THINKtwice inc

Persuasion and the Role of Visual Presentation Support:
The UM/3M Study

D. R. Vogel, 0. W. Dickson, and J. A. Lehman

Prepared by

Douglas R. Vogel
Assistant Professor of MIS
University of Arizona

Gary W. Dickson
Professor of MIS
University of Minnesota

John A. Lehman
Assistant Professor of MIS
University of Minnesota

Management Information Systems Research Center
School of Management
University of Minnesota
Minneapolis, Minnesota 55455

Abstract

This paper summarizes the findings of a study designed to systematically explore how computer generated visual support affects the persuasiveness of a presentation. Perceptions of the presenter as well as audience attention, comprehension, yielding, and retention culminating in action were enhanced when presentation support was used compared to when it was not. Further, the persuasive impact of a presentation was shown to depend on characteristics of the support used. Characteristics examined were color vs. black and white, plain text vs. text plus pictures and graphs, and 35mm slides vs. overhead transparencies. A model of the persuasion process and guidelines for the effective use of presentation support were developed. Presentation support effectiveness was also shown to vary as a function of presenter quality.

1.0 Introduction

Presentations using visual aids were found to be 43% MORE PERSUASIVE than unaided presentations.

Researchers from the Management Information Systems Research Center at the University of Minnesota and at 3M Corporation set out to explore how the use of visual support by a presenter affects the persuasiveness of a presentation. Although there have been many claims made regarding how presentations are improved by visual support, there is little empirical evidence to back up the claims. The study conducted in 1981 at the Wharton School of the University of Pennsylvania is the one empirical study that is often cited, but frequently the claims exceed the study's explanatory capabilities. To go beyond the Wharton Study, the combined UM/3M team sought to lay the basis for a program of research which will fully explore the use of visual aids in support of a presentation which has audience persuasion as its purpose.

To accomplish this goal we designed a baseline study which can support subsequent work to further probe the subject of audience persuasion. It was our intention that the baseline study be theory based and conducted in a rigorous manner in order that our results can be replicated and defensible to both the research and practitioner communities. The baseline study, which is reported upon here, involved an attempt to persuade people to commit their time and money to attending seminars on time management. Presentations supported by a variety of visual support (use of color vs. black and white; use of plain textual visuals vs. those enhanced with "clip art" and graphs; and visuals on overhead transparencies vs. on 35mm slides) were compared to a presentation with no visual support. Overall, the presentations using visual support were 43% more persuasive.

2.0 The Nature of the Study

Figure 1 represents the model underlying our study. This framework is based upon what is known as the "Message Leaning" approach to persuasion. According to this view, persuasion is communication intended to influence choice. The basic theory suggests that persuasion is a function of attention, comprehension, yielding (degree of agreement with the presenter's position) and retention which culminates in action. These intermediate factors, in turn, are a function of the characteristics of the audience, support used by the presenter, and factors fixed in the environment. Our research team enriched the basic model based upon pilot studies coupled with the results made available from the Wharton Study. The influence of the perceptions of the presenter are an example of the latter.
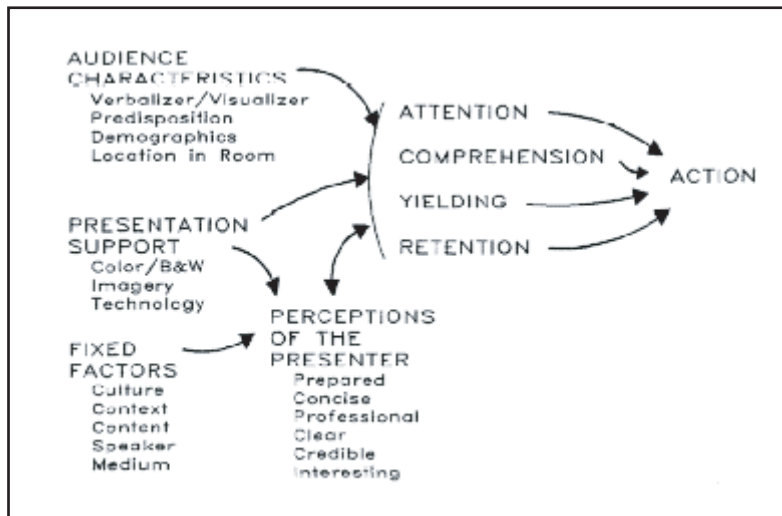
Persuasion Process Model

Figure 1.

Since we were interested in conducting a well-controlled study which would serve as the basis for additional work, we placed particular emphasis on selecting an appropriate task setting, on measurement of outcomes, and on selecting an appropriate first set of visual support for examination. Thus, in the model shown in Figure 1, we selected or created the "fixed factors," we measured audience characteristics, we varied types of presentation support, and we took measures of the intervening variables and the dependent variable, action.

In the study, we investigated the nature of visual presentation support on the outcomes of the presentation at four levels. Level 1 investigation looked at the overall effect of presentation support; level 2 examined the characteristics of support (e.g., use of color) at a more detailed level; level 3 was an attempt to test an overall model of persuasion related to presentation support; and level 4 sought to develop guidelines for the effective utilization of presentation support.

In our study, the audience was composed of junior- level undergraduate business students enrolled in an introductory course in management information systems. In the basic study (more will be said later about a few treatments not described in the basic study) the students, in groups of about 35 each, received a presentation which had as its purpose causing each student to take action. Each group received the presentation in the same room and under the same conditions. The other factors fixed in the study included the task setting and the speaker. The task setting involved a presenter giving a ten minute presentation which was aimed at influencing the students to sign up (commit time and money) for some number of seminars in time management (ten seminars were available). In this study, we were careful to fix the speaker as a variable by having the presentation on videotape. The speaker was selected on the basis of auditions to be of average quality (more will be said on this dimension later).

The above factors were fixed for all nine treatment groups. One group saw the presentation with no visual support and eight groups received one of the presentation support treatments. The presentation support consisted of some form of high quality (prepared using 3M facilities) visuals. The eight visual support treatments were color vs. black and white, plain text vs. text enhanced with clip art and graphs, and 35mm slides vs. overhead transparencies).

3.0 Procedure

In the second week of the ten week course, a visit was made to the lecture classroom where all students were together. An announcement was made by one of the research team to the effect that the School of Management was considering developing a set of 10 time management seminars for students. It was explained that students could take as many or few of the ten seminars as they wished, but each one would cost $15.00 and would take two 3-hour sessions in evenings to be arranged. It was stated that the seminars would be given by time management professionals hired by the school to offer them. The students filled out a one page questionnaire (the premeasure) which indicated their degree of interest in each of the ten seminars and the amount of time and money they would likely be willing to commit to the seminars. Nothing in detail was said about the nature of the seminars other than the ten titles such as "Working Smarter," or "Fighting Procrastination."

In the fifth week of the course, all of the laboratory sections associated with the course (13 sections of about 35 students each) met in a special room. The same member of the research team who had appeared in the large lecture section of the class told the students that they were going to see a followup presentation on the seminars that had been mentioned previously. The lights in the mom were dimmed and the ten minute videotape was shown to the students. The member of the research team (for the eight visual treatment groups) manually displayed the visual support for the presentation and synchronized their showing with the presentation. It had been explained that these had been provided by the organization that would offer the courses. Pilot tests indicated that, in the darkened room, the displays should be able to be seen clearly by persons having normal vision.

At the conclusion of the videotape (ten minutes) a questionnaire was again completed by each student. The same questions were asked before about the degree of interest in the seminars. In addition, a number of additional questions were asked about perceptions of the presenter, attention, and yielding. A short test of how well certain facts were comprehended by the students was also administered. Finally, the students were asked about the perceived legibility of the visuals used to support the presentation (in the eight visual support groups).

Ten days later, again in the large lecture class, the research team member gathered a final bit of data. Students were again given the comprehension test. Administration of this followup allowed retention to be measured.

4.0 Results

We present the results of the study in four parts. First, we will present overall conclusions. Next, we will examine the isolated impact of the various treatments. Third, we will revisit the model of persuasion through "message learning" and revise Figure 1 according to our findings. Finally, we will present some comments regarding the effectiveness of two of our visual support treatments and add some findings from treatments not in the basic study."

4.1 Aggregate Findings

Figure 2 presents the difference in resource commitment between the premeasure and the postmeasure for those receiving visual presentation support and the group receiving no support. Action in terms of two measures, time and money, are displayed. The figure shows how the group getting only a presentation without any visual support planned to spend less time and the same amount of money on the seminars. Groups getting the visual support with the presentation, on the other hand, planned to spend 16.4% more time and 26.4% more money on the seminars.

A few comments are in order regarding these results. First, it is our opinion that the time measure of action is a better one than money since all the subjects were full time students had similar amounts of time available but may have varied substantially in their personal financial positions. A second comment is that, to some degree at least, the experiment was biased against the researchers in the sense that it would have been quite easy to decrease ones level of commitment to action after seeing the presentation. This is because of the fact that, in the premeasure, only the titles of the seminars were given and it was possible to project all sorts of good qualities to the seminars. On the postmeasure the students had considerably more detail about the contents of each seminar as well as having seen a videotape presentation of an "average" presenter. Thus, it would have been quite easy to lose interest through the accumulation of additional information. This is obviously what happened in terms of the time commitment of the students seeing only the unaided presentation. Our belief in the effectiveness of visual support (of any kind tested) is enhanced in this instance given the condition that the odds were slightly stacked against the effectiveness of the presentation.
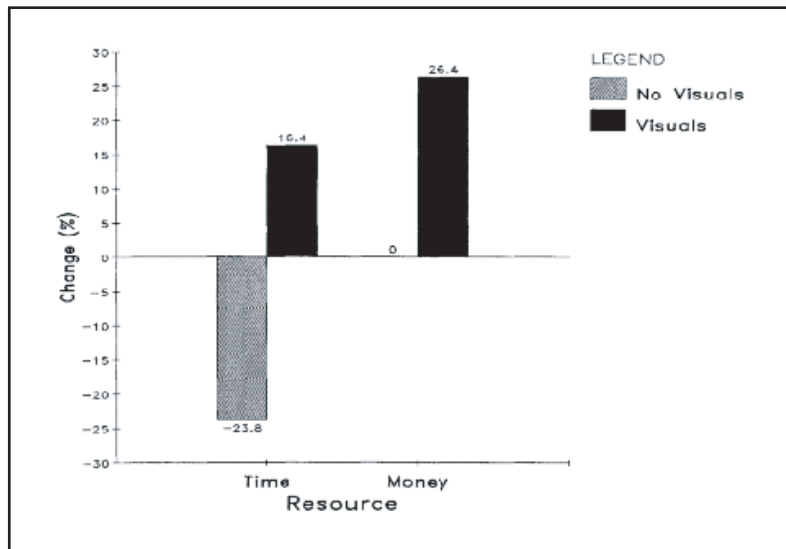
Resource Commitment

Figure 2.

Overall, using the "time" measure, the visual support yielded a 43% improvement in action. Note that the (-23.8) to 16.4 does not quite add up to 43%. This is due to the fact that the initial positions of the groups differed slightly (not statistically significant).

Figure 3 shows that, in addition to action, the difference in change between the visual support groups and the unsupported group along several dimensions included in the model given in Figure 1. Overall, every component of the model was affected by visual support (all were statistically significant).
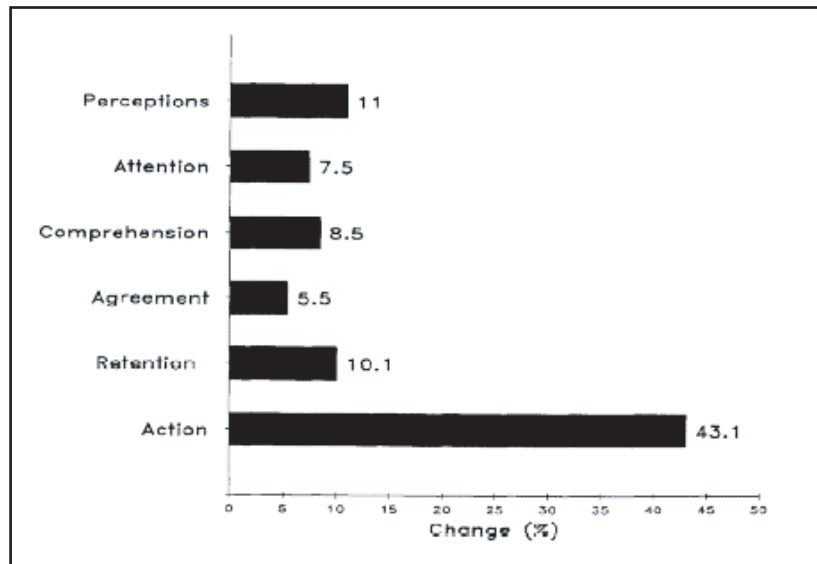
Presentation Support Impact

Figure 3.

Figure 4 is an overall evaluation of the impact of the visual support on perceptions of the presenter. The number of "arrows" is proportional to the statistical significance of the result. Four arrows signifies p=.OO1 i.e., there is only one chance in 1000 that the results are due to chance. Three arrows signifies p=.Ol, two arrows signifies p=.05, and one arrow signifies p=.10. In particular, visual support can be seen to have affected the perception of a presenter as being more concise, clearer, making better use of supporting data, more professional, more persuasive, and more interesting.

Perceptions of the Presenter


```
        compared to
      Use of No Visuals

                           Visuals

      Prepared               ↑
      Concise              ↑↑↑↑
      Professional          ↑↑
      Clear                ↑↑↑↑
      Persuasive            ↑↑
      Committed
      Credible               ↑
      Interesting           ↑↑
      Strong                 ↑
      Attractive
      Supporting           ↑↑↑
         Data
```

Figure 4.

4.2 The Characteristics of Visual Support

All of the components of the model presented in Figure 1 were, in the aggregate, affected positively by visual presentation support. Now, our attention will turn to consider the nature of the effects of specific characteristics of support.

In Figure 5, a breakout is given of the differential impact on perceptions of the presenter based upon use of overhead transparencies vs. 35mm slides. As in Figure 4, the number of "arrows" is proportional to the statistical significance of the result. Note that the groups seeing the support on slides perceived the presenter as more professional, but less clear and less interesting.

Perceptions of the Presenter


```
        compared to
      Use of No Visuals

                    Over-      35mm
                    heads      Slides

      Prepared        ↑          ↑
      Concise       ↑↑↑↑       ↑↑↑↑
      Professional              ↑↑
      Clear         ↑↑↑↑        ↑↑
      Persuasive     ↑↑         ↑↑
      Committed
      Credible        ↑          ↑
      Interesting    ↑↑↑
      Strong          ↑          ↑
      Attractive
      Supporting     ↑↑         ↑↑
         Data
```

Figure 5.

Figures 6 and 7 show the effect of color and image enhancement on the perceptions of the presenter. Figure 6 deals with the results obtained using overhead transparencies and Figure 7 concerns the use of 35mm slides. In each figure, the overall significance level of each type of perception is indicated on the left side consistent with Figure 5. The individual effects of color and image enhancement are compared in. the body of Figures 6 and 7. The number of "arrows" on the fight side of each perception in conjunction with a particular visual support treatment (e.g., color text) reflects the statistical significance of that treatment relative to the group that saw the presentation with no visual support (see explanation on page 7).

First see that the use of color had a much greater impact in the case of the overhead transparencies. In this case, the use of color (whether image enhanced or not) clearly dominated the impact of black and white. This effect definitely is not noted in the case of 35mm slides (see Figure 7). Our data gives a simple explanation of these results and suggests that results shown of using 35mm slides must be used with caution. We asked each subject to indicate the perceived legibility of the visuals used to support the presentation. Even though the same color and hue was used to produce the 35mm slides as the overhead transparencies, the projection brightness was less for the slides. Our subjects seeing the 35mm slides perceived their legibility to be significantly less than in the treatment groups seeing the transparencies. Thus, we do not suggest that using 35mm slides is inferior to using overhead transparencies, but in our experiment the differences in perceived legibility suggest that the results of using 35mm slides must be carefully examined. We will revisit the consequences of these circumstances later in this report.

Perceptions of the Presenter (Overhead Transparencies)

		B&W Text	Color Text	B&W Image	Color Image
↑	Prepared		↑↑	↑	
↑↑↑↑	Concise	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑
	Professional		↑		
↑↑↑↑	Clear	↑↑↑↑	↑↑↑↑	↑↑↑	↑↑
↑↑	Persuasive		↑↑	↑↑	↑↑
	Committed				
↑	Credible	↑	↑		↑↑
↑↑↑	Interesting		↑	↑↑	↑↑↑
↑	Strong		↑↑		
	Attractive		↑		
↑↑	Supporting Data		↑↑↑		↑↑

Figure 6.

Perceptions of the Presenter (35mm Slides)

		B&W Text	Color Text	B&W Image	Color Image
↑	Prepared			↑↑	
↑↑↑↑	Concise	↑↑↑	↑↑↑	↑↑↑↑	↑↑
↑↑	Professional	↑↑		↑↑↑	
↑↑	Clear	↑↑	↑↑	↑↑↑	↑
↑↑	Persuasive	↑↑↑		↑↑	
	Committed				
↑	Credible	↑↑		↑	
	Interesting	↑		↑	
↑	Strong	↑		↑↑	
	Attractive	↑			
↑↑	Supporting Data	↑↑↑	↑	↑↑↑	

Figure 7.

Further examination of these figures shows that image enhancement, even in the case of the transparencies, was limited in its effectiveness. From Figure 6, it can be seen that adding image enhancement in addition to color made the presenter seem slightly more interesting, but at the same time slightly less clear. Again, we will comment on these results later.

In regard to the "components of persuasion" of the model shown in Figure 1, our results indicate:

• Attention and Yielding are influenced by the perceptions of the presenter.

• Comprehension and Retention are improved if color is used rather than black and white, and may be increased by selective use of image enhancement.

• In terms of "action," color overhead transparencies had the greatest impact.

• The two treatments that stand above all the others (given the problems of perceived libi1ity of the 35mm slides) are those of color overhead transparencies (both plain text and image enhanced graphics).

Figure 8 depicts the overall effectiveness of color overhead transparencies in contrast to no visual support and all the other types of visual support tested.
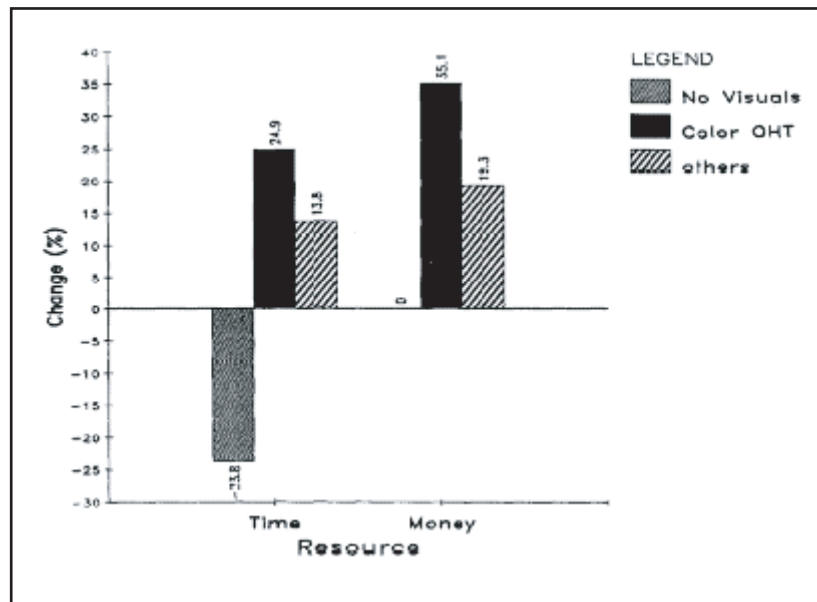
Resource Commitment

Figure 8.

Figure 9 is a breakout of the use of color overhead transparencies contrasted with all other treatments on all components of the persuasion model.
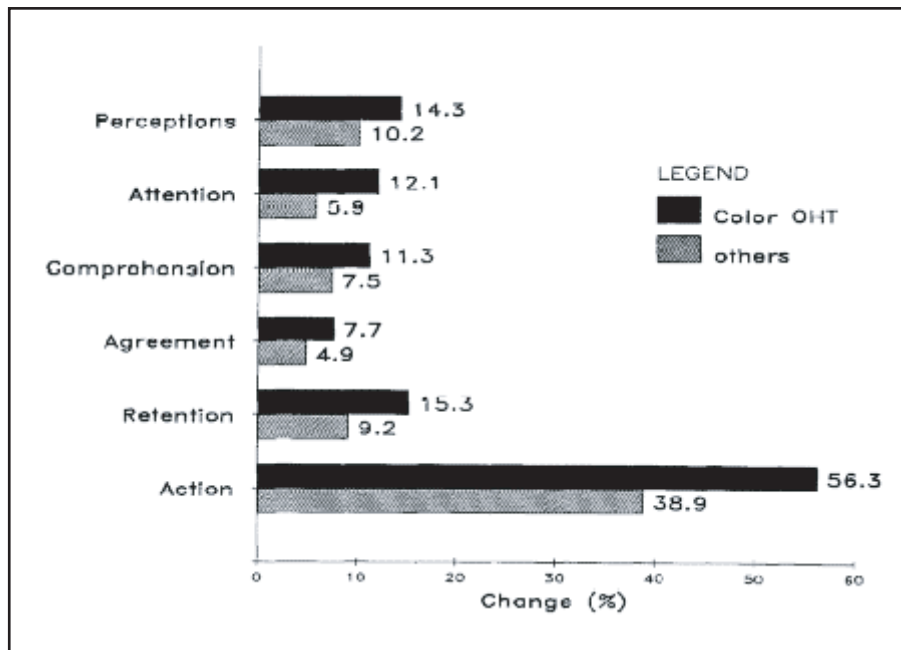
Presentation Support Impact

Figure 9.

5.0 The Model of the Persuasion Process

Our study attempted to explain how visual support of presentations results in action. We started with an explanatory model based upon the "message learning approach" to persuasion. Not testing led to the development of the model tested which was shown in Figure 1. The experimental results we obtained allow enrichment of the model as shown in Figure 10.

In Figure 10, the directional relationships of the model components are shown as arrows. The strength of the relationships based upon our study is indicated by the width of the arrows. We found visual presentation support to have a major and direct effect on perceptions of the presenter. In addition, the support had direct, but less strong, effects on comprehension and retention. Attention influences yielding and comprehension. Retention is affected by comprehension. The perceptions of the presenter are related to both yielding and attention, but the effect goes both ways. Action results from yielding, attention, and comprehension with the former the most important.

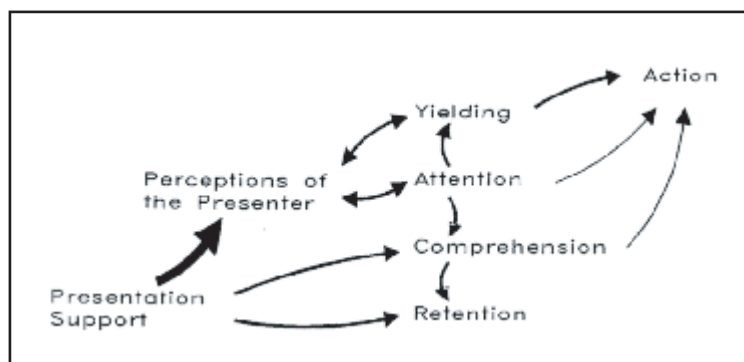*Predicting Action with Presentation Support*

Figure 10.

The knowledge presented in Figure 10 should allow a Presenter to selectively employ visual support depending on the outcome that is desired, e.g., if the goal is to enhance comprehension and retention, support of a different kind may be called for than if the focus is on creating audience attention. In addition, the revised model provides a great opportunity for further model revision and in-depth study of the model components.

6.0 Guidelines for Action

A major objective of this study was to be able to make recommendations regarding how visual support can be used to make more effective presentations. In summary form, we submit the following guidelines:

Persuasion
Use presentation support to:
> Enhance the perceptions of the presenter
> Improve audience
>> Attention
>> Comprehension
>> Yielding/Agreement
>> Retention
>
> Influence audience action

Color vs. Black and White
To be more persuasive, use presentation support in color rather than black and white.

Text vs. Image Enhanced Graphics
Use image enhanced graphics selectively

When in doubt, use plain text.

Image Enhanced Graphics
Use image enhanced graphics to:
> Increase information density
> Display multiple dimensions
> Organize complex issues
> Support abstract concepts
> Illustrate trends

35mm Slides vs. Overhead Transparencies
Use 35mm slides to heighten perceived professionalism.

Use overhead transparencies to seem more interesting.

Attention
Use presentation support to enhance audience attention.

Be particularly careful to avoid conditions that might cause poor perceived legibility.

Comprehension
Use presentation support in color to enhance audience comprehension.

Use image enhanced graphics selectively and carefully.

Yielding-Agreement
Use presentation support to enhance audience yielding-agreement in conjunction with enhanced perceptions of presenter.

Retention
Use presentation support in color to enhance audience retention.

Certainly, a summary guideline from our study is, "to be a persuasive presenter, use quality support produced by available technology." The technology available, however, should not be used indiscriminately. Our results demonstrate this fact. Additionally, the influence of the quality of the visual support can be shown to be related to the quality of the presenter. We are able to support this contention by some data collected as a byproduct of our baseline study.

7.0 Technological Caveats and the Role of the Presenter

There are two additional results of our work that are of interest. The first involves some warnings about use of two of the support types we studied in our work. The second regards the findings associated with a presenter other than the one whose results are described above.

7.1 35mm Slides and Image Enhancement

One point to which we would like to call attention involves findings regarding two types of presentation support, 35mm color slides and the use of image enhancement. Color slides are not an especially robust technology. Although care was taken to produce high quality 35mm color slides using state of the art technology and to show them in a very dark room, the audience still had problems with their legibility. This does not mean that the use of color slides is not recommended, but rather that the user must be very certain of the room conditions in which they are to be used. Color slides are best when of extremely high quality and shown in a virtually dark room (or used with very light background colors).

Image enhancement should also receive selective use. In our work, many of the visuals were image enhanced. Some of these were effective and some were not. The following example illustrates the care with which image enhancement should be used. One image enhanced slide on "working smarter not harder" worked quite well. It showed the figure of a person with a light bulb near their head on the "working smarter" side of the visual and a similar figure without the light bulb on the "working harder" side. Additionally, the smarter side had a clock showing ten o'clock and the harder side had a similar clock showing ten thirty. The idea to be conveyed was the person working smarter would finish more quickly by being more creative. In our tests, the audience got this idea and retained it. Another visual showing that $100 billion is wasted by poor use of time in any year was enhanced by showing stacks of currency. This image enhancement was ineffective in that the persons viewing the enhancement had lower levels of comprehension on this concept than those with text only. In other words, the image enhancement got in the way of the message. In short, images used indiscriminately can detract from one's presentation.

7.2 The Role of the Presenter

It so happened that we tested several "presenters" to videotape for our studies. The presenter on whom the above results are based was selected because she was determined to be of very "average" or "typical" quality. We also videotaped a second presenter that was felt by the researchers to be a significantly better presenter, "too good" to use for first study in which a presenter of moderate quality was desired. In the "baseline" study, we had four laboratory sections that were held in reserve in case we had technical difficulties with one of the treatments and needed backup. No problems occurred so we were able to employ these "extra" sections for additional treatments.

What we decided to do was to test the effect of "presenter quality" as influenced by the quality of the visual support used. As mentioned, we had a second presenter of higher quality so we were able to test this person's persuasiveness unaided and "aided" by hand drawn (using color overhead transparency pens) as well as computer generated text visual support. With both presenters making identical (using the same script) presentations we could examine the impact of the quality of their visual support on their presentations. Our results can be summarized as follows:

• A "typical" presenter using visuals can be as effective as a "better" presenter using no visuals.

• The better the presenter one is, the more one needs to use high quality visual support.

Figure 11 presents our results in terms of the perceptions of the presenter and Figure 12 shows the results concerning the components of the persuasion model. Note from these figures that unaided, there was a significant difference between the two presenters. The typical presenter, even with hand drawn visuals, was able to increase her performance to be at least equal to (and on a few items surpassing) the better presenter when he was unaided. High quality (machine produced) visuals helped the typical presenter even more.

Perceptions of the presenter

Figure 11.

Persuasive Impact

Figure 12.

Figures 13 and 14 show the change in resource commitment brought about by various quality levels of visual support for the two presenters. Figure 13 adds hand drawn visuals to the results that were already presented above for the typical presenter used in the baseline study.

See that even hand drawn visuals helped a bit on how willing her audience was to commit time to the seminars but had virtually no impact on the amount of money willing to be spent. The "better" presenter on the other hand, was hurt in his effectiveness by the hand drawn visuals in terms of time and money commitment. Figure 14 shows both measures decreased over what this presenter was able to effect using no visual support.

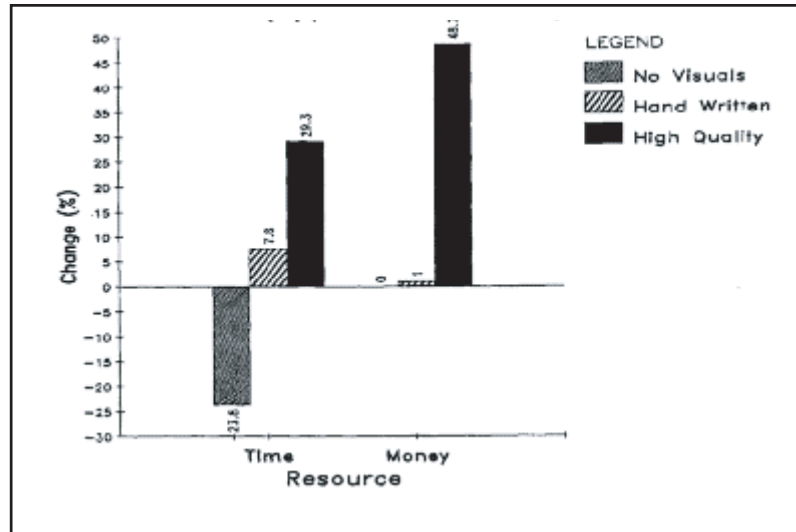*Resource Commitment (Typical Presenter)*

Figure 13.

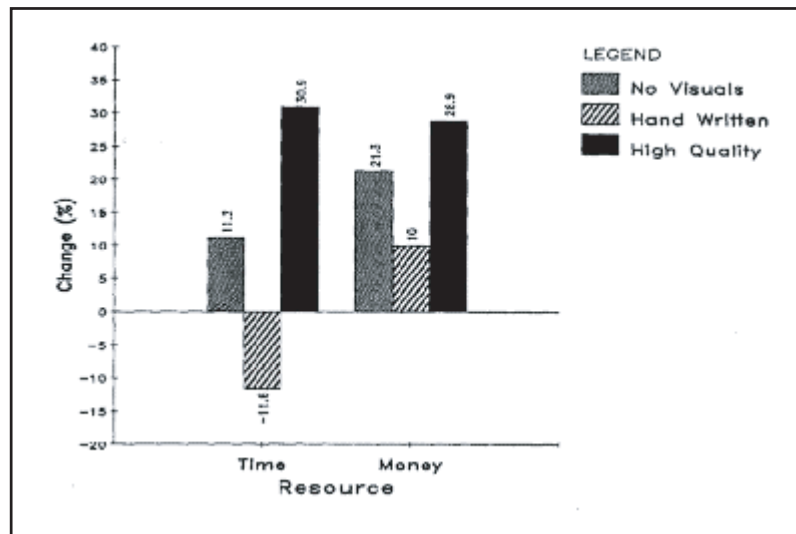*Resource Commitment (Better Presenter)*

Figure 14.

8.0 Conclusion

We have drawn three major conclusions from this study

1) Perceptions of the presenter as well as audience attention, comprehension, yielding, and retention are enhanced when presentation support is used compared to when it is not. Presentations using visual aids were found to be 43% more persuasive than unaided presentations.

2) The persuasive impact of a presentation depends on characteristics of the support used. Presentation support in color is more persuasive than that in black and white. Image enhanced graphics are effective only when used selectively and carefully. Use of overhead transparencies results in the presenter being perceived as more interesting but less professional compared to use of 35mm slides.

3) Presentation support effectiveness varies as a function of speaker quality. A "typical" presenter using presentation support has nothing to lose and can be as effective as a better presenter using no visuals. The better a presenter is, however, the more one needs to use high quality visual support.

This baseline study will be used to support subsequent work to further probe the subject of audience persuasion.