987, p. 72) suggested that "photos have increased readers' enjoyment and interest in newspapers" and "people's attention is arrested more by photos than by stories." Similarly, Garcia and Stark (1991) presented results of an eye-tracking study suggesting that the photos play an attention-directing function. Photos are the most common "point of entry" into newspaper pages (sometimes sharing that role with headlines) and that overall, 75% of all photos are "looked at." This is in contrast to the text of newspapers, only 25% of which is looked at.

How might visual and verbal cognitive styles interact with photo presence? If people with a high visualizing score are more predisposed to learning from pictures, then these individuals should benefit the most from the presence of a photo, in terms of interest in and memory for the story. On the other hand, people with high verbalizing scores should be most interested in and learn most from the story when the story is seen on its own, without anything to distract them from reading, as Jonassen and Grabowski (1993) suggested.

Effects of Picture-Text Congruency on Text Comprehension

In addition to photo presence, previous research has demonstrated that to facilitate text comprehension a photo must "fit" or be congruent with the story. Pictures that serve only a "decorative" function do not aid in learning from stories. Beyond

a mere decorative function, pictures may serve several purposes. Pictures may make the textual information more concrete, they may help organize the text, they may make the text more comprehensible, or they may transform the content of the text into something more memorable (Levie & Lentz, 1982; Levin, 1989). For any benefit on learning about the news, however, pictures must be congruent with the text.

Previous media research has shown that varying photo-text congruency can affect what people learn from a story. Wanta and Roark's (1994) study involved having high school students read and answer questions about a single front-page story (about a meeting between then Secretary of State James Baker and then Iraqi Foreign Minister Tariq Aziz) as it had appeared in one of 20 different newspapers. Although all 20 papers ran the same story, each paper used one of nine different photos (e.g., President George H. W. Bush meeting with the Iraqi foreign minister, an Army jet on a runway, Secretary of State James Baker meeting with the Iraqi foreign minister), varying in the "fit" with the main theme of the article. Results showed that recall of the story was directly related to how well the photograph related to the story.

Wolf and Grotta (1985) varied the content of a photo that accompanied the same news story (a story about a student dancer). The targeted story appeared on the front page of a campus newspaper with either an active photo of a dancer, a portrait of her, or a totally unrelated photo. The purpose of the study was to examine how variations in the type of photograph affected story readership and comprehension. The portrait produced the highest readership and the highest percentage of correct answers on a recall test.

If it is necessary that the photos are relevant to or congruent with the story for a facilitative effect to occur, people with high visualizing scores, being so predisposed for learning from visual information, should learn most when a congruent photo is paired with a story. We would not expect congruency of the photos to interact with a person's verbalizing score, as a person's verbalizing style should not rely on the content of the photographs.

Effects of Story Topic Interest on Text Comprehension
Reading theory suggests that a reader's interest in a topic can greatly affect text comprehension. An individual's interest in a topic is a "relatively stable evaluative orientation toward certain domains" (Boscolo & Mason, 2003, p. 128) or types of content. Highly interested readers process text more deeply and, thus, recall more information (Schiefele, 1996; Schiefele & Krapp, 1996). In addition, high interest can help overcome other deficiencies such as poor reading comprehension ability (de Sousa & Oakhill, 1996).

Previous media research has shown that readers are more interested in "personalized" stories than stories about issues. Graber (1990), in a content analysis and experiment on television news, showed that people tend to recall television news stories that are "humanized." Similarly, an earlier study by Mendelson and Thorson (2003) showed that readers were more interested in and recalled more about stories about the personal side of Hillary Clinton, rather than stories about her involvement in the health care debate. Price and Czilli (1996) showed that

personalized news stories were better recognized and better recalled than issue stories. Personalized stories tend to be more vivid, and people are better able to relate to the anecdotal information presented. It has been argued that there is a personalized bias in the news media, in that individual actors and human-interest stories are emphasized (Rucinski, 1992).

Because interest can help overcome reader deficiencies, people with low verbalizer scores should recall more of the interesting, personalized news stories than the less interesting, issue-oriented stories.

Hypotheses and Research Questions

A set of hypotheses about how cognitive styles should interact with the photo presence, congruity, and story type can now be proposed. Because the visualizer scale suggests a predisposition for learning from pictures, people with high visualizer scores should (a) be more influenced by the presence of news photos and their congruity with the news story they accompany, (b) find stories with a photo more interesting, and (c) remember more about stories with a photo, especially a congruent photo. Further, people with high visualizer scores should remember more about the photos than people with low visualizer scores.

Because the verbalizer scale reflects a predisposition for learning from verbal information, people with high verbalizing scores should (a) remember more about the stories than people with low verbalizer scores and (b) be more interested and learn more from stories without a photo (which might be expected to detract from their learning). People with low verbalizing scores should recall more about a more interesting, personalized story than a less interesting, issue-oriented story, as interest will aid in overcoming their lower adeptness with learning from verbal information.

These predictions are captured in the following hypotheses:

H1: People with high verbalizer scores will be more interested in the stories than people with low verbalizer scores.

H2: Photo presence will interact with visualizing such that when a photo is present, people with high visualizer scores will be more interested in the stories than when no photo is present.

H3: Photo/story congruity will interact with visualizing such that when the photo and story are congruent, people with high visualizer scores will be more interested in the stories than when the story and photo are incongruent.

H4: People with high verbalizer scores will recall more about the stories than people with low verbalizer scores.

H5: Photo presence will interact with visualizing such that when a photo is present, people with high visualizer scores will recall more about the stories than when no photo is present.

H6: Photo presence will interact with verbalizing such that when a photo is present, people with high verbalizer scores will recall less about the stories with a photo than stories without a photo.

H7: Photo/story congruity will interact with visualizing such that when the photo and story are congruent, people with high visualizer scores will recall more about the stories when picture and text are congruent than when they are incongruent.

H8: Story interest and verbalizing should interact such that people with low verbalizing scores will recall more about the more interesting, personalized story rather than the less interesting, issue-oriented story.

H9: People with high visualizer scores will recall more about the photos than people with low visualizer scores.

As it is not clear how story type might interact with visualizing, we examine the following research question:

RQ1: How will visualizing affect interest in personalized versus issue-oriented news stories?

These hypotheses were tested in a situation in which college students read a simulated newspaper containing a target personalized or issue-oriented story about former U.S. First Lady Hillary Rodham Clinton. Congruence and presence of accompanying photos were also manipulated.

Method

Stimulus Materials

Four photos of Clinton in a professional role and four in a personal role (wife) were employed in the study. All eight photos were real newspaper/magazine photos that had been published in the *New York Times*, *Washington Post*, *Newsweek*, or *Time* magazine. All the photos used in this study portrayed Clinton engaging in some action, not posed.

One news story concerned Clinton's thoughts on her role as wife to former U.S. President Bill Clinton (the personalized story), and one story concerned her role in health care (the issue-oriented story). Both stories were mostly positive in tone and approximately the same length. Each story appeared with each of the eight photos and each story appeared without a photo, for a total of 18 story-photo conditions. Congruency was manipulated by either pairing the same story and photo setting (e.g., personal story and personal photo) or not (e.g., personal story and professional photo).

To make the test as ecologically representative as possible, a "natural newspaper environment" was created for the stories and photos. Each reader was given a three-page newspaper that appeared "real" except that it was printed on regular paper rather than newsprint. The first and second pages of the newspaper were identical for everyone. The third page contained the Clinton story manipulation.

Dependent Measures

The first four questions of the questionnaire asked, of all the stories participants read in the simulated newspaper, which one was the most interesting, the second,

third, and fourth most interesting. All respondents were able to identify four stories. Where the participants placed the story about Clinton operationalized "story interest." If the story was the most interesting, it was coded as a 1, if the story was the second most interesting, it was scored a 2, and so on. If the Clinton story was not in the top four, the variable was coded as a 5. This means we did not differentiate between whether the story was in memory at all or just not in the top four.

The next question cued participants with the Clinton headline that they had read and asked them to write down all they could remember about the story, placing each "idea" they recalled into a box provided on the questionnaire. The number of boxes filled in operationalized "story idea recall."

The same procedure was used to ask participants to recall the photo that went with the story. This variable was "photo idea recall." Thus, the three dependent variables were story interest, story idea recall, and photo idea recall.

Procedure and Participants

First-year college students (N = 123) from a large, midwestern U.S. university, were tested in groups of up to 18 students. All sessions were conducted in the same room. Students first read and signed a consent form, which followed the university's Institutional Review Board policies. The experimenter gave participants a randomly assigned version of the three-page newspaper and asked them to "go through the paper" as they normally would. After 20 minutes, the papers were collected and the readers each received a questionnaire. After the questionnaires were completed, participants were thanked and excused. They were asked not to discuss the experiment with others in their class. Students received course extra credit for participation in this study.

The Kirby et al. (1988) VVQ scale was modified slightly for this study. Rather than having dichotomous questions, we chose to place each item on a seven-point scale between *strongly agree* and *strongly disagree*. This allowed for a wider variation in responses. Also, we altered the wording of one of the visual scale questions from "I like newspaper articles that have graphs" to "I like newspaper articles that have photos."

We used only the visual and verbal scales, as theoretically, the dream scale did not seem to fit with newspaper reading. This is also in accordance with Kirby et al. (1988), who indicated that it is acceptable to use only the two-scale version of the VVQ instead of the three. (See appendix for a listing of scale items).

Results[4]

The participants in the study had a mean visualizer score of 23.67 (SD = 8.35) on a scale that varied from 10 to 70, with 10 being most visual. The *most visual* person in the sample scored a 10 and the *least visual* scored a 53. Cronbach's α for the 10 items on the visual scale was .71. For the verbalizer scale, the mean was 30.59 (SD = 9.34) on a scale that varied from 10 to 70, with 10 being *most*

[4] All post hoc, paired comparison tests were analyzed using Scheffe's method.

Table 1. Frequency Distributions for Visualizer by Verbalizer Levels (Frequency, or % of Total)

| | | Visualizers | | | |
		Low	Moderate	High	Totals
Verbalizers	Low	16 (13.0%)	14 (11.4%)	5 (4.1%)	35 (28.5%)
	Moderate	11 (8.9%)	25 (20.3%)	16 (13.0%)	52 (42.3%)
	High	6 (4.9%)	16 (13.0%)	14 (11.4%)	36 (29.3%)
	Totals	33 (26.8%)	55 (44.7%)	35 (28.5%)	123 (100.0%)

verbal. Score on this scale ranged from 12 to 65. Cronbach's α for the verbal scale was .77.

The two sets of scores were each divided into three groups (low, moderate, and high) by first splitting the scales into quartiles. The outer two quartiles became the low and high groups, and the middle two quartiles became the moderate group (see Table 1 for distributions).

The two scales were significantly correlated (r = .33; p = .0002). This is consistent with previous findings (Kirby, 1988) that visualizing and verbalizing are not the opposite ends of a continuum, but rather are two separate dimensions. People who were high verbal learners also tended to be high visual learners.

Effects on Story Interest Rankings
H1 predicted a main effect for the verbalizer scale such that high verbalizers would rank the HRC story more interesting than low verbalizers. H2 predicted that high visualizers would rank the Clinton story as more interesting when a photo accompanied the story. RQ1 examined the effect of visualizing scores on learning from personalized and issue-oriented news stories.

We employed four-way analysis of variance with story interest as the dependent variable: 2 (photo presence) x 2 (personal vs. professional story) x 3 (visualizer level) x 3 (verbalizer level). Visualizing did not have a significant main effect (η^2 = .006; *Power* = .11), nor did it interact with either photo presence (η^2 = .009; *Power* = .14) or story (η^2 = .012; *Power* = .19). The other three independent variables did show significant main effects. People found the personal story more interesting, $F(1,94)$ = 6.63, p < .005; η^2 = .05, than the professional story. A story with a photo was more interesting than one without, $F(1,94)$ = 5.47*, p* < .01*;* η^2 = .04, and the verbalizing main effect, $F(2,94)$ = 2.44, p < .045; η^2 = .03, showed that the high verbalizers (M = 3.11) found the Clinton stories more interesting than low (M = 3.26) and moderate verbalizers (M = 3.35), regardless of the photo-story version they saw.[5]

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[5] Even though the main effect was significant, none of the pairwise comparisons were significant (p < .10).
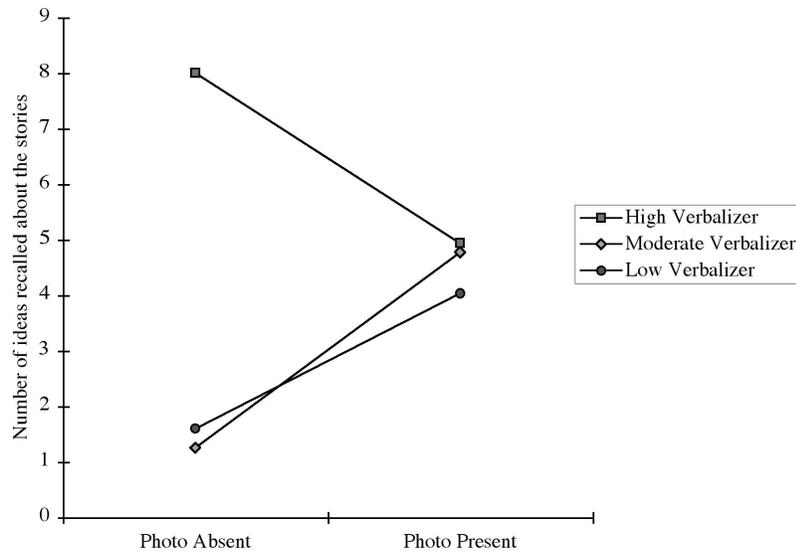
Figure 1. Interaction of photo presence and level of verbalizing on recall of the news stories.

In a separate analysis, photo-story congruency was examined to test H3 that visualizing and photo-story congruency would interact in their impact on story interest. There was no main effect of congruency on the interest ratings (η^2 = .00004; *Power* = .03), nor did congruency interact with the visualizer style (η^2 = .001; *Power* = .05) or the verbalizer style (η^2 = .007; *Power* = .11). Thus, only H1 is supported.

Recall of the News Stories
H4 predicted high verbalizers would recall more about the stories than low verbalizers. In addition to these main effects, several two-way interactions were predicted. H5 predicted an interaction between photo presence and visualizing. H6 predicted that photo presence would also interact with verbalizing. H8 predicted an interaction between a person's verbalizer score and personalized/issue-oriented story. Finally, RQ1 examined the interaction of visualizing with personalized/issue-oriented stories on recall. The visualizing/verbalizing hypotheses were tested first in a four-way analysis of variance with number of story ideas recalled as the dependent variable: 3 (verbalizing level) x 3 (visualizing level) x 2 (photo presence) x 2 (personalized or issue-oriented story).

As expected, there was a significant main effect for verbalizing, $F(2,94)$ = 9.72, $p < .0001$; η^2 = .21), with the high verbalizers remembering significantly more than the low verbalizers (*high = 5.35, moderate = 4.50, low = 3.68*). There was no significant effect of visualizing on recall of story content (η^2 = .003; *Power* = .07).

Neither verbalizing (η^2 = .005; *Power* = .20) nor visualizing (η^2 = .02; *Power* = .30) interacted with personalized or issue-oriented stories. Visualizing also did not interact with photo presence (η^2 = .005; *Power* = .10), but verbalizing did, $F(2,94)$
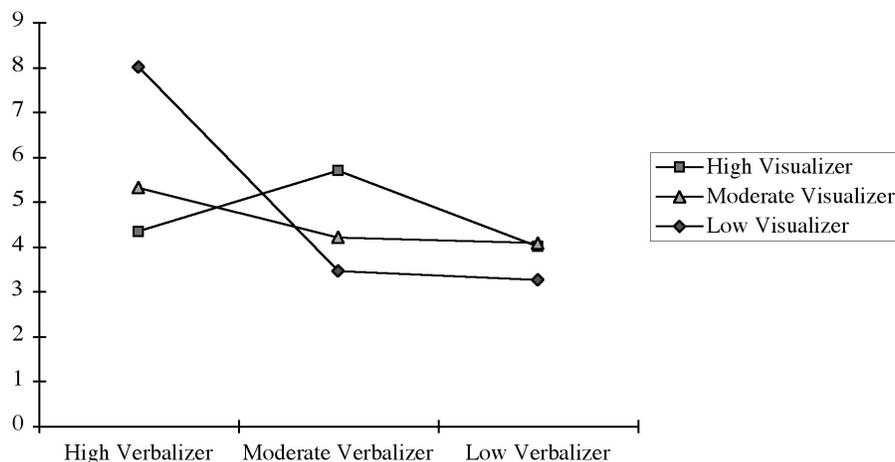
Figure 2. Interaction of verbalizer and visualizer levels on ideas recalled from the news stories.

= 3.86, $p < .01$; $\eta^2 = .05$). As can be seen in Figure 1, high verbalizers recalled more about the story when there was no photo, $F(1,35) = 5.73$, $p < .01$; $\eta^2 = .14$. Moderate, $F(1,50) = 4.66$, $p < .002$; $\eta^2 = .09$, and low, $F(1,32) = 2.66$, $p < .055$; $\eta^2 = .08$, verbalizers recalled more when a photo was present. This suggests that high verbalizers were being hindered by photo presence, whereas moderate and low verbalizers were aided.

There was also a significant visualizer by verbalizer interaction, $F(4,94) = 2.48$, $p < .025$; $\eta^2 = .06$ (see Figure 2). This showed that there was only an effect of verbalizing for those who were lower on the visualizer scale, $F(2,30) = 6.10$, $p < .003$; $\eta^2 = .29$. For this group, only the most verbal people ($M = 8.00$) recalled significantly more than the other two groups ($M = 3.45$ and 3.25). Overall, then, H4 and 6 were supported, but H5 and 8 and RQ1 were not.

H7 stated that high visualizers would show greater impact of story-photo congruency than low visualizers. This was tested for story recall using a 2 (story type) x 2 (congruent, incongruent) x 3 (verbalizer level) x 3 (visualizer level). This four-way ANOVA showed no interaction effects between story-photo congruency and either the visualizer ($\eta^2 = .007$; *Power* = .11) or verbalizer variable ($\eta^2 = .013$; *Power* = .20). There was a main effect for story, $F(1,74) = 10.31$, $p < .001$; $\eta^2 = .08$. People recalled significantly more ideas about the personal story ($M = 5.6$ items recalled) than the issue-oriented story ($M = 3.5$ items recalled). There was also a significant interaction between personalized/issue-oriented story and congruency, $F(1,74) = 4.63$, $p < .015$; $\eta^2 = .03$. People recalled more about the personalized story when there was story-photo congruency, but recalled more about the issue story when there was story-photo incongruency.

In terms of recall, a person's visualizing style played no role in recalling story content, but a person's verbalizing style did, regardless of whether a photo was present or not. There was no support for H7.

Effects on Recall of the Content of the Photos
The final analyses examined the effects of verbalizing and visualizing on how much was recalled about the photos. H9 predicted high visualizers would recall more about the photos than low visualizers. To examine this hypothesis, we conducted a four-way ANOVA on photo recall: 2 (personalized/issue story) x 2 (story-photo congruency) x 3 (verbalizer level) x 3 (visualizer level). There was no main effect for visualizing (η^2 = .01; *Power* = .18), but there was a significant main effect of the verbalizer scale, $F(2, 74)$ = 3.61, p < .015; η^2 = .06. The high verbalizer group (*M* = 4.50) and the moderate verbalizer group (*M* = 3.94) recalled significantly more than the low verbalizer group (*M* = 2.83). Thus, Hypothesis 9 was not supported.

There was one unpredicted interaction to note. There was a significant interaction between the visualizer scale and the personalized/issue story type, $F(2,74)$ = 3.45, p < .02; η^2 = .04. For the issue stories, all three levels of visualizers recalled the same amount, *low mean* = 3.08, *moderate* = 3.48, *high* = 3.59; $F(2,53)$ = .22, p < .4; η^2 = .008. However, for the personal story, low visualizers recalled significantly more about the photo than the other two groups, *low* = 5.10, *moderate* = 3.25, *high* = 3.17; $F(2, 54)$ = 5.57, p < .01; η^2 = .17.

Discussion

This study expands our knowledge of how individual differences affect media processing. Further, this research expands education theory beyond classroom materials to begin to understand how news visuals and texts interact with cognitive styles. Clearly, the newspaper is not the same stimuli for all users. What people learn depends greatly on an interaction between their cognitive styles and the nature of the media stimuli to which they are exposed. The results add strength to Cronbach and Snow's (1977) argument that to predict learning researchers need to examine the interaction between individual processing differences and the type of learning task. Our results suggest that media variables, such as picture presence, story-picture congruity, and story content explain only a part of people's reactions to the newspaper. Specific styles seem to affect learning for specific learning situations. This study suggests that learning from a text-oriented environment, such as a newspaper, is best predicted by examining a person's verbalizing orientation.

The advantage for verbalizers in learning from newspapers was unmistakable. Although levels of visualizing had no impact on remembering information from the stories or photos or finding the stories interesting, verbalizing did. High verbalizing was associated with better recall of stories and photos than was low verbalizing. The best story recall occurred for those people high on verbalizing and low on visualizing. When photos were absent, high verbalizers remembered the most about the stories, so not only did photos not aid them, they actually damaged their memory, presumably by some sort of distraction process, although the exact nature of this effect must await further research. Perhaps just as interesting was the fact that, although high verbalizers were hurt by the presence of a

photo, low verbalizers were helped—just the pattern we had expected to find for the high visualizers but did not. Perhaps pictures serve to strengthen the memory trace for people less predisposed to learn from verbal information, a pattern supported by Levie and Lentz's (1982) review of the effects of redundant illustrations on text comprehension.

We were surprised that people who were high visualizers were not aided in text comprehension when using photos. Visualizing did not interact with photo presence or photo-story congruence. In this text-dominated environment, a person's predisposition for learning from visuals does not seem to be a factor in processing news stories. Learning from the newspaper environment, even one with pictures, is predicted only by verbalizing. This is consistent with the pattern reported by Schofield and Kirby (1994), who found that only a person's visualizer level predicted speed of map processing. A person's verbalizer level was not a factor in the graphical environment.

It should be noted that all of the measures were verbally mediated. Story interest and story and photo recall were all verbal tasks. For that reason, we may not have provided visualizers the opportunity to show better "visual" memory. A person's visualizing orientation may be more relevant to understanding learning in a more completely visual environment, such as in a multiple photo spread in *National Geographic* or a photo exhibit. Further, it is intriguing to consider whether visualizers would perform better with television news, where more of the information could be carried by the image, although research already indicates that most of television news information is contained in the text (e.g., Graber, 1990; Neuman, Just, & Crigler, 1992). Nevertheless, television images could prove more distracting to high verbalizers, although resulting in some relative advantage for high visualizers.

As in any study that examines how a processing style interacts with other variables to influence performance, findings of significant effects create more questions than they answer. What is most critical here is what happens when the high verbalizer encounters a news story accompanied by a photo. Does the photo distract attention from the story or interfere with storage into memory? A better understanding of the exact impact on processing of photos for these people is necessary. Future research should examine a visual-only environment to see if the findings are reversed, that a person's visualizer level predicts learning, wheras a person's verbalizer level makes no difference. This would add to our knowledge of how aptitude and task interact. Last, future research needs to examine these effects for different types of news content, not just stories connected with such a potentially polarizing figure as Hillary Rodham Clinton.

It is important to continue to delve into the black box of information processing. This study continues the exploration of how a person's individual cognitive characteristics affect the processing of media content.

Appendix
Verbal and Visual Learning Styles Questionnaire

Verbal items:

1. I enjoy doing work that requires the use of words.
2. I enjoy learning new words.
3. I can easily think of synonyms for words.
4. I read rather slowly.*
5. I prefer to read instructions about how to do something rather than have some-one show me.
6. I have a better than average fluency in using words.
7. I spend little time attempting to increase my vocabulary.*
8. I dislike word games like crossword puzzles.*
9. I dislike looking up words in dictionaries.*
10. I have a hard time remembering the words to songs.*

Visual items

1. I don't believe that anyone can think in terms of mental photos.*
2. I find illustrations or diagrams help me when I am reading.
3. I have a hard time making a "mental photo" of a place that I've only been to a few times.*
4. I seldom use diagrams to explain things.*
5. I like newspaper articles that have photos.
6. I don't like maps or diagrams in books.*
7. When I read books with maps in them, I refer to the maps a lot.
8. The old saying "A photo is worth a thousand words" is certainly true for me.
9. I have always disliked jigsaw puzzles.*
10. I find maps helpful in finding my way around a new city.

*Items reversed.

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