For Whom is a Picture Worth a Thousand Words? Effects of the Visualizing Cognitive Style and Attention on Processing of News Photos

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Abstract
A study was conducted to examine the relationship of visualizing and verbalizing cognitive styles and the processing of news photographs. Theory predicts that attention will mediate the relationship between visualizing and photo memory, but not between verbalizing and memory. Both visualizing and attention predicted memory, but the mediational relationship was absent. High visualizers perceived the news photos as more interesting and more unified than low visualizers. Verbalizing level did not predict attention to or memory for the new photographs. The results are discussed in terms of visualizers’ efficiency in processing visual stimuli.

Both media researchers and psychologists are interested in people’s processing of visual information, and a great deal of literature is devoted to understanding how abstract visual images, illustrations and photographs are perceived, attended to and remembered (e.g., Barry, 1997; Berlyne, 1973, 1974, 1975; Graber, 1990; Messaris, 1994; Paivio, 1971). One specific objective is to examine how pictures affect the manner in which we attend to and learn from accompanying texts (e.g., Levie & Lentz, 1982; Mendelson, 2001; Wanta, 1988; Zillmann, Gibson & Sargent, 1999). Such theoretical research is of concern to the practice of photojournalism. News photography is considered to be critically important to people’s perceptions of the news (Goldberg, 1991). After headlines, photos are the most likely
element to attract the attention of readers (Garcia & Stark, 1991). News photographs are also more likely to be examined than are captions and stories.

One aspect of visual information processing that has received little attention, especially in media research, is the effect of individual differences in cognitive styles, that is, in preferred ways of processing information, on the perception, attention to and memory of images. Of interest in this paper is how differences in both visualizing cognitive style (a preference for learning from visuals) and verbalizing cognitive style (a preference for learning from words) affect people’s attention, memory and perception of news photographs, and what mechanisms underlie these cognitive styles.

The purpose of this paper is threefold. First, this study will disentangle the processes of attention to and memory for news photographs as consequences of the visualizing style. To do so, I will test a model proposing that high visualizers attend more than low visualizers to visual material, which in turn leads to improved memory. In this model, attention is the mediating variable that causes high visualizers to learn more from pictures than low visualizers. Second, this study examines the differences between high and low visualizers and verbalizers in perceiving images. People who prefer to learn from visuals should be more sensitive to aesthetic variations in photos. No previous studies have examined differences in visualizers’ vs. verbalizers’ perception of images. Third, this study will expand upon an earlier study (Mendelson & Thorson, 1997) demonstrating that verbalizers recall more information from newspaper stories in a newspaper-reading situation (including both photos and stories), but showed no effect of visualizing on learning for verbalizers. Here I use a picture-only study design to determine whether this lack of effect was an artefact of our measurement technique or the nature of the newspaper reading task (stories and photos).

The next section examines past research in the areas of cognitive styles, specifically focusing on visualizing and verbalizing cognitive styles, attention and memory, and perceptions of photographs.

**Literature Review**

**Cognitive Styles**

A key area of research in mass communications focuses on the effect of individual differences on people’s attention to, perceptions of, and learning from various media. Miron, Bryant and Zillmann (2001) discuss a variety of individual differences including age, gender, intelligence, temperament and personality that affect how children process television. Among the personality types discussed in this review article are Type A versus Type B personalities, and introversion versus extroversion.

A concept that has received little attention from media researchers is cognitive style, although it has been extensively examined by education researchers. Cognitive style refers to an individual’s typical and consistent
approach to organizing and processing information (Jackson & Lawty-Jones, 1996; Jonassen & Grabowski, 1993; Riding, Burton, Rees, & Sharratt, 1995; Sadler-Smith, 1996). Cognitive styles are different from learning strategies. “A style is considered to be a fairly fixed characteristic of an individual, while strategies are the ways that may be used to cope with situations and tasks” (Riding & Sadler-Smith, 1992, p. 323). As cognitive styles are stable and trait-like, they manifest themselves consistently over time and across situations. Learning is greatly influenced by matching a person’s cognitive style to the instructional method (Kogan, 1971; Lesser, 1971; Witkin, Moore, Goodenough, & Cox, 1977).

Seeming most relevant to processing visual and verbal components of news, the visualizer/verbalizer cognitive style focuses on differences in the way people attend to and learn from visual as opposed to verbal information (Jonassen & Grabowski, 1993). A person with a verbalizing style is word-oriented, shows high fluency with words, prefers to read about ideas, and enjoys word games. A person with a visualizing style is image-oriented, prefers to have someone show them how to do things, and enjoys visual games such as jigsaw puzzles. Further, visualizers, being more image-oriented, have greater fluency with illustrations, understanding their subtleties, while verbalizers are better at understanding semantic complexity (Jonassen & Grabowski, 1993; Riding & Ashmore, 1980).

Originally, the visualizer and verbalizer concepts were thought to be opposite ends of a single continuum (Richardson, 1977). A person either preferred to learn from visuals or s/he preferred to learn from words (Jonassen & Grabowski, 1993). More recently, however, this idea has given way to the view that these concepts are distinct (Antonietti & Giorgetti, 1998; Green & Schroeder, 1990; Kirby, Moore & Schofield, 1988; Parrott, 1986; Schroeder, 1989). A person might prefer to learn from both words and visuals (i.e., be a visual learner and a verbal learner) or neither. In support of the two-scale concept, Kirby et al. (1988) showed that Richardson’s Visualizer Verbalizer Questionnaire (VVQ) did not form a single scale, but rather three: a verbal dimension, a visual dimension and a dream vividness dimension (which was not a part of present study). Each of their sub-scales was measured by 10 questions (see Appendix A).

Effects of Visualizing/Verbalizing

In summarizing the research examining the effects of visualizing and verbalizing on learning, Jonassen and Grabowski (1993) state that visualizers learn better when they see the information in a visual form, such as pictures, diagrams and maps, while verbalizers will learn better when they can read the information. In one of the earliest studies that examined effects of the visualizing and verbalizing styles, Marks (1973) found that people who were...
high visualizers were more accurate in recall of information contained in 15 color pictures than people who were low visualizers.

Riding and Ashmore (1980) gave children who had been pre-tested on Riding’s verbalizing-imager scale either a short passage about, or a picture of, canal barges. The children were then given a recall test on details from both the picture and the text. The verbalizers remembered more when they read the short passage, while the imagers remembered more when they learned the information from a picture.

In a study examining how people with different cognitive styles approach a similar task, Casey, Winner, Hurwitz, and DaSilva (1991) had college students copy a complex figure, then redraw the figure again without looking at it. Visualizers were better at reproducing the objects from memory than verbalizers.

In a study by Mendelson and Thorson (1997), high verbalizers recalled more about news stories and, surprisingly, news photos, than low verbalizers. Further, high verbalizers recalled less about the stories when a photo accompanied the stories, while low verbalizers recalled more in the same circumstances. Not only did photos not aid the high verbalizers group, they actually hindered memory, perhaps through distraction. Visualizing level made no difference in processing newspaper content. Two possible explanations for the lack of effect for the visualizer variable are that the scale did not validly measure the concept of visualizing or the fact that in a newspaper reading situation, photographs are not seen as an important source of information and therefore people who prefer to learn from visuals have no advantage. Certainly, it has been argued that most photographs in newspapers are highly conventional in content (Hagaman, 1996; Hall, 1973), offering little information beyond the topic of the story.

**Attention as a Mediator of Memory**

Research on visualizing and verbalizing styles has examined the effect of the styles on learning and memory. The process or mechanism beneath these effects has not been examined. Do people high in visualizing simply organize the visual material better in memory, while people high in verbalizing do the same with verbal material? Or do people high in visualizing spend more time looking at pictures, while high and low verbalizers do not differ in the amount of time spent with photos? This study seeks to determine whether attention (as measured by viewing time) is a mediator between cognitive styles and memory (Baron & Kenny, 1986). (See Figure 1 for mediation model).

Attention has been defined in many ways, though most definitions can be separated into two groups: those about the selective nature of processing (a spotlight notion) and those about the capacity or intensive nature of attention (Kahneman, 1973). For this study, I am interested in the former; the idea of attention as a conscious, directed processing.
Attention, in this light, is the process whereby some incoming stimuli are selected for more complete processing. People who learn better from visuals should direct their attention to this form of information, while those who learn better from texts should direct their attention to verbal form of information.

There is good reason to believe that attention plays a key role in memory. Although it is true that memory encoding can take place automatically, studies have shown that explicit, direct recall of stored material is only possible when controlled processing occurs both at the time of encoding and at the time of retrieval (Bargh, 1984; Cowan, 1995). According to Cowan, controlled attention allows for a more complete encoding of a stimulus, longer-lasting activation, and a more deliberate, conscious retrieval process. With attention, both the physical and semantic features of attended stimuli are better encoded. Fisk and Schneider (1984) showed that attention is required for recall and recognition. They had people attend, in varying degrees, to words that were surrounded by numbers. A later memory test for the words showed that the less attention people paid to the words, the worse their recall and recognition.

More evidence of the role of attention on memory is found in research on processing of visual scenes. Memory for a visual scene is directly related to the number of fixations made or the looking time (Loftus, 1972; Nelson & Loftus, 1980; Rayner & Pollatsek, 1992). Potter and Levy (1969) found that the longer the viewing of each picture, the greater the overall probability of recognizing it correctly. As Nelson and Loftus (1980) stated, “Eye fixations are useful in remembering pictures because the more fixations there are, the greater the likelihood that features will be acquired that will ultimately prove useful for distinguishing a target from distracters” (p. 399).

One index of selective attention is the length of time people attend to or view a stimulus. The amount of time a person spends looking at a stimulus has been operationalized as ‘eyes on screen’ (Thorson, 1996), an index of the amount of time an individual looks at a television screen, or as “voluntary visual attention (VVA)” the amount of time spent looking at different objects within a visual field when there are no instructions given to a study participant. (Nunnally, 1971).

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Perceptions of Photographs

Beyond the how much visualizers and verbalizers attend to photographs, it is important to understand how different viewers perceive images. Here I review the literature examining how people who differ in visualizing and verbalizing perceive visual information. Although no research in visualizing/verbalizing cognitive styles has hitherto examined differences in picture perceptions, research in psychological aesthetics, does examine perceptual ratings of visual images. Berlyne (1973; 1974, 1975; see also Cupchik, 1986; Cupchik & Berlyne, 1979; Ertel, 1973) has written extensively about those properties of an image that transcend its content. A common method used in Berlyne’s work is to have participants rate various visual stimuli, such as meaningless visual patterns, line drawings of animals, and reproductions of paintings, on a series of semantic differential items and then factor-analyze the responses to reveal higher order dimensions. Berlyne’s studies consistently revealed three superordinate perceptual characteristics on which visual stimuli are evaluated: hedonic value or interest, visual complexity, and arousal. More recent work on news photographs articulated an additional characteristic—typicality, defined as the perceived newness or novelty of the content or composition (Mendelson, 2001; Thorson & Mendelson, 1996).

Although there have been no studies that link visualizing or verbalizing levels to people’s perception of visual images, some studies have examined the effect of different levels of artistic training (an ability as opposed to a cognitive style) on the perceptions of visuals. Hare (1974) had a fine arts group and a nonartistic group (psychology majors) rate a variety of visual patterns on three scales: simple/complex, displeasing/pleasing, and uninteresting/interesting. He found the two groups did not differ in their perception of the visuals. On the other hand, Winston and Cupchik (1992) had two groups that differed in artistic training (no art course or ten or more art courses) rate a series of high art and popular art paintings. The results showed that the artistic group rated the high art as more complex than the popular art, but did not rate either type of art as more pleasant or warm, while the non-artistic group rated the popular art as more pleasant and warm but did not differentiate between the two types of art in terms of complexity.

It is important to examine the effect of differences in visualizing and verbalizing on perception of the dimensions of complexity, activity (arousal), interest (hedonic value) and typicality in order to understand how visualizers and verbalizers see photographs.

Hypotheses

Earlier I proposed a model suggesting attention mediates the impact of “visualizing” style on memory (Baron & Kenny, 1986). This mediation can
be demonstrated in a series of regression equations. First, an independent variable (visualizing cognitive style) must predict the mediating variable (attention). Second, the independent variable (visualizing cognitive style) must predict the dependent variable (memory). Third, the mediating variable must predict the dependent variable. Last, the effect of the independent variable is reduced or eliminated when controlling for the mediating variable. The basic hypotheses of the study are:

H1: The visualizing score will be positively related to the length of time the news photographs are viewed.
H2: The visualizing score will be positively related to the number of news photographs recalled.
H3: Viewing time of the photographs will be positively related to better recall of the photographs.

The possibility that attention mediates visualizing suggests:
H4: There will be a nonsignificant relationship between visualizing and recall when controlling for attention.

Given that the experimental task in this study is viewing and recalling news photographs, it is not expected that a person’s verbalizing level will play a role. Showing participants news photographs by themselves does not represent a “normal” viewing situation; however the objective of the study is to isolate the process involved in processing pictures.

Finally, to understand how visualizing and verbalizing cognitive styles affect picture perception, participants will evaluate the viewed news photographs. It is likely that high visualizers, due to their preference for visual information, will rate the images as more interesting, but no previous research has directly examined this. A series of research questions are proposed to better understand the effect of cognitive styles on the perception of photographs.

RQ1a-d: What will be the effect of visualizing and verbalizing levels on the four perceptual scales: interest, activity, complexity, and typicality?

Method

H2-Stimuli

Each participant viewed 36 news photos taken from the National Press Photographers Association/University of Missouri School of Journalism 1996
Pictures of the Year competition archives. There were 12 photographs in each of three categories: Accidents (a common local news story topic), then-President Clinton (a national news story topic) and War (an international news story topic). All photographs were displayed as black-and-white images, and were similarly sized. The participants were told they would be looking at a set of news photographs and then answering a questionnaire about their reactions.

**Measures and Procedures**

After completing a consent form, participants were told they would be viewing a slide show of news photographs. They could view each photo for as long as they liked. They were instructed to advance to the next photograph by pressing the space bar; they could not return to previous photographs. Participants viewed all 36 photographs (in random order) for as long as they liked (the attention measure), pressing the space bar to advance to the next photograph. The amount of time each image was viewed was used as the measure of selective attention, as the choice to advance to the next photograph was the participants’. The presentation software recorded this amount of time. Following the presentation, a series of questions were asked. These included demographic and media use items, followed by the 20 items that form the visualizer and verbalizer scales (Kirby et al., 1988; see Appendix A). It was assumed these questions and the time it took to answer them reduced immediate memory for the photographs they had seen. Next came a free recall section where the participants were asked to write down a description of all the photographs they could remember. The total number of images recalled was used as the critical index of memory. The participants were then shown each photograph again and rated each of them on 10 7-point perceptual scales. The ten scales, based on those used by Berlyne (1973; 1974; 1975), with updated language, were: active/calm; emotional/unemotional; simple/complex; organized/disorganized; interesting/uninteresting; pleasing/displeasing; like/dislike; surprising/unsurprising; informative/uninformative; and atypical/typical. After completing the questionnaire, participants were debriefed and thanked. The entire study lasted approximately 30 minutes.

**Display and Recording Apparatus**

The photographs were displayed on a 17-inch monitor attached to a Macintosh PowerPC 8100 using Cedrus SuperLab software. This software presented the photographs in a random order and recorded the viewing time (in milliseconds).
Results

Thirty-nine undergraduates from a large Midwestern university participated in the study in exchange for extra credit in a course they were taking.

Visualizer and Verbalizer Scales

The visualizer and verbalizer scales are each based on those of Kirby et al., (1988). Cronbach’s alpha was calculated for each of these scales using all ten questions. Neither scale produced a satisfactory level of reliability and unreliable items were removed. The final verbalizer scale \( \alpha = .67 \) contained six items and could range from 6 to 42 (actual range 20 to 42; \( m = 34, sd = 4.45 \)), with a higher score indicating a greater preference for verbal learning. Five items were used to form the visualizer scale \( \alpha = .66 \), which could range from 5 to 35 (actual range 19 to 35; \( m = 28.03, sd = 4.34 \)), with a higher score indicating a greater preference for visual learning. The two scales were slightly negatively correlated \( r = -.10; p < .56 \), though not significantly, meaning they are independent measures.

Perception Scales

A principal component factor analysis using Varimax rotation on the perception items identified four factors. “Interest” (similar to Berlyne’s hedonic factor) contained interest, pleasingness and liking \( (\text{Cronbach’s alpha} = .68) \). “Activity” (similar to Berlyne’s arousal factor) was made up of the activity and emotionality items \( (r = .59; p < .001; \text{Cronbach’s alpha} = .74) \). “Complexity” (similar to Berlyne’s complexity factor) was made up of the complexity and organization items \( (r = .49; p < .002; \text{Cronbach’s alpha} = .65) \). “Typicality” was made up of the surprising, informativeness and typicality items \( (\text{Cronbach’s alpha} = .72) \).

Mediation Model

To analyze the mediation model (H1-H4; see Figure 1), a series of regressions were run; in each analysis gender, age and parents’ income were entered first and, thus, statistically controlled (Baron & Kenny, 1986). H1 predicted that visualizing would be positively related to the amount of time spent viewing the photos (attention). To test this, the mean viewing time for all 36 photos was calculated for each person. On average, people viewed each of the pictures for 7.6 seconds. The regression results (see Tables 1a & 1b) indicate that neither the visualizer scale nor the verbalizer scale was significantly related to viewing time \( (R^2 \text{ change} = .045; p < .23) \). Thus, H1, and the first requirement for mediation, was not supported.
## Table 1a
### Hierarchical Regression Results for Attention and Memory

<table>
<thead>
<tr>
<th>IV sets</th>
<th>Viewing Time</th>
<th>Photo Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>Step $R^2$</td>
</tr>
<tr>
<td>Step 1:</td>
<td>Income</td>
<td>-.158</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>-.166</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-131.000</td>
</tr>
<tr>
<td>Step 2:</td>
<td>Visualizer Scale</td>
<td>1.177</td>
</tr>
<tr>
<td></td>
<td>Verbalizer Scale</td>
<td>.998</td>
</tr>
<tr>
<td>Step 3:</td>
<td>Interaction Between</td>
<td>-1.264</td>
</tr>
<tr>
<td></td>
<td>Visualizer &amp; Verbalizer</td>
<td></td>
</tr>
<tr>
<td>Total $R^2$</td>
<td></td>
<td>.10</td>
</tr>
</tbody>
</table>

1Betas are from the final model
2Column may not add to total due to rounding
*alpha < .05

## Table 1b
### Hierarchical Regression Results for Memory, Controlling for Viewing Time

<table>
<thead>
<tr>
<th>IV sets</th>
<th>Photo Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
</tr>
<tr>
<td>Step 1:</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
</tr>
<tr>
<td>Step 2:</td>
<td>Viewing Time</td>
</tr>
<tr>
<td>Step 3:</td>
<td>Visualizer Scale</td>
</tr>
<tr>
<td></td>
<td>Verbalizer Scale</td>
</tr>
<tr>
<td>Step 4:</td>
<td>Interaction Between</td>
</tr>
<tr>
<td></td>
<td>Visualizer &amp; Verbalizer</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td></td>
</tr>
</tbody>
</table>

1Betas are from the final model
2Column may not add to total due to rounding
*alpha < .05
H2 suggested that the visualizing cognitive style would predict recall for the photos. Participants on average recalled just over 20 of the 36 images. Only visualizing significantly predicted recall ($R^2$ change = .15; $p = .034$). A person’s visualizer level was positively related to the number of photographs recalled ($Beta = .38; p < .025$). H2 was supported.

H3 predicted that attention would be positively related to recall. The regression results support this hypothesis. Longer viewing time was positively related to recall ($R^2$ change = .14; $p < .012$; $Beta = .39; p < .024$).

Even though H1 was not supported, the relationship of cognitive style and recall was examined while controlling for attention (H4). Results show a slight reduction in the partial correlation (though not significant) between the visualizer cognitive style and recall when attention is controlled ($partial r_{without\ attention} = .38; partial r_{with\ attention} = .34$). Overall, the mediation model was not supported. Visualizing and attention seem to be related to memory through two independent paths. As predicted, verbalizing was not a significant predictor of recall or attention.

**Perceptions of News Photographs**

A series of research questions asked how visualizers and verbalizers would perceive various properties in the photos. To examine these questions, a series of regressions were analyzed (see Tables 2a and 2b). In each regression gender, age, and parents’ income were entered first, and thus statistically controlled. The first dependent scale was self-reported interest in the images. The interest scale mean was 4.8, on a seven-point scale, with higher values meaning more interest. The regression results (after controlling for gender, age and income) showed that both the visualizer ($beta = .36; p < .013$) and verbalizer ($beta = .29; p < .04$) scales were positively related to interest ratings ($R^2$ change = .19; $p < .013$).

Next, activity level ratings were analyzed. The activity scale mean was 4.8, on a seven-point scale, with higher values meaning more active. The regression results revealed no significant effects for either visualizing or verbalizing levels.

The third perceptual property scale measured the perceived complexity of the photographs. The complexity scale mean was 2.9, on a seven-point scale, with higher values meaning greater perceived complexity. The regression revealed a significant, though negative effect ($R^2$ change = .41; $p < .001$) for both the visualizer ($Beta = -.32; p < .023$) and verbalizer scales ($Beta = -.59; p < .001$). Higher levels of each cognitive style were associated with the photos being viewed as less complex/more organized.

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### Table 2a
**Hierarchical Regression Results for Perception Scales: Interest and Activity**

<table>
<thead>
<tr>
<th>IV sets</th>
<th>Interest Scale</th>
<th>Activity Scale</th>
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</thead>
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<td>β</td>
<td>Step R²</td>
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<tr>
<td>Step 1:</td>
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<td></td>
</tr>
<tr>
<td>Income</td>
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<td>.034</td>
</tr>
<tr>
<td>Age</td>
<td>.175</td>
<td>-.086</td>
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<tr>
<td>Gender</td>
<td>-.118</td>
<td>-.119</td>
</tr>
<tr>
<td>Step 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visualizer</td>
<td>.227</td>
<td>.192*</td>
</tr>
<tr>
<td>Verbalizer</td>
<td>.244</td>
<td>-.016</td>
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<tr>
<td>Step 3:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
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<td>.003</td>
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<tr>
<td>Visualizer &amp; Verbalizer</td>
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<td></td>
</tr>
<tr>
<td>Total R²</td>
<td>.229</td>
<td>.113</td>
</tr>
</tbody>
</table>

*1 Betas are from the final model  
*2 Column may not add to total due to rounding  
*α < .05

### Table 2b
**Hierarchical Regression Results for Perception Scales: Complexity and Typicality**

<table>
<thead>
<tr>
<th>IV sets</th>
<th>Complexity Scale</th>
<th>Typicality Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>Step R²</td>
</tr>
<tr>
<td>Step 1:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>-.040</td>
<td>.003</td>
</tr>
<tr>
<td>Age</td>
<td>.152</td>
<td>-.075</td>
</tr>
<tr>
<td>Gender</td>
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<td>-.038</td>
</tr>
<tr>
<td>Step 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visualizer</td>
<td>.529</td>
<td>.407*</td>
</tr>
<tr>
<td>Verbalizer</td>
<td>.171</td>
<td>1.243</td>
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<tr>
<td>Step 3:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
<td>-1.093</td>
<td>.007</td>
</tr>
<tr>
<td>Visualizer &amp; Verbalizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total R²</td>
<td>.418</td>
<td>.102</td>
</tr>
</tbody>
</table>

*1 Betas are from the final model  
*2 Column may not add to total due to rounding  
*α < .05
Last, the effects of visualizing and verbalizing cognitive styles on perceived typicality of the images was examined. The typicality scale mean was 3.7, on a seven-point scale, with higher values meaning greater perceived typicality. Like the results for the activity scale, results for the typicality scale analysis reveal no significant relationships between the cognitive styles and perceptions.

**Discussion**

The first objective of the study was to test a model that proposes that greater visualizing levels lead to greater attention to visual material, which in turn leads to improved memory. The results suggest that only part of this model is valid: attention does not seem to be the underlying mediating process between visualizing and recall. Though people who spent more time viewing the photos remembered more of them, and visual learners remembered more of the photos than those who were not visual learners, there was no relationship between visual learning and attention to the photos. Therefore, attention does not appear to be the mechanism that explains the better recall observed in visual learners. Perhaps people who are visual learners are better at organizing visual information in long-term memory. These results suggest that learning from news photographs can be due to individual learning styles (a trait), and/or due to the allocation of controllable attentional resources (a state), which can vary from task to task. Previous research suggests attention is automatically attracted to formal features in an image, such as novelty (Lang 1990; Mendelson, 2001). A revised model, showing these two paths, is suggested by the results (see Figure 2).

*Figure 2. Actual model of visual processing.*
As expected, verbal learning style was not a factor in attending to or learning the strictly visual information. These results thus bolster the discriminant validity of the separate concepts of visualizing and verbalizing cognitive styles. Had the visualizer and verbalizer styles fell at the opposite ends of a single continuum, we would have expected to see a reversed and significant effect for verbal learning on memory.

The second purpose of the paper was to begin to identify differences in how visual (and verbal) learners perceive photographs. High visualizers perceived the news photos as more interesting and less complex than did those who were not visual learners. That self-identified high visualizers found all photographs more interesting might be easily predicted. The perceived complexity result further suggests high visualizers are better able to see images as unified wholes and see relationships between elements in the photographs. This ability is similar to the notion of chunking, the process that allows chess experts to see organization and meaningful relationships on a chessboard (e.g., Chase & Simon, 1973; Glaser & Chi, 1988; Miller, 1956) and remember patterns of moves effectively. Master chess players are able to extract a larger amount of information from each fixation on a board by seeing patterns in larger, more meaningful chunks. High visualizers are efficiently able to store more information about each news photographs, which may lead to a more unique memory trace facilitating recall. Combining these results with a failure to demonstrate attention as a mediator for recall, I conclude that high visual learners may have a better ability to organize visual information efficiently and meaningfully. Further research will probe this possibility.

There was no relationship between visualizing and the other measures of typicality and activity. Thus, people may not need to be highly visually oriented to perceive typicality and activity in photos. Perhaps these perceptions are more dependent on the nature of the photographs themselves and not due to a more attuned visual sense. This study is the first to suggest how visual learners “see” photographs.

Interestingly, the same pattern of results was found for high verbal learners. These participants found the photos more interesting and less complex/more organized than those who were low verbal learners. Nonetheless, no relationship was detected between verbalizing and memory, suggesting that interest in visuals is not a precondition for learning from them.

The third objective of this study was to examine whether the visualizer style was related to processing news photographs. This objective was motivated by the lack of relationship for the visual learners found in Mendelson and Thorson (1997), which examined the effects of cognitive styles on the
processing of news stories and photos in a newspaper. In that study, only the participant’s verbalizing level made a difference in processing the news information. In the present study, when photos were shown in isolation from a story, only the visualizing style was related to photo processing. The combined results of these two studies suggest that when photos are presented with news stories they serve mainly a headline function, telling readers the topic of the story, and do not help visualizers understand the meaning of the story any better. It may be that both visualizers and verbailzers attend to the headline and text for main information. Often news photos simply show the main actors involved. To be helpful in learning, a picture needs to clarify relationships or transform the textual content into a more understandable format (Levin, Anglin & Carney, 1987; Levin, 1989). When photos are presented alone, the story is created completely from the interaction of the image and stored information in the viewer’s long-term memory. A person who learns best visually may have a more complex store of visual stories that provide context for what they are seeing.

Combining the results of this study with the results of Mendelson and Thorson (1997), we get a better sense of how learning styles affect the processing of information from a variety of mass media outlets/formats. Cronbach and Snow (1977; Snow, 1989) argued for the examination of interactions between aptitudes, which include individual differences in personality and learning styles as well as abilities, and treatments or tasks that affect learning. The visualizer and verbalizer aptitudes may interact with the format-specific tasks (see Figure 3). For example, it may be more relevant to determine a person’s verbalizing level when examining learning in a more text-oriented environment, such as a newspaper, whereas a person’s visualizing level may be more relevant to learning in a completely visual environment, such as photographs on their own. With regard to learning from newspapers, the information is most often in the text, so one’s verbalizer level may be most important for determining the ability to learn.

These results suggest several areas for further research. The effect of visualizer/verbalizer cognitive styles on responses to media that present verbal and visual components simultaneously, such as television, should be examined. It is unclear whether and to what extent both cognitive styles may affect attention, perception, and memory of news stories on television. Further, to better test the aptitude-treatment interactions, an experiment should be designed in which visual and verbal learners are randomly assigned to tasks that either match their style or not. A Web environment, such as an online newspaper, would be ideal for such an experiment, since this mimics some of the personalizable aspects of interactive media.
Cognitive styles give media researchers an important way of looking at individual differences, beyond simply demographics and psychographics. This research begins to expand our understanding of how people’s internal cognitive processes interact with mediated messages. A better understanding of this interaction will put media professionals in a position to expand on Lesser’s (1971) advice: “We must discover how to adjust and adapt instructional strategies . . . to the differences we have identified among students” (p. 530).

**Figure 3.** Proposed interaction model of visual/verbal cognitive styles and task type on learning

Cognitive styles give media researchers an important way of looking at individual differences, beyond simply demographics and psychographics. This research begins to expand our understanding of how people’s internal cognitive processes interact with mediated messages. A better understanding of this interaction will put media professionals in a position to expand on Lesser’s (1971) advice: “We must discover how to adjust and adapt instructional strategies . . . to the differences we have identified among students” (p. 530).

**Notes**

1. Riding and colleagues (Riding & Ashmore, 1980; Riding, Burton, Rees, & Sharratt, 1995; Riding, & Sadler-Smith, 1992) use the terms verbalizer and imager.
2. The concepts of visualizer/verbalizer cognitive styles are 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).
3. Visualizing and verbalizing were measured using the scales developed by Kirby *et al.*, (1988).
References


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*Mendelson – For Whom is a Picture Worth a Thousand Words? Effects of...*


Appendix A

Visualizer and Verbalizer Cognitive Style Questions

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 someone 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 used in final scales.