Matching Visitor Learning Style with Exhibit Type: Implications for Learning in Informal Settings

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Introduction

The importance of education in society today has helped to shape the future of the museum. The museum has long been concerned with public education; indeed, museums were founded with the notion of public education clearly in mind. Today, with the continual rise of popular education and the marked increase in museum attendance, the educational value of museums is widely appreciated (Lee, 1968). As educational institutions, museums are obligated to provide experiences that are both enjoyable and educational to people of all ages and backgrounds. By focusing on the unique qualities of the museum, it is clear that they are capable of imparting knowledge, encouraging curiosity, and promoting aesthetic sensibility (American Association of Museums, 1984).

As a place for education, in fact, the museum may have some advantages over more formalized public education for persons of all ages. Potentially at least, the museum is an exciting alternative to conventional education. Miller (1988) believes that museums provide a special opportunity to stimulate interest in many different topics, and that this interest will foster involvement in other learning experiences – both formal and informal. The museum should serve as an ideal learning environment for inviting inquiry, questioning, and constructive practice in investigatory behaviors. The great strength of the museum as an educational institution is that visitors are free to explore and to discover things on their own in an environment where they can have direct experiences that are enjoyable and that also serve their needs for intellectual and cultural growth. According to Lee (1968), this self-directed learning resembles learning from life; therefore, it can be deeply personal, rich, and highly rewarding.

Some of the features which give museums their potential pose difficulties which may result in little or no academic-type learning. Within the museum, communication and learning must involve a heterogeneous audience varying widely in interests, age, background, and reasons for being in the museum. Museum visitors are voluntary; they are there on their own terms and not necessarily motivated to devote the time and effort to learn new historical, scientific, or artistic ideas (Screven, 1969, 1973). While the visitor is free to stop, look, and listen, he or she is also free to

ignore the relevant and attend to the irrelevant. Within a display, it is difficult to control the order in which a visitor will view materials where simple ideas must precede complex ones. In addition, the typical visitor-exhibit relationship is a passive, one-way affair in which the visitor's "response" is mostly random and the exhibit remains unresponsive to it (Screven, 1973).

Studies indicate that what people take away from their exhibit experience is often quite different than what exhibit planners intended (Screven, 1969, 1974b; Shettel, 1973; Washburn, 1975a, 1975b). It has also been shown (Screven, 1976, 1986b; Shettel, Butcher, Cotton, Northrop, and Slough, 1968) that the time visitors spend looking at an exhibit is usually less than the time required for even the most elementary recognition of the main ideas in most exhibits. Those visitors who do spend time looking at an exhibit usually know little more about the intended messages after seeing the exhibit than before. In addition to not gaining any new information, some visitors may even perceive the content of the exhibit as support for the misconceptions the exhibit was designed to correct. It seems that unless a visitor comes to an exhibit with a fair amount of prior knowledge on the subject, they are likely to appreciate only the main points of that exhibit (Lee, 1968; Lewis, 1980; Miles, Alt, Gosling, Lewis, and Tout, 1988; Screven, 1974a, 1986b; Shettel, 1973).

Establishing a paradigm which consistently improves learning across all demographic groups has, however, proven to be elusive. Although a number of important variables have been identified which affect performance, attention, and learning in informal environments (such as entering knowledge of the exhibit, pre-conceptions about the topic, expectations, and make-up of the visitors' group), many issues remain unsettled. For example, one important variable that has not been experimentally examined in museums is the learning style preference of visitors. The present study examines visitor learning style preference and its effect upon learning in an informal educational setting.

Traits of Visitors

Most of the research involving visitor characteristics has focused on demographic features and some important factors have emerged from this type of research. For instance, visitors, with the exception of scholars, appear to share four traits: (1) a higher education and socioeconomic levels than the general population; (2) a family or social orientation; (3) a visual orientation; and, (4) an interest in novelty seeking (Screven, 1986a).

Very little data has been collected to examine why visitors behave as they do during a visit. It has been suggested that examining the psychographic characteristics of visitors such as values, attitudes, perceptions, interests, expectancies, and satisfactions could be helpful in assessing why visitors behave as they do (Hood, 1983, 1985, 1986).

In an effort to identify different "types" of museum visitors, it is necessary to investigate the literature on "learning styles." Although this research has typically been conducted in formal learning settings, it seems reasonable that it can also apply to the informal setting of the museum. Perhaps by investigating how different people learn, it will be possible to construct exhibits which match these visitor characteristics.

Identifying Visitor "Learning Style"

For some time, educators have recognized that individuals have different ways of collecting and organizing information into useful knowledge. Recently, educators looking for a "scientific" way to determine how learners learn best have turned to learning style theory to provide a better match between how a person best gains knowledge and the methods used to impart that knowledge.

There is no disputing that individual differences in learning exist. Some students learn more quickly than others and retain information better than their peers. Why such differences exist has not been an easy question to answer.

One key issue which is raised when individual differences are discussed is the notion of learning style. A preferred mode of learning has been identified as one of the major variables accounting for individual differences (Cronbach, 1967). Variation in learning style may help to account for differences between individuals in educational settings.

The study of differences in learning style is one of the more promising areas in education and associated fields. Learning style can be defined as an individual's consistent way of responding to and using stimuli in the context of learning (Hayden and Brown, 1985). Learning style researchers assert that individuals have different ways of collecting and processing information. It follows, then, that these differences may play a fundamental role in the variation which is observed between individuals on certain learning tasks.

In formal settings, learning style differences have implications for instructional methods. In informal settings, learning style differences may have implications for exhibit design and the informational qualities of exhibits.

Clearly, we can see that learners, in order to optimize their performance, must have educational activities which appeal to their preferences. Environments which fail to provide a match between a learner's style and various educational components are self-defeating.

Unfortunately, research regarding learning style within informal learning settings is scarce. Therefore, a need exists for research which assesses the extent to which the learning style preferences of visitors can be used as a basis for modifying exhibits in informal settings.

Myers-Briggs Type Indicator (MBTI)

One instrument which has proven useful in identifying visitor learning is the Myers-Briggs Type Indicator (MBTI). The MBTI (Myers, 1962; Myers and McCaulley, 1985) is a forced-choice, self-report personality inventory based on Carl Jung's (1971/1921) theory that much apparently random variation in human behavior is actually quite orderly and consistent, due to certain basic differences in the way people approach life. The MBTI is one of the most widely used measures of learning style (DeVito, 1985). The underlying assumption is that every person has a natural preference for one or the other pole on each of four indices:

1. The E-I index was designed to measure the person's preferred orientation to life. *Extraverted (E)* types are regarded as being oriented primarily to the outer world of objects, people, and action, having a tendency to get caught up with whatever is happening around them. *Introverted (I)* types have a more inward orientation and tend to detach themselves from the world around them.
2. The S-N index was designed to measure the person's preferred way of perceiving things. *Sensing (S)* types focus on perceptions received directly through their sense organs; they notice the concrete details and practical aspects of a situation. *Intuitive (N)* types look at things more vaguely, so as to get a certain spontaneous hunch from the unconscious; they like to deal with abstractions, inferred meanings, and the hidden possibilities in a situation.
3. The T-F index was designed to measure the person's preferred way of making decisions. *Thinking (T)* types rely on logical structures to put clarifying order into a particular situation; they are skilled at objectively organizing material, weighing the facts, and impersonally judging whether something is true or false. *Feeling (F)* types, on the other hand, are skilled at understanding other people's feelings and analyzing subjective impressions, basing their judgments on personal values.
4. The J-P index was designed to measure the person's preferred way of dealing with the outer world. *Judging (J)* types are organized and systematic; they live in a planned, orderly way, aiming to regulate life and control it. *Perceptive (P)* types are more curious and open-minded; they go through life in a flexible, spontaneous way, aiming to understand life and adapt to it.

According to the theory, one pole of each of the four preferences is preferred over the other pole. The preference on each index is independent of preferences on the other three indices, so that the four indices yield sixteen possible combinations called "types," denoted by the four letters of the preferences (e.g., ESTJ, INFP).

The Sensing-Intuition preference is an important one, especially in the area of learning. Sensing individuals have been described as the types who are more interested in the immediate data received through their senses, while intuitive types are more interested in perceiving the relationships, meanings, and possibilities suggested by experience (McCaulley, 1974). The intuitive types are outnumbered in the population by the sensing types by a factor of two or three to one (Myers and McCaulley, 1985).

Method

Subjects

The subjects were 400 visitors (188 males and 212 females) over the age of 18 (M = 34.48 years) to the *Rain Forest: Exploring Life on Earth* exhibit at the Milwaukee Public Museum. There were 100 subjects in each of four conditions: baseline, control, and two experimental conditions. Subjects were randomly chosen either before or after they had viewed the exhibit and asked to participate.

Rain Forest: Exploring Life on Earth

The *Rain Forest: Exploring Life on Earth* exhibit in the Biology Hall of the Milwaukee Public Museum served as the site for the experiment. This 11,000 square foot exhibit hall was designed to create the impression of a tropical rain forest. The exhibit hall is intended to bring to life the discoveries of modern biology in a real-life atmosphere. There are approximately 70 exhibits within the hall, which include information on topics such as evolution, re-forestation, and biological diversity. The four exhibits included in this study were located on the second (or canopy) level of the hall. This exhibit hall was chosen for two reasons: First, it contains several major divisions with a variety of exhibits; second, the major objective of the exhibit hall is clearly educational in nature.

Materials and Procedure

In the initial condition in this study, a control group of 100 subjects was utilized to assess the extent to which visitors could correctly answer an 11-item questionnaire derived from the target exhibits. Visitors were asked to fill out the questionnaire and complete the MBTI as they entered the exhibit area, prior to viewing the exhibits of interest. The information provided by this group of subjects reflected visitors' entering knowledge. It also provided insight into the distribution of MBTI learning preferences among visitors. This control data allowed the researchers to make comparisons with subjects in the other conditions who viewed the exhibit prior to completing a questionnaire.

In each of the other three conditions (baseline and two experimental conditions), 100 visitors were asked to fill out a questionnaire and MBTI either before of after viewing the exhibits. In soliciting visitors in these

conditions, both cued and non-cued techniques were utilized. Fifty visitors received cued testing and 50 visitors received non-cued testing in each of these conditions. In the cued technique, when a visitor entered the exhibit area by himself/herself or in a small group (e.g., dyad, triad), a researcher approached the first person from the group and greeted him/her. Visitors were instructed to behave as they normally would. The researcher did not ask the visitors to attend to any specific features of the exhibit area. Subjects were tracked by the researcher during their inspection of the exhibit area in order for behavioral observations, such as time spent, to be recorded. These observations were as unobtrusive as possible. After the observations had been completed, visitors were given an information packet (demographic sheet, questionnaire, and MBTI) and seated at a table where they completed the materials. After completing the information, visitors were thanked for their participation in the study.

In the non-cued technique, visitors were solicited after they had viewed the exhibits and as they were exiting the area. As in the cued technique, the first individual within a given party of visitors was approached by the researcher and asked to participate in the research project. Unobtrusive behavioral observations and time spent at each exhibit were recorded prior to asking the visitor to participate in the study. In this way, the extent to which the researcher's verbal instructions influenced visitor behavior was assessed. It was hypothesized that no difference in performance would occur between the cued and non-cued visitors.

The baseline condition allowed the researcher to determine whether any relationship existed between learning style as measured by the MBTI and learning outcome on the exhibits as assessed by the questionnaire. The baseline condition also provided information regarding the current informational qualities of the exhibits. The baseline condition utilized the exhibits' existing labels and narration without any modification by the researcher. In this way it was possible to measure the effectiveness of the present exhibits.

Labels constructed by the experimenter were used in the experimental phases of this study. These labels did not replace the museum's existing labels, rather, they served as organizational devices which oriented visitors toward the exhibits and, in some cases, conveyed additional information which was not included in the existing labels.

The first experimental condition included labels which were "intuitive" in nature. These labels were created to appeal to intuitive type learners, who are at their best when they are allowed to creatively solve problems and when they can be original and learn on their own. These labels emphasized reading and problem-solving, both of which appeal to intuitive thinkers. In addition, these labels emphasized meanings, values, and relationships, rather than definitions, practical uses, or detailed factual accounts. These labels also made use of questions, because intuitive learners seem to respond best

to novel or original expression of ideas. An example of an intuitive label created for the biological diversity exhibit was:

How are YOU like the cotton-top tamarin and the morning glory?

All living things are made up of cells. At the nuclear level, you, the tamarin, and the morning glory all encode information by use of the chemical DNA.

The second experimental condition included labels which were "sensing" in nature. These labels were created to appeal to sensing type learners, who are at their best when allowed to directly apply their five senses. These labels included concrete, real-life facts, and emphasized the explanation of why something is the way it is. These labels emphasized practical implications, because the concrete, actual uses of things and devices are of interest to sensing individuals. In addition, these labels explained why something is the way it is, rather than having the learner problem-solve or hypothesize about the answer. Sensing learners do not like ambiguity or uncertainty, especially if the answer is not easily arrived at or requires intuition or abstract reasoning. An example of a sensing label for the biological diversity exhibit was:

All living things are made up of cells.

In addition to being made up of cells, all the plants and animals you see here use DNA to encode genetic information."

Results

It was determined that visitors' knowledge that they were being tracked through the exibit hall did not influence their behavior (i.e., no difference between cued and non-cued visitors for time at exhibits or scores on the questionnaire). Thus, data for cued and non-cued visitors were combined in the following description of results.

Comparisons were made to determine if the distribution of sensing and intuitive learners in the present study was different than the distribution in the general population. Myers and McCaulley (1985) have stated that 75% of the general population are sensing-type learners, while 25% are intuitive-type learners. The reverse was true in this study, with 34.8% of the subjects categorized as sensing-type learners, and 65.2% of the subjects as intuitive-type learners. Chi square analyses showed that there was a significant difference in the distribution of sensing and intuitive learners in the present study when compared with the distribution of sensing and intuitive learners in the general population ($\chi^2 = 346.60$ (3, $N = 400$), $p < .0001$).

The percent of correct responses to the rain forest questionnaire for both sensing and intuitive visitors is shown in Figure 1. Analyses were conducted to ascertain whether there were differences between sensing and intuitive visitors to the questionnaire in each condition. In the control condition, there were no differences in performance on the questionnaire between sensing (M = 5.72 out of 11) and intuitive (M = 5.66) visitors, F (1, 98) = 0.03, $p > .05$. There were also no differences between sensing (M = 6.0) and intuitive (M = 5.49) visitors in the baseline condition, F (1, 98) = 1.84, $p > .05$. However, intuitive visitors performed (M = 8.53) better than sensing visitors (M = 5.16) during the first experimental condition, when intuitive labels were in place, F (1, 98) = 172.41, $p < .0001$. When sensing labels were implemented during the second experimental condition, sensing visitors performed better (M = 7.62) than intuitive visitors (M = 5.30) on the questionnaire, F (1, 98) = 43.32, $p < .0001$.

To determine if there were differences between sensing and intuitive visitors in the amount of time spent at the four target exhibits, analysis of variance tests were performed between sensing and intuitive visitors in each condition. The average time sensing and intuitive visitors in each condition spent at the exhibits is shown in Figure 2. There were no differences in the amount of time sensing (M = 194.34 s) and intuitive (M = 189.28 s) visitors spent during the baseline condition, F (1, 98) = 0.05, $p > .05$. In the first experimental condition, the addition of intuitive labels coincided with an increase in the amount of time intuitives spent (M = 222.87 s) over the amount of time the sensing group spent (M = 127.32 s), F (1, 98) = 33.26, $p < .0001$. In the second experimental condition, there were no differences in the amount of time sensing (M = 224.03 s) and intuitive visitors (M = 195.30 s) spent at the four target exhibits, F (1, 98) = 1.40, $p > .05$.

Analyses were also computed to determine if sensing and intuitive visitors in each condition differed in responses to the rain forest questionnaire. It was hypothesized that sensing visitors' scores would increase (over the baseline and control conditions) with the addition of sensing labels in the second experimental condition, and would either stay the same or decrease with the implementation of intuitive labels in the first experimental condition. An ANOVA showed that there were differences in how sensing visitors scored, depending upon condition, F (3, 147) = 14.07, $p < .0001$. As predicted, it was found that sensing visitors in the second experimental condition scored significantly higher (M = 7.62) than sensing visitors in the control (M = 5.66), t (79) = 5.14, $p < .001$, baseline (M = 6.0), t (64) = 3.88, $p < .001$, and first experimental conditions (M = 5.16), t (70) = 6.15, $p < .001$. There were no differences between the sensing visitors' scores in the baseline (M = 6.0) and control conditions (M = 5.66), t (77) = 0.88, $p > .05$ or baseline (M = 6.0) and first experimental conditions (M = 5.16), t (68) = 2.07, $p > .05$. Finally, there

were no differences between sensing visitors' scores in the control (M = 5.66) and first experimental conditions (M = 5.16), t (83) = 1.36, $p > .05$.

These analyses were also computed to determine if intuitive visitors' scores varied according to condition. It was anticipated that intuitive visitors' scores would increase over baseline levels when intuitive labels were added in the first experimental condition, and would be similar to or less than intuitive visitors' scores in the baseline and control conditions when sensing labels were added in the second experimental condition. It was found that there were differences in intuitives' scores across conditions, F (3, 245) = 58.77, $p < .0001$. Intuitives in the first experimental condition (M = 8.53) did score higher than intuitives in the baseline (M = 5.49), t (128) = 11.02, $p < .001$, control (M = 5.72), t (113) = 9.56, $p < .001$, and second experimental conditions (M = 5.30), t (126) = 11.59, $p < .001$. There were no differences, however, between intuitives' scores in the baseline (M = 5.49) and control conditions (M = 5.72), t (119) = 0.80, $p > .05$, baseline (M = 5.49) and second experimental conditions (M = 5.30), t (132) = 0.67, $p > .05$, or control (M = 5.72) and second experimental conditions (M = 5.30), t (117) = 1.43, $p > .05$.

Analyses were conducted to determine if differences in the amount of time subjects spent at each exhibit was related to condition (see Figure 2). It was found that there were differences in the amount of time sensing visitors spend dependent upon condition, F (2, 101) = 6.38, $p < .002$. Sensing visitors in the second experimental condition spent more time (M = 224.03 s) than sensing visitors in the first experimental condition (M = 127.32 s), t (70) = 3.47, $p < .001$. In addition, sensing visitors spent more time during the baseline condition (M = 194.34 s) than during the first experimental condition (M = 127.32 s), t (68) = 2.37, $p < .02$. There were, however, no differences in the amount of time sensing subjects spent in the baseline (M = 194.34 s) and second experimental conditions (M = 224.03 s), t (64) = 1.02, $p > .05$. An ANOVA showed that time spent by intuitive visitors did not vary according to condition, F (2, 193) = 2.32, $p > .05$.

Discussion

The results clearly show that there are individual differences in the ways museum visitors process information. Matching visitor learning style and exhibit presentation can result in increased learning. Intuitive learners performed better on the rain forest questionnaire when intuitive labels were in place than during baseline and control conditions, and sensing learners performed better on the questionnaire when sensing labels were in place. Both sensing and intuitive learners performed about the same in the baseline conditions as in the "unmatched" conditions (sensing learners viewing intuitive labels and intuitive learners viewing sensing labels).

An intriguing facet of this study was the amount of time visitors spent at the exhibits. Intuitive visitors spent more time during the first experimental condition than during baseline, but also spent more time during the second experimental condition (when sensing labels were implemented) than they did during baseline. The sensing labels seemed to *increase* the amount of time intuitive visitors spent at the exhibit.

On the other hand, while the sensing visitors spent more time when sensing labels were in place than they did during the baseline condition, they spent less time when intuitive labels were in place than they did during the baseline condition. Thus, it seems as though intuitive labels resulted in a *decrease* in the amount of time sensing visitors spent.

A "mismatch" between learning style and presentation of information seems to mean different things to sensing and intuitive learners. Intuitive learners spend more time at the exhibits when labels are added, regardless of the way information is presented, yet sensing visitors only seem to spend time and actively pursue information when the presentation is matched to their learning style.

Perhaps the addition of several sensing or intuitive labels heightened the effect of the labels. Visitors may be even more likely to attend to and process information efficiently with matched labels. The fact that intuitive visitors scored higher with mismatched labels may be due to the fact that they prefer reading, and the additional labels gave them more to read. At the same time, sensing learners prefer activity or interaction to reading, and the addition of several intuitive labels (which require more reading than the sensing labels) may have discouraged them from reading at all.

It is possible that the addition of the sensing and intuitive labels in this study did not change the exhibits to sensing or intuitive exhibits *per se*. Perhaps the labels just "cued" the visitors to pay attention to the exhibits, and this helped them to answer more questions correctly on the questionnaire. This does not account, however, for the differences between sensing and intuitive visitors when the different types of labels were in place. Intuitive visitors performed better with intuitive labels and sensing visitors performed better with sensing labels. The addition of the labels alone does not account for these differences, because, for example, sensing visitors would have performed better with both sensing and intuitive labels, rather than only when the sensing labels were implemented. If the labels were just cueing visitors, then a general increase in time spent and questionnaire score would have been observed, and there would not be differences between sensing and intuitive visitors when the sensing and intuitive labels were in place.

The questionnaire used in this study could have created some bias. By its very nature, the questionnaire is an intuitive measure. It requires the manipulation of written symbols (words), and involves problem-solving. Such an instrument is a disadvantage to sensing learners (Myers, 1974). Also, the questionnaire was designed to test knowledge of facts gleaned from

the exhibit. The researchers, who are both intuitive learners, may have attended to those facts for which they had a preference, possibly biasing the questionnaire against sensing individuals. Furthermore, this same bias may have entered in during the construction of the labels. The intuitive labels may have been of superior quality due to the experimenters' preferences. The experimenters' sensing labels may not have contained features which sensing learners found intriguing. It should be noted, however, that sensing learners did out perform their intuitive counterparts during the second experimental condition (where the sensing labels were implemented). Thus, the labels must have been at least marginally appealing to the sensing visitors.

Further explanation of the results could be due to the fact that the rain forest questionnaire is an inherently intuitive measure. Intuitives have a natural interest in the meanings of words, symbols, communication, and reading. Sensing learners are more interested in the "real thing" than in words or symbols describing reality. As might be expected, intuitive learners earned the highest scores when the intuitive labels were in place, but their scores were also higher when the sensing labels were in place than during baseline conditions, when no labels were added. Sensing learners achieved their highest scores when the sensing labels were in place, but when the intuitive labels were in place, their scores dropped to levels below those earned during baseline conditions. In addition, while the sensing visitors' scores were highest when the sensing labels were in place, their scores were not as high as the intuitive visitors' scores when the intuitive labels were in place. This is probably also due to the intuitives' natural inclination for reading.

Future research could concentrate on changing other aspects of an exhibit. For instance, adding "real" things to an exhibit to see if these make it more appealing to sensing visitors. Which groups will learn best when given a principle or rule, followed by many examples or variations in applying it? By definition, the intuitive visitors have a natural interest in the "big picture" and have only a passing interest in details or facts. They get bored with the obvious, and would be expected to learn best when given a problem with the task of discovering the solution.

A purely sensing or intuitive exhibit, however, may not be the best approach to take when planning a new exhibit. By creating an exhibit that only appeals to one type or the other, you run the risk of alienating a portion of your museum audience. A better approach may be to incorporate both sensing and intuitive components in all exhibits. Exhibits that contain a variety of approaches to learning that appeal to visitors with different learning styles will enable them to obtain the same information and may provide a more efficient teaching-learning environment for different visitors.

Future research must also assess the utility of the MBTI in learning style assessment in informal settings. Although widely used in formal

educational settings, the MBTI is only one of several assessment devices which are available to researchers. In the present study, the MBTI was able to differentiate visitors on the basis of their mode of perceiving information (sensing vs. intuition). Other devices may have identified other psychological dimensions which distinguish one visitor from another. The dichotomous categorization used in the present study may have been overly simplistic. Perhaps other assessment devices would allow for greater stratification, making it possible to identify more than just two "types" of visitors. It is recommended that other learning style assessment devices be studied in order to allow for comparisons with the MBTI.

One implication regarding the MBTI is that an individual's preferred mode of perceiving information does indeed account for some of the variation between visitors. In the future, however, research should focus on identifying the crucial behavioral differences between sensing and intuitive visitors. Results of such studies would probably confirm the differences which have been observed between sensing and intuitive learners in formal educational settings. Greater attention to behavioral tendencies of visitors rather than questionnaire scores may allow for distinctions to be drawn. A logical step to take would be the development of behavioral taxonomies for sensing and intuitive visitors.

Additional research is also called for regarding the matching of learning style to exhibits' educational components. The present study used modified exhibits to approximate visitors' preferences. If matching exhibits' educational features to visitors' preferences were the focus of the design process from the inception of the exhibit, then subsequent modification would not be necessary.

The present study suggests that a model matching the museum visitor with an exhibit's teaching components is the best way to ensure that a visitor will learn. Similar models have been proposed in the formal learning setting (e.g., Butler, 1984; MacNeil, 1980; Tallmadge & Shearer, 1969), and the results obtained in the current study suggest that this kind of a model would also be appropriate for the informal learning setting. It is clear that something must be done to improve the learning capabilities of the museum environment. This model may provide the direction necessary for museums to help their visitors learn everything possible from exhibits.

In summary, the results of the present study indicate that matching visitors' learning styles with the informational qualities of exhibits has a positive impact on learning. Learning style assessment of visitors can be a worthwhile undertaking. Through learning style assessment the heterogeneous nature of museum audiences may become more manageable, as visitors come to be defined in terms of their learning preferences. Categorization of learners, along with exhibit classification, may allow for greater structure to be brought into the design of effective educational components in informal learning settings.

If we intend to take advantage of the powerful educational opportunities available in the museum environment, then something must be done to improve visitor learning. Identifying different visitor learning styles is an important first step toward taking advantage of these educational opportunities. The next step is to design museum exhibits to "match" the learning style of visitors. By doing this, the full educational capacities of the museum can surely be realized.

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Figure 1

Percent of Correct Responses on Questionnaire for Sensing and Intuitive Visitors in Each Condition

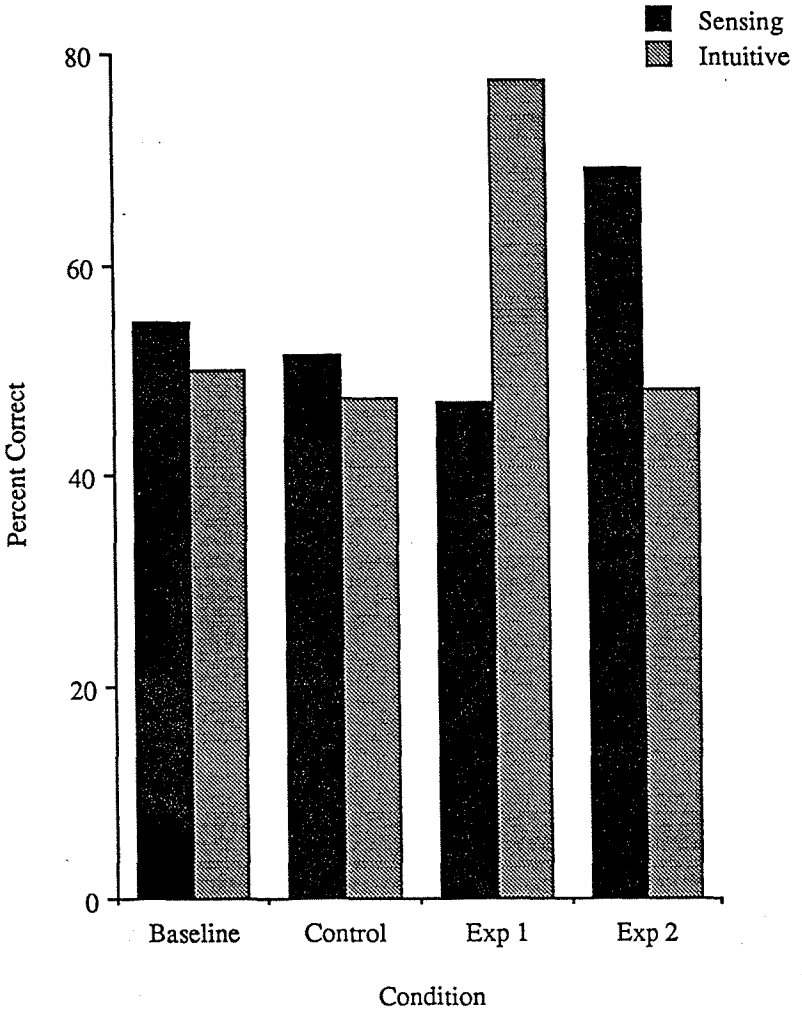

Figure 2

Average Time Spent by Sensing and Intuitive Visitors in Each Condition