Editor's Note:

As your new editor for the *Journal of Interpretation Research*, I wish begin my term by expressing gratitude to a couple of people who have been involved in the production of JIR. First and foremost, I wish to thank Professor Ted Cable for editing JIR for the past four years. As the first editor of this publication, Professor Cable produced several memorable issues and established a high standard of quality for scholarly work being published in the area of heritage interpretation. We are greatly indebted to his dedicated service. Additionally, Dr. Marcella Wells of Colorado State University is the guest editor of this special issue of the *Journal of Interpretation Research*. Dr. Wells has put together an excellent issue focusing on visitor studies. This special issue of JIR is a part of our continued efforts to focus on specific topical areas of interpretation research.

The purpose of JIR is to promote scientific inquiry and experimentation, as well as to foster scholarly commentary about heritage interpretation. Interpretation is a broad and eclectic area of study. Articles published in JIR attempt to capture and highlight for publication the prominent theoretical, empirical, and practical advances in interpretation. With the assistance of a dedicated and talented group of Associate Editors, we will devote ourselves to producing the highest quality peer-reviewed journal.

For more information, please see our new website: [www.journalofinterpretationresearch.com](http://www.journalofinterpretationresearch.com).

Respectfully,

Cem Basman

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INTRODUCTION

A Note from the Guest Editor

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In 1996, the 9th annual Visitor Studies Association Conference was held in Colorado. The program steering committee for this conference included a psychologist (Ross Loomis), a museum evaluator (Margie Marino), and an interpretive specialist (myself). One of the goals of this conference was to stimulate a richer dialogue between visitor studies professionals and natural resource interpreters. Whereas this connection may seem an obvious one, there is still little historic precedent for collaboration in research between these two disciplines.

The Visitor Studies Association (VSA) was founded in 1987 to promote the understanding of visitors as a tool for enhancing the visitor experience in informal learning environments such as museums, historic sites, nature centers, parks, science centers, zoos, art galleries, and similar settings. Managers of these settings recognized a need to better understand their customers, that is:

- What do visitors know, need, and desire in informal learning experiences?
- How do visitors interact with interpretation and communications media they encounter in informal learning situations?
- Are visitors interacting with exhibits or interpretive media in ways intended by the educators, designers, fabricators, interpreters, and resource managers?
- What meanings do visitors make of their encounters with interpretive media and exhibits?
- What do visitors take with them following an interpretive/informal learning encounter?
- How effective are specific approaches and media for improving awareness, increasing knowledge or understanding, eliminating misperceptions, changing attitudes or behaviors, and so forth?

Researchers who conduct visitor studies traditionally are grounded in the psychology and museum science literature. Natural resource interpreters and researchers are typically grounded in education and/or social psychology literature. Although there have always been interpreters and educators in most museum settings, there have been far fewer researchers in interpretation, and there is still little cross-pollination of ideas between the two disciplines. As Lois Silverman so aptly put it in her recent JIR review of Contemporary Issues in Heritage and Environmental Interpretation by Uzzell and Ballantyne, “The omission of important and relevant
evaluation references such as Marilyn Hood, Stephen Bitgood, Ross Loomis, and Minda Bourn may be a disappointment for some visitor studies professionals."

There are numerous other instances where the conspicuous lack of visitor studies is evident in the interpretation literature. Thus, the purpose of this special edition of JIR is to again stimulate the cross-pollination of visitor studies and interpretation.

In the article “Situated Cognition: Implications for Visitor Studies,” Mary Lou Koran, Patricia Willems, and Betty Camp present an idea conceived by John Koran before his death in 1998. Situated cognition is the idea that learning is situated in specific physical and social contexts. The authors present related literature on the topic and discuss how situated cognition applies to museums and informal learning. They then review recent research related to this topic and discuss some implications of this work for visitor studies.

In “The Nature, Role, and Measurement of Affect,” Robert Webb reviews the history of affect research and describes a number of sources of affect. This article compares these sources of affect to cognitive effects in mental processing. He concludes the paper with a brief discussion about the measurement of affect and its application to visitor studies.

In the article “The Role of Attention in Designing Effective Interpretive Labels,” Steve Bitgood presents a conceptual framework on visitor attention and the design of interpretive labels. He reviews three of the characteristics that influence visitor attention to interpretive labels: (a) selectivity, (b) focusing power, and (c) limited capacity of attention. In an effort to improve the effectiveness of labels, Bitgood presents practical suggestions for maximizing visitor attention.

In “Photographs as a Research Tool in Visitor Studies,” Betty Camp, John Koran, and Mary Lou Koran review the literature related to using photographs as a research tool. They discuss photography used by researchers to assess behaviors, photography used to assess learning, and photographs used as an evaluation tool. They then review studies related to “Visitor Employed Photography.” Their conclusion discusses a specific research study conducted at the Florida Natural History Museum to determine whether different student characteristics influence student attention to and recording of (via photos) exhibit content.

In my research brief, I discuss a summative evaluation conducted at Golden Gate Canyon State Park. In this study, Colorado State Parks wanted to understand more about how visitors to a newly constructed visitor center were processing the exhibits. The use of visitor observation and self-administered surveys is discussed. The results of the study—including holding time, holding power, and visitor use data—are presented, and implications for this type of research are discussed briefly.

In the book review, Kirsten Ellenbogen of King’s College London reviews Beverly Serrell’s book Exhibit Labels: An Interpretive Approach. Her candid and substantive review will be useful for many who have used or are considering the use of this book for teaching, writing, and research.

Today more than ever, when the work of the resource manager is 90% visitor management and 10% resource management, understanding the effect of resource communication, education, and interpretation is critical. Visitor studies is a conglomeration of education, communications, social psychology, cognitive psychology,
and leisure studies research. Visitor studies should become part of the interpretive researcher’s toolbox, and all interpreters should broaden their networks and readings to include visitor studies literature and research. Our ability to conduct systematic and careful research regarding the visitor experience will only enhance our ability to serve as effective resource professionals.

—M.W.
JOHN KORAN, 1937–1998

The following paper is presented in memory of John J. Koran, whose ideas inspired the work.

Professor Koran received a Ph.D. in science education from Stanford University in California in 1968. He was an assistant professor of science education at the University of Texas at Austin (1968–1971) prior to becoming an associate professor at the University of Florida (1971–1974). In 1974 he became a professor of science education and curator of education at the Florida Museum of Natural History. He then became associate dean of the Graduate School and of International Studies in 1986, where he served until 1991. He returned to teaching and research as a professor of science education and curator of education at the Florida Museum of Natural History until his unexpected death in June 1998.

During his career, Professor Koran published over 70 refereed research studies and presented more than 100 papers at national and international meetings on topics such as concept formation, curiosity, aptitude treatment interaction, modeling, teacher training, and learning in informal settings. His research focused on learning in museums, zoos, aquaria, and other informal settings.

His wife and colleagues developed the following paper based on Professor Koran’s research interests just prior to his death.
SITUATED COGNITION:
IMPLICATIONS FOR VISITOR STUDIES

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Abstract:
The development of visitor studies can benefit from the growing bodies of research in cognitive and social science. Recent perspectives in learning assume that thinking and learning occur as individuals interact in specific contexts. This emphasis contrasts with traditional information-processing models that highlight the processing and movement of information through mental structures, deemphasizing the importance of context.

The situated perspective can inform us about the ways in which the organization of classrooms as well as informal learning environments—such as museums, zoos, parks, and nature centers—may affect opportunities for productive learning. This offers new opportunities for exploring situational effects in informal learning settings and incorporating them within a larger psychological context. This article discusses illustrative ongoing research and its implications for visitor studies in general.

Keywords:
Situated cognition, informal learning settings, visitor studies, qualitative methods, quantitative methods, mixed methods.

INTRODUCTION
In recent years, some cognitive psychologists have proposed that most thinking and learning is situated in the specific physical and social contexts in which they occur (Greeno, 1998; Cobb & Bowers, 1999; Ceci & Roazzi, 1994). This emphasis

Note: Accepted September 2000. This paper is dedicated to John J. Koran Jr., whose work inspired it.
contrasts with information-processing models that highlight the processing and movement of information through mental structures, downplaying the importance of specific contexts such as museums, zoos, and other informal settings. The significance of the situated cognition view is that knowledge and strategies in which cognitive resources are purposefully deployed are unlikely to transfer into new contexts, especially when they are very different from the ones in which the learning originally occurred.

A number of research examples support the situated cognition perspective. For example, DeLoache, Cassidy, and Brown (1985) devised a memory-for-location task in which very young children watched as a small toy was hidden. After a short delay, during which the child was encouraged to play with other toys, crayons, and paper, the child was asked to retrieve the original toy. A trial was scored correct if the child went to the toy without first searching elsewhere. Half of the children participated in this hide-and-seek task in their own homes, half in a laboratory playroom. More than three times as many target retrieval behaviors occurred in the lab as in the home. These findings were replicated in a second study using a within-subjects design to explore the effect of context.

If researchers had only studied strategy used for this task in the lab, they might have concluded that very young children are always planful and strategic in retaining information. Conversely, if they had only studied the behavior in the children’s own home, they might have concluded that very young children are nonstrategic. Clearly, neither conclusion would have been wholly accurate.

Another example of contextual effects was found in Ceci and Bronfenbrenner’s (1985) study of time monitoring in older children, in which they recruited children to bake cupcakes or to charge a motorcycle battery. While waiting for the cupcakes to bake or the battery to charge, they were invited to make unlimited use of a Pac Man video machine. A wall clock was available for time monitoring, and clock-checking behavior was recorded by the observer. Again, half of the children did the baking or charging in their own homes, half in the laboratory. A number of contextual effects emerged. Children did less overall clock checking in the home, but they did more strategic clock checking, watching the clock more frequently as the deadline approached. The children were more likely to use a complex, time-conserving strategy in the familiar environment of their home than in the unfamiliar environment of the lab. Again, conclusions about strategy usage would have been inaccurate if time monitoring had been studied in only the home or the laboratory.

Research has also shown that children who sell candy, gum, or other items on the street may readily use basic mathematical procedures when they calculate prices for various quantities of items or when they determine the amount of change they should give a particular customer. Yet these children may not transfer such procedures to classroom math lessons (Carraher, Carraher, & Schliemann, 1985; Schliemann & Carraher, 1993). Furthermore, Piagetian research has shown that children can often apply logical thinking skills, such as proportional reasoning or separation and control of variables, to situations with which they have had previous experience yet not be able to use them in less familiar contexts (Ceci & Roazzi, 1994; Siegler & Ellis, 1996).
Even within a school context, knowledge and skills do not necessarily transfer from one classroom setting to another (Bassok & Holyoak, 1993). In a study by Saljo and Wyndham (1993), students were asked to figure out how much postage they should put on an envelope that weighed a particular amount and were given a table of postage rates to enable them to determine the correct amount. When students were given this task in a social studies class, most of them simply used the postage table to find the correct answer. When students were given this same task in a math class, most of them tried to calculate the postage, sometimes carrying it out to several decimal places. In doing so, they were attempting to apply some of the complex mathematical operations that served them well in their daily math assignments—operations that were often counterproductive in this situation.

It should be noted that not all cognitive psychologists believe learning to be as situated as some of their colleagues maintain (Anderson, Reder, & Simon, 1996). They point out that people often do use what they have learned in school in nonschool contexts. For example, most individuals in our society engage in reading and simple mathematics—skills probably learned in school—in nonschool contexts almost every day. An additional criticism is that in its current form, situated learning theory is too vague to allow for accurate predictions of transfer (Anderson, Reder, & Simon, 1997). Despite such criticism, situated learning theory has numerous supporters who argue for clarifying these questions through research and for the study of learning and cognition in a variety of contexts, such as laboratories, homes, schools, museums, zoos, and outdoor parks or settings.

It is not that there is no continuity expected in the behavior of individuals from one setting to another but that such continuity is also accompanied by systematic differences. As Bronfenbrenner (1979) noted, this idea is not novel in everyday experience. We expect children to behave differently at school than at home. We expect adults to behave differently at work than at play. Yet we have not specified expected variations in learning or in strategy usage across settings, and we have not frequently designed studies to observe such variations. The study of situated cognition offers rich new opportunities for exploring contextual perspectives in informal settings and incorporating them within a larger psychological context.

**Educational Research in Museum Settings**

The recent thrust of museums has been to educate the public and conduct research formally and informally, but the focus often has been on attendance, visitor behavior, and time spent on particular exhibits and activities, areas often unpublished because they are used only for in-house evaluation or published only in museum-related literature. Only occasionally do results of research in museum settings get published in educational journals (Ramey-Gassert, Walberg, & Walberg, 1994). The frequency of articles on the importance of museum learning is perhaps unequal to the potential of museums for actually producing and improving learning.

A new type of research agenda utilizing qualitative and quantitative as well as mixed methods might answer interesting questions about learning in the context of a museum. Falk, Koran, and Dierking (1986), as well as Yalowitz and Wells (2000), point out that the uniqueness of the museum setting calls for new research questions and ways of collecting data. If setting effects are readily demonstrable for
children and adults engaged in a variety of tasks and employing a variety of skills and strategies, how might situated learning theory guide future research on learning in museums? There are at least two possible ways.

One way that situated learning theory might guide future museum research is for museums and other informal settings to be treated as specific settings that must be observed and described richly. They need also be differentiated from other specific settings, such as classrooms and laboratories. Bronfenbrenner (1979) urged this some time ago. He cautioned that each setting is a situation that derives its meaning from other settings in the participants’ lives. He further argued that although it is entirely valid scientifically to place a falling object in a physical vacuum to study its behavioral laws under optimally controlled conditions, it is not valid to assume one can place a person into the same sort of vacuum.

Thus, the problem becomes how to describe museums and other informal settings as unique contexts. One such descriptive scheme was proposed by Koran and Koran (1986, 1990) in which characteristics of the museum as an informal learning setting are contrasted with characteristics of the classroom as a formal learning setting (Table 1). Schools and museums are commonly categorized as formal and informal learning settings, respectively (Ramey-Gassert, Walberg, & Walberg, 1994). Other similar distinctions between formal and informal environments have been proposed by Ramey-Gassert et al. as well as by Resnick (1987).

The intent of Table 1 is to suggest some variables and starting points for describing museum settings and differentiating them from other kinds of settings. It is intended to be heuristic rather than exhaustive. Although the classification schemes presented attempt to differentiate informal learning settings from formal learning settings, it should be noted that different types of informal settings may differ from each other as well as from formal learning settings along many of these dimensions. For example, museums may differ from zoos, science centers, nature centers, parks, and so forth, and even different kinds of museums—such as children’s museums, natural history museums, and science museums—may differ from each other.

Given a rich description of settings, the second way in which situated learning theory may guide research on learning in informal settings is in prompting hypotheses about continuity and variation across multiple settings. In other words, under what conditions would we expect learning to transfer across settings, and under what conditions would we expect it to be context-bound? This suggestion assumes that studies would be designed either with between-subjects designs, where children would be randomly assigned to different settings, or with within-subject designs, where each learner would be observed in each setting with the order of the settings counterbalanced across subjects. Single-setting studies, such as we often see in research on informal settings, would not be the norm (Garner, 1990).

An attempt to generate such hypotheses is provided in the work of Koran, Longino, and Shafer (1983), who proposed a taxonomy of different kinds of exhibits in museum settings and focused attention on factors to be considered when studying learning in different types of exhibits (Figure 1). This figure attempts to locate various types of exhibits along a continuum of learner involvement and activity, comparing and contrasting them with classroom situations. For example, static case exhibits are seen as more closely resembling classroom texts and worksheets,
Table 1. A comparison of formal and informal learning settings

<table>
<thead>
<tr>
<th>Formal</th>
<th>Informal</th>
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<tbody>
<tr>
<td>1. Takes place in the classroom</td>
<td>Takes place in museums, zoos, aquaria, businesses, and the “field”</td>
</tr>
<tr>
<td>2. Learning conditions are prescribed</td>
<td>Learning is through free choice</td>
</tr>
<tr>
<td>3. Motivation is extrinsic</td>
<td>Motivation is internal</td>
</tr>
<tr>
<td>4. The content is prescribed</td>
<td>Content is variable and changing</td>
</tr>
<tr>
<td>5. Content is organized and sequenced</td>
<td>Content frequently is not organized or sequential</td>
</tr>
<tr>
<td>6. Attendance is mandatory</td>
<td>Attendance is voluntary</td>
</tr>
<tr>
<td>7. Time is standardized</td>
<td>Each learner decides on how much time is spent</td>
</tr>
<tr>
<td>8. All students experience all content</td>
<td>Many kinds of objects, displays, and content are experienced</td>
</tr>
<tr>
<td>9. Learners are of similar ages</td>
<td>Learners are of all ages</td>
</tr>
<tr>
<td>10. Learners have similar backgrounds</td>
<td>Learners have diverse backgrounds</td>
</tr>
<tr>
<td>11. Communications and language are</td>
<td>Communications and language are more than likely casual and diverse</td>
</tr>
<tr>
<td>generally formal and constrained</td>
<td></td>
</tr>
</tbody>
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Adapted from Koran, Longino, and Shafer (1983).

Static setting  Dynamic setting

Informal education example:
Exhibit cases containing objects  Walk-through or immersion exhibits  Hands-on or interactive exhibits

Formal education example:
Classroom setting  Field trips  Lab experiments  Experiential lessons
Lectures
Textbooks
Worksheets

Figure 1. Differentiating settings in museums, science centers, and classrooms. Adapted from Koran, Longino, and Shafer (1983).
whereas hands-on or interactive exhibits are seen as more analogous to laboratory experiences. It should be noted that there could, in fact, be some overlap in these dimensions, depending on the design and intent of the exhibit as well as age and other characteristics among observers. However, taxonomies such as these may be developed and used among researchers, trainers, and disseminators to generate hypotheses regarding the effects of a variety of contexts on cognition and learning.

If these suggestions are implemented, what kinds of research questions about learning and cognition might subsequently be grounded in situated learning theory? Again, a nonexhaustive list of possible questions is provided:

1. How does learning and strategy usage vary from home, to school, to informal learning settings?
2. How does learning and strategy usage differ between different kinds of informal settings, such as museums, zoos, aquaria, science centers, and nature centers?
3. How does learning and strategy usage differ within different kinds of informal settings, such as different kinds of museums (e.g., children’s museums, science museums, natural history museums) or exhibits?
4. Are there developmental differences in proficiency at adjusting learning and strategy usage to meet the demands of different settings?
5. Does amount and kind of learning and strategy usage vary according to whether learners themselves select the goal to be achieved rather than someone else selecting it for them (a common difference between formal and informal settings)?
6. Does social interaction in the acquisition of knowledge and strategies affect their subsequent use (a common difference between formal and informal settings)?

**Research in Progress**

Recent ongoing research at the University of Florida is addressing various aspects of situated cognition in informal learning settings. A master’s thesis by Bergeron (2000) explores how the question of context raises important concerns regarding the effect of settings on information processing for special populations, in this case children classified as having Attention Deficit Hyperactivity Disorder (ADHD). Most research on ADHD children has been conducted in laboratories or classroom settings. This research has shown that ADHD children display inappropriate degrees of inattention that are believed to be chronic for most children with this disorder. However, the American Psychiatric Association states that signs of the disorder may be minimal or even absent in certain settings (Yelich & Salamone, 1994). There is extreme variability in the display of these behaviors across settings, with some children manifesting the disorder only in specific settings, for example, those which usually include contexts requiring sustained attention, such as classrooms. In some informal settings, however, ADHD children seem to maintain attention longer than laboratory reports suggest.

The purpose of the current study is to determine how the deployment of attention in a museum context may differ from the results obtained in laboratory and school settings. Results of this study may potentially contribute to a reconceptualization of the disorder in terms of a theory of context as well as discovering elements in these contexts affecting attention and learning in general.
A doctoral dissertation by Carlin (1999) explored the role of epistemic curiosity in learning during a school field trip to a zoo. Although curiosity has frequently been explored in museum contexts, there has been no equivalent research assessing any type of curiosity at a zoo. In fact, most studies done in informal settings have been conducted in museums. Research on learning in zoos and other informal settings is extremely sparse. An understanding of learning in informal settings will be of limited scope if the majority of research is conducted only in museums. The differences in museum and zoo settings may elicit different behaviors, thereby affecting if and what visitors learn in these different settings. This further suggests the need for more research on learning outcomes in a zoo setting as well as other types of informal settings.

Unlike much museum research (Koran & Koran, 1984), Carlin (1999) found that curiosity did not increase significantly as a result of the visit to the zoo, primarily because entry-level curiosity regarding the zoo was so high initially that it imposed a ceiling effect on measured curiosity. An additional finding of interest was that while the field trip to the zoo did not produce an overall quantitative gain in knowledge, qualitative analyses using an instrument adapted from Falk, Moussouri and Coulson (1998) showed a reorganization of knowledge in which, following the field trip, participants identified more animals displayed at that zoo than they had before. Moreover, more animals were identified by genus and species following the field trip than before. This type of qualitative analysis should be pursued in other informal learning settings to determine the potential effects of settings on the organization of knowledge. These findings mark the beginning of our efforts to explore situated cognition in informal settings and suggest the need for further research in this area.

**Conclusion**

All learning occurs in some setting or situation. The question is the nature and extent of their situated character. How tightly learning will be bound to context depends on the kind of knowledge being taught and on the way the material is studied. How much transfer there is depends on the degree to which the tasks and settings share common elements.

The principle of situated cognition supports encouraging the use of knowledge and strategies in a variety of settings. If we want our students to use the things they learn in school in real-world situations, we should teach subject matter and skills within the context of such situations. Many informal settings have the potential to arouse interest, motivate learning, and allow students to build connected knowledge through meaningful experiences. They also provide rich opportunities to study learning in a variety of settings. This offers museums and other informal settings new opportunities to become unique partners with schools and universities in advancing our understanding of learning.

**References**


THE NATURE, ROLE, AND MEASUREMENT OF AFFECT

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Abstract:
To define the appeal of museums, historic sites, and other informal learning settings, one must understand the feeling component of the experience, not just the informational one. This article seeks to clarify the nature of this affective factor, especially as it can be distinguished from the larger term emotion. The origin of affect in personal relevance and its more specific sources in identification, human interest, and stimulus characteristics are discussed. The role that affect plays in directing attention, aiding memory, and allowing decision making are explored relative to its use in exhibits and displays. Finally, a simple method of measurement is introduced to encourage its assessment for improvement of informal learning and its use in research.

Keywords:
Affect, emotion, relevance, identification, human interest, informal learning, attention.

INTRODUCTION
It has long been clear that the appeal of museums, historic sites, nature centers, and other informal learning settings is not solely in the information they provide. After all, the same information is available in videos, documentaries, and libraries. However, the nature of the added attraction known as affect has remained somewhat murky. What is this quality that is powerful enough to bring people to these places in growing numbers? The answer lies in a distinction that has developed over the last few decades between the mental functions of cognition, emotion, and affect. This paper reviews some of that research from the fields of psychology and consumer behavior, summarizes where it comes from and what it can do, and supplies a method that can be used to measure it so that it may be better utilized.

HISTORICAL BACKGROUND
We have for many years liked to consider ourselves reasonable and even logical creatures. We take pride in regarding the human capacity to reason as the quality that lifts us above the other animals. This propensity is revealed in the advertising approach of a hundred years ago. At that time, products were sold primarily by
expounding on the merits of the product. That is, machines were extolled as able to
do the job better than the competition, and clothes were praised as able to last
longer. As the technology of illustration grew, there was a corresponding increase
in their use in advertising and a growing awareness that the pictures were powerful
assets. Eventually pictures came to dominate ads, particularly when color printing
appeared, and the written copy not only diminished in size but also altered in
function.

Today we see ads that are simply a single-page-sized picture, sometimes not
even relevant to the product, with the brand name perhaps in one corner. Copy, if
there is any, tends to call attention to style or how you will feel when using the
product. Today we are aware that advertising is often selling image rather than
merits of the product or service.

Although advertising has been evolving in this way, there has been much effort
within the field of psychology to understand just what is going on. It was not until
the waning of strict behaviorism that there was a general recognition of the split
between cognition and emotion. It was the advent of the computer in the late
1940s and early 1950s that set off a revolution in our thinking about cognition.
Until that time, thinking was considered pure magic. It seemed to go on in the
head, but no one had the least glimmer as to how it worked. Indeed, most believed
it would never be understood and that its study was beyond the reach of science.

The computer changed this thinking because here at last was a physical ma-
chine that was doing something that looked a lot like thinking. We used to argue at
length about whether the computer’s early computations were really a form of
thinking or whether it was simply mechanical. As computers became faster and
more powerful, we no longer argued the point but, rather, set about using the
computer model to investigate our thought processes. Thus, the field of cognition
was launched.

The element of emotion, however, was left behind. Computers don’t show that.
There is no evidence that computers have ever felt anything, let alone the rich
variety of feelings that humans experience. Parenthetically, how would we ever
know if they did? Indeed, how can I know that another person feels? I can know
this only because the person tells me so, and because I myself have felt, I tend to
believe other humans do as well. But this is another topic. Without going into the
long history of research on emotion, suffice it to say that the analyses had not been
of much use to marketers seeking guidance on why customers preferred one prod-
uct over another, nor to exhibitors wondering why one display was effective and
another was not.

Zajonc’s Finding
In 1969, an important study was done by Robert Zajonc (pronounced like science),
but the implications were so surprising that many rejected the findings as necessar-
ily flawed in some way (see Zajonc, 1980, 1984; and Zajonc & Marcus, 1982). It
took some fifteen years of replications and discussion before the evidence was
accepted. When it was, it changed the way we look at emotion.

What Zajonc did was to flash familiar words on a screen at very short exposure
times. Participants were unable to report when the flashes had occurred, let alone
what the words were. They were asked to guess the affect in the words, that is, whether they were “good” words or “bad.” For example, pleasure might be a good word, whereas anger would be bad. The amazing finding was that study participants could report this dimension with better than chance accuracy—with material they were not aware of having seen. The result turned traditional emotion theory on its head. For instance, common sense said that you had to be able to tell me you saw a cat before you could tell me how you felt about it, but here was evidence that this understanding was wrong. In other words, a person starts feeling about a cat before even knowing it is present. The time referred to here in the word before is measured in milliseconds, or thousandths of a second, but the time relationship is apparently correct. No wonder researchers were skeptical.

As the results held up, explanations were needed, and this part has taken a couple of decades to shake out. For instance, neurological researcher Joseph LeDoux reasoned that if such a result was possible, the nervous system must have a connection from the thalamus directly to the amygdala, a connection that had not been previously reported. He set about to find it and in 1992 reported that indeed there was such a connection (LeDoux, 1992). The amygdala is the main site of emotional arousal, and this connection would allow incoming stimulation to trigger an emotional response at the same time that the signal was going on up to the cortex, where it would produce awareness. The presence of these parallel tracks seems to be why the phenomenon occurs.

Zajonc’s finding set off a surge of interest in the emotional system. One of the ideas that came out of this research was a clearer understanding of what affect was. For example, Richard Lazarus engaged Zajonc in a long-running argument over whether emotion was part of cognition. As the papers flew back and forth, it became clear that they were not talking about the same thing. Zajonc was talking about the good-bad dimension within emotions, a dimension that every study of emotion ever done had shown was a component part, but Lazarus was talking about whole emotions, a level in which understanding and arousal are added to the basic good-bad dimension. Specifically, Zajonc was interested in preferences, whereas Lazarus was concerned with emotions. To make a long story short, affect became the name for the level of preferences, a neurologically more primitive level, whereas emotion was used to refer to the more complex cortical level. In other words, when you feel a preference for vanilla over strawberry, it is clearly a feeling, but you can hardly be said to be emotional about it. (Chocolate, of course, might be a different matter.) The fact that a preference is a feeling argues against it being simply cognitive in the usual sense. At the same time, there is almost no arousal, and it has no involvement of another person, a component that emotion often has.

Affect seems to work in this way. When we encounter an unknown object or situation for the first time, we appraise it, that is, we find out whether it is good or bad. In the case of ice cream, we taste it. We like the taste, and we tag the concept of ice cream with an affective tag that reads “very good.” The next time we encounter that object, we do not have to go through this process of appraisal. We instantly know from its label that it is “very good.” The theory states we are similarly tagging everything we experience. These tags must be stored at a very low level in the brain because they are so readily accessed. On the other hand, they
seem to be stored separate from other meanings. For instance, if you prick your finger with a rose thorn, you not only register that an event has happened but also become aware that an important event has happened because it hurts. You will be wary of roses in the future. This quality of hurt signaling importance, or arousing enough emotion, is what we are calling affect.

What this process means is that there is an affective meaning to things that has not been properly understood. We have been looking for an emotional reaction and don’t always see one because, of course, affect can be very low level. Nearly everything has an affective tag. The neuropsychologist Damasio calls them somatic-markers (Damasio, 1994). We can feel about things without being at all emotional in the usual sense. A whole layer of feeling exists that we had not seen clearly.

Of course, affect does not always come first. When a person sees a complex picture or exhibit, for example, it may take some time to figure out just what is there. Even if the individual parts are familiar, they may be confusing when grouped together in a new way. If no particular figure emerges from the background, then the brain system that is looking for matches to past experience will not be able to function as rapidly. When a figure does emerge, it will trigger its affective component immediately. (For more on the nature of affect, see Webb, 1999, Chapter 6.)

**Sources of Affect**

**Personal Relevance**

The general source of affect is personal relevance. It in fact seems to be the way that the organism has developed to record and remember exactly that quality, because it clearly has tremendous survival value. All creatures down to the level of flatworms and below have to be able to approach food and avoid predators, and they need to have some way of quickly remembering which category things are in, or they will not survive. Still, having determined that personal relevance is the required element, it may be difficult to specify all of the things that fit this category for each person we meet. What may be of importance to one person may have no interest to another. Moreover, because we all tend to see ourselves as close to the norm, though our personal experiences may vary widely, it is not always possible to evaluate the affective content of an object or situation that others see. The visitor studies field came into being in large part because this is so. Experience has shown that there is no substitute for empirical testing. Few exhibits are opened with the expectation that the material will not be noticed or understood, and yet frequently, on testing, exhibits turn out to have unanticipated outcomes.

Some things are relevant to most people (such as cool air, good food, and friends), and other things are relevant only to small groups (such as Red Sox logos, nail polish colors, and John Deere tractors) or even to a single person (such as my grandfather’s watch). Mass marketers and anyone seeking to reach the widest audience possible must focus on those affective elements that appeal (are relevant to) the largest number of people. For example, the modern “blockbuster” museum exhibit has just such wide appeal. On the other hand, appeal to the interests of smaller groups may require mounting special exhibits. As marketers in general are finding out, it is important not just to count heads but also to identify who the
visitors really are. While smaller exhibits each draw fewer visitors, combined with other similar special-interest shows, they may ultimately tap as large a pool as the mass approach. Appeal to the individual is now becoming possible on the Internet, where our responses are tabulated as the sites collect information about who their visitors are. Interactives in the museum setting also provide a way to tailor presentations to the viewer. All of these methods are attempts to maximize personal relevance.

Involvement
A number of terms have been used to refer to the quality of personal relevance, and their meanings overlap considerably. Involvement has been used in the consumer literature to refer to the state that results from perception of relevance. The term probably began with Sherif and Hovland (1961), but Krugman introduced the term to the consumer literature (1965). He specifically says he does not mean attention, interest, or excitement but, rather, the number of “bridging experiences,” connections, or personal references per minute that the viewer makes between his or her own life and the stimulus. The term has come to mean essentially the looking for information and attention that occurs because of the perception of personal relevance (see Webb, 1993).

Petty, Cacioppo, and Schumann (1983) were among the first to study viewers in the two conditions of high and low involvement. They referred to two routes for the processing of information, one essentially cognitive in which one is looking for information (the central route), and the second in which one is simply drifting and waiting for something to come along with some affect content (the peripheral route). The central route indicates high involvement, whereas the peripheral route results from low involvement. All of us have been in each of these states at one time or another. Both types are likely to be among the visitors to a museum or historic site, but they must be dealt with differently. The “high-involved” respond to specific information, whereas the “low-involved” respond best to affect. (For more on the differences between low-involved and high-involved viewers, see Webb, 1997.)

Identification
Identification began with Freud and meant the incorporation within ourselves of the behaviors, thoughts, and feelings of others. It has come to mean, more generally, the process of perceiving qualities of others as representative of oneself. Hence, we feel closest to and more personal relevance to those whose image we perceive as close to our own. For example, small children are particularly attracted to images of children their own age. Thus, Nelson (1986) found that children are more likely to learn when the model is a child than when the model is an adult. These increases in attention and learning in children indicate identification at work.

As more has become known about affect, it has become clear that the motivating element in both involvement and identification is affect. In other words, the stimulus triggers affect, and we become more involved. Both terms describe situations that produce high positive affect, and they are quite similar. There is an extensive literature on both. The common element in both is that they refer to being able to put yourself into the picture.
Vividness
Nisbett and Ross (1980) proposed a term that includes the element of personal relevance, or being able to picture something happening to ourselves. They called it vividness. They saw it as being produced by three factors, but all three are aspects of personal relevance. The first they called emotional interest, a term that seems to reflect the intensity dimension of personal relevance. For example, a plane crash is inherently more vivid than a normal flight. When we put ourselves in more intense pictures, an affective, or even emotional, response takes place. (For all three factors, the examples are provided by Fiske & Taylor, 1991.) The second element they identified as imagery-provocation, or the ability to get us to picture it. For example, a detailed description of a particular accident is more vivid than the statistics about it. This quality reflects our own storehouse of pictures from our personal history. The better the match, the more vivid a picture will be. The third element, proximity, is whether the object or event is close in a sensory, temporal, or spatial way. For example, an accident in your local airport is more vivid than an accident elsewhere. This element too echoes personal relevance as it reflects the degree to which something “comes close to home.” In other words, their evidence supports the idea that increased affect will result from techniques that help us put ourselves in the picture.

Human Interest
Another term for much the same thing is human interest. The term has been popular in the journalism field, but it has always been hard to verbalize just what constitutes it. Stories that allow us to relate to the human beings in them certainly contain human interest. We tend to empathize with others in the various plights of life, perhaps because we can picture ourselves in that situation and vicariously feel the pain, grief, or happiness. The closer their condition is to our own, the more intense the affect aroused. The bottom line here is that exhibits that show and are about people will be better attended and more involving than others will. Women especially will want to view exhibits about people. Men are sometimes more attracted to machines and action than women are, but human interest tends to cross genders. The same interest differences that we find in men and women some studies have found in children, sometimes as early as age 2.

The relationship of the identification process to historic sites and history museums is particularly important. The quality that all historical museums in general have is the power of the real artifact, and research is beginning to document that this power is based on affect. Artifacts have more affective pull by virtue of being three-dimensional, but more than that, real items trigger one’s imagination in a way that even pictures cannot. Add people to the artifacts, and the attraction is irresistible. For example, presentations of objects are made much more involving if they include photographs of similar objects actually being used perhaps a hundred years ago. That is, a hay rake is interesting, but seeing the very object in the hands of a 19th-century farmer allows us mentally to put ourselves into a scene. Reconstructed villages derive much of their appeal from their ability to take us “there.” One could predict that the more successful exhibits are in the illusion, the more powerful the affect will be. All museums of this type allow us more easily to put ourselves in the picture. When we do, we not only remember better but also have
a much deeper experience than we possibly could by simply reading the historical record. We will also become a much better salesperson for the exhibit to others.

Cognitive Effects
An important implication of our new understanding of affect is that we must accept that we often respond to things because of how we feel about them rather than because of what they are. What they are and how we feel are connected in the first appraisal process, of course, but once the tags are in place, they are less conscious and it becomes hard to change them because we may not realize they are there. Our feeling bias is put in place instantly and automatically on every encounter. This means that affective content is often directing our thinking and reacting. For example, when we rationalize, we are making up reasons why something must be the way we want it to be. Why do we bother to do this? We often seem to be trying to convince ourselves, not others. What we are doing here is trying to bring the affective level into consonance with the cognitive level. We are trying to find reasons for our feelings. But note that it is feelings that lead the way. We do not usually have as much success running the search the other way. That is, finding feelings to support our cognitions. We may know what we ought to feel but realize we don’t really feel that way. Take cigarette smokers, for example. They all know the reasons why they should not smoke, but they continue to do it because of the way it makes them feel or perhaps the way they feel if they don’t smoke. In short, we are much more affectively controlled than we like to admit.

Note that I am not saying that cognition is always driven by affect but that it often is. For instance, cognition seems to drive affect when we read about a tragedy and tears come to our eyes. Conversely, affect drives cognition when we see a picture of a bride and want to know more about her. We are more familiar with the cognition-affect direction because it fits nicely with our traditional view of humans as reasonable beings. The affect-cognition direction is less understood and less well accepted, perhaps because it suggests we are controlled by our lower, more animalistic natures.

Decision Making
Zajonc gives a good example of affect driving the decision-making process:

Phoebe Ellsworth once wrote me about a decision process in which she was engaged. She was at Yale University at that time and had received a very attractive offer from Stanford University. Being at Yale, she of course followed the Irving Janis (1982) procedure for decision making in which one takes a large sheet of paper and on the left side lists all the positive points and on the right side all the negative points. All of the points are then weighed very carefully. At the end of this process, the decision maker should know exactly what to do.

Phoebe wrote me that she and her husband tried to follow the procedure. They looked at the sheet for a long time and finally Phoebe exclaimed, “Oh hell, this is not working. I have to get some more pluses on the right side or else I will make the wrong decision.” In other words
there was an underlying prior predisposition that preempted what would be, in normative terms, a rational choice (Zajonc, 1986, pp. 2–3).

The “prior predisposition” Zajonc writes about is, of course, the affective element, whereas the listing of pluses and minuses is the cognitive component.

Some would say that all decision making is ultimately based on affect. In this year of a U.S. presidential election, it certainly does seem that how we feel about the candidates is equal in importance to their positions on issues. Advertising was quick to see the implications relative to product-choice decisions, and we began to see more and more of the all-picture-no-copy ads that today are commonplace. Pictures are powerful sources of affect because we process pictures rapidly. They make use of affective tags placed there previously. Thus, pictures of babies can be counted on to deliver a jolt of positive affect, which is then attached by subtle classical conditioning to the perhaps unfamiliar brand name. We come away liking the brand better though not conscious of the process that caused the shift.

Learning
The literature supports the finding that when things have higher affect, they are easier to retain (see Mitchell, 1979; Burnkrant & Sawyer, 1983). Greenwald and Leavitt (1984) spelled out the reason for the connection when they proposed that the personal relevance makes us stay with material longer and makes us “elaborate.” It is at this level of processing that connections to existing memories take place. We think about the new material, perhaps noticing that “this is the same as….” or “this explains why….” The more of these connections that are made, the better the retention will be. Indeed, retention is a function of our amount of elaboration and not whether one intends to learn. Intention may help, but only if it leads to more elaboration. This is why teachers are counseled to make their material relevant.

An important study by Celsi and Olson (1988) found that if advertising is personally relevant, it triggers a search for more information. (Advertising is amazingly similar to museum exhibit design in that in both cases there is a very brief moment to catch attention and deliver a message that one hopes will have a future impact.) Specifically they found four factors that influence how personal relevance aids retention:

- The amount and direction of their attention
- The cognitive and physical energy they expend during comprehension
- The focus of their attention and comprehension processes
- The depth and breadth of semantic elaboration during comprehension

(p. 223)

The same mechanism can be assumed to be working in an exhibit format. Remember that one’s brain reads personal relevance in its own affective response.

Memory
The reverse side of the learning coin is, of course, memory. While learning is the input, memory is the output. We assess learning only through memory. However, there are factors that affect retrieval of material that is clearly stored. That is to say,
both processes have their own principles and form overlapping disciplines in psychology. Perhaps the extreme case is that of “flashbulb” memories. Some memories are extremely easy to recall and remain so for years. The death of John F. Kennedy and the Challenger disaster are two common examples. The element that makes these stand out is twofold. First, they are unique. There have been no other events like them. These memories avoid a common problem that comes about when similar memories are stored together day after day. It is hard to remember distinctive elements, and they all blend together. The chronology of your days is of this type. Try to recall what you did 27 days ago, and you will see what is meant. The second feature that flashbulb memories have is that they are loaded with affect. They tend to be highly charged emotional events. The presence of affect tends to make material better remembered.

Getting Attention
Affect is heavily used by advertisers to get attention. This use follows the research demonstration of affect’s role in this process. Remember that traditionally students of cognition had come to understand attention as a cognitively controlled process. That is, we focus on material that supplies the information we need at any given time. Attention was thus seen as a directed information search. However, Zajonc’s finding added a second type of attention control. The evidence suggests that while we are absorbed in a cognitive task of some sort, perhaps reading a book, our lower level brain continues to monitor the world around us and will interrupt us if it finds any strongly affective tags. This type has been found to be especially important in the low-involved viewer who is not looking for anything in particular—the viewer who is likely to be found in museums, in fact.

One interesting area concerns the valence that unknown objects automatically have, because some studies indicate it will be mildly positive and others that it will be mildly negative (Cacioppo & Gardner, 1999). On the one hand, one could argue that survival is enhanced if we treat unknowns as potentially dangerous until we find out otherwise. On the other hand, much of our modern world has a high level of safety. Tags of unknowns are likely to vary with the level of perceived safety. Thus, they are likely to be mildly positive in relatively safe places such as public halls or museums, but unknowns would be registered as negative in a dangerous place such as a dark street at night. The distinction may be of some concern as in the case of small children, for whom most unfamiliar places are a bit scary.

The affective quality attached to unknowns is probably the source of the impact of novelty. Unusual stimuli tend to attract more attention than familiar stimuli. Novelty is, of course, a staple in advertising, appearing often as the process of going against the viewer’s expectations. For example, novelty is being used when surrounding an image with a lot of white space or when using no sound in the opening of a commercial. Novelty is ephemeral, however, and tends to wear off rather quickly. Thus, any device will lose its effectiveness if there is any amount of return traffic. Too much of it can also be a problem, causing information overload and a shutdown of cognition. Consistent with our earlier point of perceived safety, Koran and Koran (1983) caution that the whole museum experience may be so novel for children that it can overwhelm an individual exhibit.
Thus, it is primarily affect that directs us to sort among stimuli and focus on those of highest concern. It appears likely that a low-level processor detects the affective quality of previously encountered stimuli and interrupts the higher level, where we may be thinking about something else, to report that a strong affect has been detected. The higher level then breaks off and checks out the source of the affect, a process known as “getting our attention.” Thus, cognitions with strong affect will tend to get priority, absorb our attention, and dominate our thinking (Klinger, Barta, & Maxeiner, 1980).

Moreover, the stronger the affective cues, the quicker their associated stimuli will get our attention. Dangerous species in a zoo attract attention more strongly than nondangerous ones (Bitgood, Patterson, & Benefield, 1986). One’s name always gets a person’s attention because it has high affective value. One difficulty with strong attention-getters is that they may pull viewers away from the intended message. Babies and sexy women easily do this when they are used in advertising. Michelin tire company solved the problem cleverly when it located the baby right in the middle of the product. Similarly, the milk mustache that has become so well known is effective because it puts the product in the middle of the face of the celebrity attention-getter, so that in remembering the face one also remembers the product. The product in a museum or outdoor site is harder to specify, being both information and an affective experience, but it is a product nonetheless.

**Affect from Object Properties**

*Size*

Affect is apparently increased with the size of the perceived object. This is probably predictable, because larger predators are certainly more of a threat than small ones. Not surprisingly, attention-getting power also increases with increasing size, but with decreasing returns. For example, “In print media, attention increases...in proportion to the square root of the ad’s area. Thus to double its attention-attracting power, the size of the advertisement would have to be quadrupled” (Loudon & Della Bitta, 1984, p. 429). Whether this applies directly to exhibits is not clear. It would be a good project for research. Three-dimensional objects may present a different relationship between size and attention. One museum study by Bitgood, Patterson, and Benefield (1986) confirmed that in general the larger an exhibit, the greater its holding power, but the complete relationship was not measured.

Large size seems to increase not only attention getting but also memorability. This is doubtless why museums often have one big item to attract visitors. This might be a dinosaur, a railroad locomotive, or, in the case of the New Hampshire Historical Museum in Concord, a stagecoach. Such items are generally the thing remembered longest and most favorably by visitors. The large item will also likely be the thing people return to see again and will create a comfortable feeling of orientation and familiar space for returning visitors. The constancy of such an item would be particularly important when exhibits are changed often, to help the museum preserve its sense of continuity and identity.

Operating on the negative side, however, is the tendency for large, dramatic pieces to draw attention away from the rest of the exhibit unless properly placed.
The stagecoach in Concord was for a while right at the entrance, in front of you as you came in, out by itself with spotlighting. Its size created an excitement that set a tone for the visit and did not draw from anything else because it was by itself. Later it was moved to an upstairs room where it was crowded by the walls, competing with other exhibits, poorly lighted, and visible only from one side. It lost much of its magic. In its place back at the entrance hall was antique furniture, which, to put it mildly, did not generate the same excitement. In fact, the tone set was probably just the opposite. The coach was eventually returned to its featured place. One comment, however, is that the rest of the exhibits sometimes failed to come up to the excitement one had been led to expect on entering. The challenge is to sustain this initial level of attention and anticipation.

Large size as an attention-getter is also illustrated by the many roadside attractions that were popular in the 1930s and 1940s. One of these, a milk bottle, is used today by the Children’s Museum in Boston. Built in 1934 and 40 feet tall, it was relocated in the 1970s from the roadside to its current location in front of the museum, where it gives a valuable sense of location and identity. Here we have an excellent example of a commercial application being used effectively in the museum setting to attract attention and create excitement.

Changes in scale, whether up or down, seem to be particularly attractive for children. Within the same museum in Boston, there is a set of items commonly found on desks and a computer that have been reproduced in huge size. These are always popular attractions. In the other direction, Herbert (1981) reported the tremendous attraction of a small-scale diorama of a working sawmill for 5th- and 6th-graders, at the Halifax Museum in Nova Scotia. It is often used by teachers to generate conversation about the scene.

Color
Color and music are other powerful affect manipulators. For instance, four-color ads attract 38% more readers than black-and-white ads, according to one study (Cahners Publishing, 1980). Adding just one color to black-and-white newspaper ads increases effectiveness by 41%. This probably illustrates the power of contrast and distinctiveness more than just color, because the color in this situation is contrasted with the noncolor background. Moreover, color ads not only get more attention but are also remembered better, being generally twice as memorable as black-and-white ads, according to advertising expert Ogilvy (1985). Although these statistics may not be directly relevant to the exhibit business, they do illustrate the power of color. Because many antiques lose their color over time from sun and weathering, the added impact of color must often come from the background, yet many history museums seem to employ sombre earth tones as background. Such colors add an air of seriousness to the artifacts. Wall colors make a difference. Blue and green walls have been shown to be more relaxing, positive, and less threatening, and thus may increase attention to objects displayed there. Warm colors are more tense and make shopping decisions less pleasant (Hawkins, Best, & Coney, 1992). On the other hand, warm colors pull consumers in best and are recommended for store windows and entrances (Bellizzi, Crawley, & Hasty, 1983).

Bright colors, particularly the primaries, are well known as attention-getters.
Red is so effective that it is used to call attention to danger, as in stop signs, and for this reason is a dominant color in the packaging of products. The most popular color combination in the dominant U.S. culture is red, white, and blue (which is probably why the U.S. flag and many other flags use these colors). But these colors are used so frequently today that their attention-getting power has been reduced. Choosing more popular colors means one must balance increased attention getting with potential decrease of appeal.

Colors may also carry meanings, as patriotism or national politics in the case of red, white, and blue. A number of sources list many other meanings of colors (e.g., Birren, 1956), some supported by empirical research, some not. For example, blue, the most popular color, is supposed to convey a meaning of commanding respect and authority, yet coffee in a blue can is seen as “mild” (Schiffman & Kanuk, 1994). Context is probably a significant variable here. Combinations change meanings too, so that blue and white as a combination is different from just blue. Blue and white in a breakfast china set is the most popular color combination but hardly seems associated with respect and authority; nor does it produce the depression that solid blue might.

Colors can also imply a particular time, and because colors come and go in popularity (often under the orchestration of merchandisers), they may be dated. Remember how homes of the 1970s favored orange, dark brown, and copper? Color meanings and reactions in particular settings are not always predictable and are definitely a matter for empirical testing.

Other color effects are not so obvious. For example, political editing to make one candidate appealing and the other unappealing regularly uses color. Pictures of the appealing candidate may be outlined in blue, whereas the opposition’s are outlined in black; a candidate’s comments may be underlined in blue (calm, cool) versus red (hot-tempered); supporters may be colorfully dressed versus washed out. These techniques were used by Bush supporters in the primaries of the late 1980s, where Dole was the opposition (Wilkie, 1994).

Music
Music too has an enormous range of affective influences. A detailed review of the effects of music is not possible here. Its use in movies to create mood is familiar to everyone. It can increase or decrease the pleasure of the moment. It can have behavioral effects of speeding us up or slowing us down, usually without us being aware of it. It can change our perception of the passage of time and thus relieve the long wait in a line. It can relax us and make us test better and apparently even learn better.

The impact of music on mood raises the question of the relationship of affect to mood. Mood has not seen the research interest that affect has recently, and less is known about it. Generally affect is considered a stimulus property, or a feeling produced by perception of an object or event. Mood, on the other hand, is generally considered a property of the person, an internal state. The complication comes in that we change our affective assessment of things as our mood shifts. Movies, therefore, by manipulating our mood, are changing our perception of the affect being generated by events on the screen. Mood influences our involvement in the world around us. (For more on this, see Webb, 1997.)
**Faces**

Attention to faces is so important to us that a special center in the brain has evolved with the sole function of recognizing faces. We also read faces and determine a great deal of information about the person from their facial expressions. By far the most important thing we read there is in the evaluative dimension, that is, liking and disliking forms of affect. The process is rapid, and physical attractiveness plays a major role in this assessment (see Hatfield & Sprecher, 1986). Attractive people are much more likely to be liked, and this evaluation spills over into most other judgments. Attractive children are judged less harshly by adults than are unattractive children (Dion, 1972). Unattractive defendants are likely to get longer sentences than attractive ones, and crimes against attractive victims will likely bring longer sentences than those against unattractive victims (Landy & Aronson, 1969). In one study, pictures of people who were previously rated attractive and unattractive were given to participants to rate on a list of characteristics having nothing to do with physical attractiveness. Attractive people were rated highest on nearly all characteristics (Dion, Berscheid, & Walster, 1972). It certainly is one reason why pretty faces are used to sell products. All of this means that having attractive faces in an exhibit will make people pay more attention to it and likely feel more involved with it. Indeed, the term *attractive* implies attention-getting.

**Measuring Affect**

In recent years, we have been using a method of measuring affect in our lab at Suffolk University that could easily be used in museums and at historical sites. It involves a simple rating scale, with seven steps from “very unpleasant” to “very pleasant”:

<table>
<thead>
<tr>
<th>UNPLEASANT</th>
<th>PLEASANT</th>
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<tbody>
<tr>
<td>Very</td>
<td>Very</td>
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<tr>
<td>Moderately</td>
<td>Moderately</td>
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<td>Mildly</td>
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<td>Neutral</td>
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<td>Very</td>
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1---2---3---4---5---6---7

Viewers are asked to rate a picture, word, or object on the scale by simply making a mark at the point they feel the appropriate rating would be. Although they express some hesitation at first, it turns out they can do it easily and that there is considerable agreement among them. We have had groups rate a succession of pictures, giving them about 5 seconds of viewing and 2 or 3 seconds between to make their rating. More complex stimuli, such as a picture with many parts, will need longer viewing time, whereas a single simple object will require less. The responses are then scored to the nearest 10th and an average derived for the group. Some pictures are predictable. For example, babies and young animals generally score at high positive affect, whereas pictures of injuries or death score at high negative. Some pictures are quite variable (e.g., a picture of President Clinton) depending very much on the viewer and on the moment in time. Because the affect content of an environment or exhibit is controlling much of the attention and learning that goes on there, measuring that element can be quite informative.

One could also use such a rating instrument to measure the reaction of groups before and after viewing an exhibit or experiencing an area. They would need to be different groups and therefore of sufficient numbers to get a reliable mean.
rating. Groups of 40 to 50 will show considerable agreement. One would then find out whether the experience had changed the way visitors feel about something. This would be a valuable addition to the typical assessment of what visitors learn. By asking about parts of an exhibit, one could find out how they fit together and whether one part influenced the others. Or again, it could be used before and after an exhibit change of some sort. It could be used to find out if different groups vary in their perception of an exhibit—for example, children and adults or trained and untrained viewers of art.

We have used the ratings to measure pictures used in the classical conditioning of advertising. We paired neutrally rated words with high-affect pictures and showed that the rating of the words shifted upward in affect rating as a result. At the same time, a control group showed that neutral pictures paired with neutral pictures did not change their ratings (MacDonald, 1999). We used pictures only once and paired words and pictures only three times, yet the word ratings shifted.

We have a study in progress in which we are comparing memory for high-affect pictures with low-affect ones. We expect to confirm that the higher the affect, the better the retention. This would be consistent with other findings using different materials.

One advantage this method has over other measures that ask how one feels about something is that it focuses on the dimension that is of most importance. People tend to get confused when asked how they feel, because how one feels is such a complex question. The rating method shifts the focus from the person to the object and seems easier for most people to do. It is easy and quick to collect and measures a quality often unmeasured yet of tremendous importance. The method deals only with the pleasant–unpleasant and intensity dimensions. Because Russell (1979) concluded that nearly all the variability influencing consumer choices could be captured by these two dimensions. That is, affect, which is what these dimensions define, is the central component of all emotional experience. Use of this simple rating device may allow evaluators to begin to measure the often-ignored quality of affect.

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THE ROLE OF ATTENTION IN DESIGNING EFFECTIVE INTERPRETIVE LABELS

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Abstract:
Processes of attention can provide a conceptual framework for understanding visitor reactions to interpretive labels. In this article, three principles of attention are used to organize what we know about interpretive label design. The first principle, selectivity, suggests that the distinctiveness or salience of a label or object will influence which of many elements will be given attention. The second principle, motivated focusing, states that motivation is enhanced by minimizing the amount of effort, increasing cognitive-emotional arousal and minimizing distractions. The last principle, limited capacity, proposes that the resources of attention have a limited capacity and are depleted over time with effort expended. Findings of research studies and specific principles (e.g., an isolated object receives more attention than an object embedded in dense stimuli) are described within this conceptual framework.

Keywords: Attention, interpretive labels, exhibit labels, effectiveness, cognitive processing.

INTRODUCTION
Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought….It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatterbrained state which…is called distraction (James, 1890, p. 403).

Purpose
Despite some cynicism among interpretive professionals, visitors will read well-designed interpretive labels. However, how labels are designed is critical. The purpose of this article is to suggest a psychological approach, using the concept of attention, as the basis for designing effective interpretive labels. In addition to previous work (e.g., Bitgood, 1993, 1996), the conceptual framework proposed here incorporates a rapidly growing visitor studies literature including the excellent work of Judy Rand (1990), Chan Screven (1992), Beverly Serrell (1983,1996) and many others. Several useful guides are available for designing labels (see Ham, 1992;

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Rand, 1990; 1993; Screven, 1992; Serrell, 1996; Tilden, 1977). In addition, a number of research studies have examined the numerous variables that play a role in the design of interpretive labels (for summaries, see Screven, 1992; Shettel, Butcher, Cotton, Northrop, & Slough, 1968; Serrell, 1996). One can also find a substantial amount of speculation based on research extracted from textbook typography or on the personal experience of interpretive professionals.

This article offers a psychological framework based on the processes of attention to integrate the visitor literature on labels for any interpretive setting—be it exhibits, wayside signs, trail signs, or other media. In addition to providing a framework for label design, this article reviews research studies that support the framework.

**Interpretive Labels: What Are They and What Is Their Role?**

For purposes of this article, the phrase *interpretive label* is used to refer to titles, orientation/introductory labels, and section or group labels (Serrell, 1996). However, much of what will be said about attention applies to noninterpretive labels as well (identification labels, wayfinding and orientation, etc.). The current analysis is most concerned with the major condition necessary for delivering the interpretive message, that is, focused attention on the objects and labels. It is assumed that the principles of attention described below apply to objects as well as labels of all types. Thus, interpretive labels are a special case of objects in terms of the processes of attention.

The limitations of attention prevent visitors from simultaneously attending to both label and objects. When given a choice, visitors look at objects rather than read labels. Because the focus of visitor attention is primarily on three-dimensional visual experiences, this is where interpretation should start. Rarely do visitors start their viewing experience by reading text. In study after study, graphic panels not associated with some three-dimensional objects receive little attention. Label reading cannot (and should not try to) compete with the visual experience.

It follows that labels are most effective when they complement objects. They complement by focusing attention on important characteristics, explaining phenomena, or serving some other such function. Visitors generally want to know what they should look for, how to focus their attention, and so forth. How do you design for this complementary role of labels? Here are a few suggestions to provide visual reference to the label:

- Focus attention on important ideas or relevant features associated with the exhibit object.
- Create a symbolic dialogue between the label and the object.
- Answer the visitors’ questions first, and then try to tell them what you think they should know.
- Use labels to ask what is most notable or important about the object(s).

**Importance of Evaluation**

The only way to determine whether interpretive labels are truly effective is through objective evaluation. Given the complexity of most interpretation, measuring the
impact of interpretation on the audience is essential. Evaluation can be conducted during all phases of interpretive development (e.g., Bitgood & Loomis, 1993; Bitgood & Shettel, 1996; Screven, 1990). During the planning stage, a front-end evaluation attempts to assess the audience’s existing knowledge, misconceptions, attitudes, preferences, and interests. During the preparation stage, ideas and media can be tested (formative evaluation) and modified to make them more effective. After installation, interpretation can be “fine-tuned” with remedial evaluation.

What Is Success, and How Do You Measure It?
What are the criteria of label success? It is important to make a distinction between the success of overall interpretation (the big picture) and success of individual interpretive labels. The “big picture” message (a sentence or statement of what the exhibition is about) is of critical importance (Ham, 1992; Serrell, 1996) but should not be confused with the success of an individual label. Some individual labels may fail to deliver their message, but the “big picture,” or overall theme, may still be successful. The current article deals primarily with the design and ultimate success of individual labels. See Serrell (1996) for a discussion of “big picture” considerations.

How do you measure success? The outcome measures generally include the percentage of visitors who stop at a label (often called “attracting power”); the reading time (related to “holding power”); collateral behaviors (e.g., social interaction, pointing); and measure(s) of knowledge gain, memory, reasoning, or attitudes (“communication power”). (For further discussion of these measures, see Screven, 1990; Serrell, 1996; and Shettel, Butcher, Cotton, Northrop, & Slough, 1968.)

The Conceptual Framework
The basic assumption underlying this framework is that the processes of attention play a vital role in the design of interpretive labels. All major textbooks in cognitive psychology include a chapter on attention (e.g., Best, 1999; Reed, 2000; Reisberg, 1997; Solso, 1998). Although there is considerable disagreement on what these processes of attention are, there seems to be general agreement on at least three of their characteristics. First, attention is selective—when we focus attention on one thing, we tend to ignore others. Think of attention as a spotlight that selectively focuses on one thing at a time (Johnson & Dark, 1986). In some cases, we can divide attention, but it is difficult except under very specific conditions. Second, attention has focusing power. If highly motivated, we can focus our attention on something with considerable concentration. The degree of concentration is related to the level of motivation (Easterbrook, 1959). Third, the capacity of attention is limited (Kahneman, 1973). There is only so much of this cognitive resource available, and it dissipates with time and effort. The more time passed and effort expended, the less attention available.

Principle of Selectivity
Attention is selective in the sense that some things capture our attention while others do not and in the sense that we can attend (generally) to only one thing at
The question for label design is, What factors in the interpretive setting are involved in the process of selective attention? If we can attend to only one thing at a time, what will it be? Capturing visitor attention is the first step in the interpretive process. Visitors must first pay attention to a label before it has any chance of delivering an interpretive message.

Two obvious factors in capturing attention are (a) the salience or distinctiveness of the label and (b) the traffic-flow patterns in the environment. The more salient the label, the more likely it will be noticed. Traffic flow also influences whether a label will be detected: labels in locations along the pathway taken by visitors have a higher chance of being seen than those not in the path.

**Stimulus Salience (Distinctiveness)**
Following are some of the major factors that influence visitor attention in terms of detecting labels. Note that all of these factors are related to the distinctiveness of the label.

**Isolation.** An object and its interpretive label isolated from other objects are likely to get the undivided attention of visitors (e.g., Melton, 1935, 1972). The greater the number of stimuli surrounding a label, the less likely it will be noticed, especially if the label lacks other salient factors.

**Size.** Larger point size and larger label background increase the attention-getting power of an interpretive label (Bitgood & Patterson, 1993). Of course, this is true only up to a point. Appropriate scaling must be considered.

**Contrast with setting background.** An interpretive label that blends into the background may be ignored because it lacks attention-getting power. In the parlance of signal detection theory, background “noise” makes it more difficult to detect a stimulus.

**Multisensory characteristics.** Adding sound, smell, or touch to an interpretive label may attract a higher level of attention. However, a nonvisual stimulus could also compete with the label if not carefully designed to be complementary.

**Lighting.** The overall level of lighting is, of course, important in determining whether a label will be noticed. In addition, the contrast in lighting between a label and its surroundings produced by spotlighting is another way to make a label more obvious. (Lighting contrast could be considered a special case of “contrast with setting background,” as discussed above.)

**Line-of-sight placement.** A label that falls easily within a viewer’s line of sight is easier to detect. One consideration is the distance from the floor—labels placed more than 6 or 7 feet above the floor often go unnoticed because people tend not to look up (Bitgood, Benefield, & Patterson, 1990; Bitgood, Conroy, Pierce, Patterson, & Boyd, 1989). Another consideration is where visitor attention usually is focused—on the object. If the label is not close to the object it describes, it is unlikely to be noticed (Bitgood, Benefield, & Patterson, 1990).

**Circulation/Traffic Flow**
Many labels are missed because of the traffic flow. If visitors do not pass by a label, they will obviously not give it attention. Consequently, understanding how visitors move through interpretive spaces is important. Several circulation factors (assumed
to be in the order of importance in the following list) seem to determine whether visitors will pass by the labels, giving them at least a chance of receiving attention.

**Attraction of a salient object.** A large object (such as an exhibit display) will influence the traffic flow by creating a tendency for visitors to move toward or approach it after entering the environment (Bitgood, Benefield, Patterson, & Litwak, 1991). Landmark objects influence pathways, which in turn influence whether other objects receive attention. For example, visitors are likely to bypass and consequently ignore a less salient object in order to approach and view a more salient one.

**Attraction (or distraction) of an open door.** Melton (1935) reported that there was a strong tendency for visitors entering a gallery to move along the righthand wall and exit by the first open door. When the door was closed so that visitors had to exit by the same door as they entered, visitors circulated more completely through the gallery, giving attention to more objects on display.

**Arrangement of objects/displays.** The arrangement of objects within the environment determines how people will move through the environment (e.g., Bitgood, Hines, Hamberger, & Ford, 1992). In every exhibit space, there are “hot” and “cold” spots of visitor attention that are at least partially influenced by the circulation patterns of visitors. Myriad exhibit islands create a chaotic traffic flow in which some displays receive a high level of attention and others receive a low level. When the flow is chaotic, visitors are more likely to miss a display unintentionally. If there is a clear pathway or order of viewing displays, each object is more likely to get attention.

**Inertia.** Visitors tend to continue along a straight-line path unless some force (e.g., landmark exhibit object) pulls them away. Melton’s (1935) proposed “exit gradient” is a special case. Melton defined “exit gradient” as the tendency to take the shortest distance between the entrance and exit when moving through a gallery.

**Right-turn bias.** In the absence of other forces, visitors have a tendency to turn right when entering an interpretive space (e.g., Melton, 1935).

**Principle of Motivated Focusing**

The second principle of attention is that focused attention requires motivation. Motivating visitors to focus on labels and objects is the most challenging task in interpretation. Rand (1990) has suggested some intriguing ideas on how to “hook” readers with the use of language. Screven (1992) has identified many of the variables that seem to increase visitors’ motivation to read labels. Motivating interest results in focused visitor attention on the interpretation.

There appear to be three general rules for motivating visitors to focus their attention on labels: (a) minimize the perceived effort to read, (b) increase cognitive-emotional arousal (provoke interest in the subject matter if it is not already there), and (c) minimize distracting factors.

**Minimize Perceived Effort**

In terms of the processes of attention, mental effort may do two things: (a) decrease motivation to attention and (b) deplete the “power supply,” or capacity to attend
over time. The first of these will be discussed here, and the latter (depletion of the "power supply") will be discussed later.

By reducing mental effort, more cognitive resources for attending to interpretation are available and presumably will increase motivation to focus. Ham (1992) expressed this notion in the following way: "[Interpretation]...is presented in a way that is easy to follow. Another way of stating this is that interpretation, at its best, does not require a lot of effort from the audience" (p. 19).

Following are some of the factors that can help reduce mental effort:

**Number of words per “chunk.”** Bitgood and Patterson (1993) demonstrated that breaking down a long label into three smaller ones (chunks) resulted in increased reading. This concept is also referred to as tiering text or creating a message pyramid (Trapp, Gross, & Zimmerman, 1991).

**Proximity of label to object.** The least amount of effort in label reading occurs when a visitor can look at the exhibit object and read a label at the same time. Thus, placing a label on a railing in front of the object viewed is more effective than on the side of the exhibit or away from the exhibit (e.g., Bitgood, Benefield, & Patterson, 1990). Placement closer to the exhibit object is apparently important in a recessed exhibit display as well (Bitgood, Campbell, et al., 1992). There is a common approach to interpretation (especially in natural history museums and naturalistic zoo exhibits) that places interpretive labels away from the naturalistic exhibits. The assumption is that the immersion experience will be compromised by the presence of text that is unnatural to the setting. Interpretive labels are often placed in a central area away from the exhibit. Evaluations of such exhibits suggest that this is a mistake if one wants to motivate visitors to read labels.

**Ease of cognitive processing.** Visitors are more likely to read if information is arranged in a manner that minimizes effort. One way to accomplish this is to bullet a list of items rather than embedding them in a paragraph format. Another way to decrease cognitive processing is to provide small chunks of text close to a visual image on a diagram/illustration/graphic.

**Figure-ground contrast.** Figure is the form that must be distinguished from the background. The greater the contrast, the easier the perceptual effort. Not only is it easier to attract attention with high figure-ground contrast, but it is easier to read text when the letters and the background have high contrast (Bitgood, 1989).

**Sensory overload (density of labels/objects).** The greater the number of labels in an area, the less attention any one label is likely to receive. This clearly relates to attention and may also relate to perceived effort. That is, an overabundance of text in any form (number of words per label or number of labels) may be perceived as too much work.

*Increase Cognitive-Emotional Arousal*

One of the more difficult tasks that interpretive labels attempt to accomplish is to provoke interest, thought, or both in the visitor. Once stimulated, visitors become more "mindful" and are more willing to read and think about the exhibit content. Thus, increasing cognitive-emotional arousal motivates focusing on interpretive objects. Provoking interest may also be a way to renew the resources of attention (see “Principle of Limited Capacity” later in this paper).
Following are brief descriptions of, and the evidence for, many of the variables that seem to motivate label reading:

**Ask questions.** Among others, Rand (1990) has suggested that labels should ask questions rather than just tell the facts (e.g., “Which jaws could crush a crab?”). Several studies suggest that labels that ask questions can be effective at provoking label reading (Hirschi & Screven, 1988; Litwak, 1996). The content of the question is likely to be critical. If the question raises issues or provides information that is not interesting to visitors, it is not likely to be motivating.

**Confront and correct misconceptions.** Once a misconception about a subject has been identified by a visitor study during the planning stage (front-end survey), directly confronting this misconception may provoke greater interest. Rand (1990) provides an example: “They may look empty, but mudflats crawl with life.” Currently there do not appear to be any studies that have examined the effectiveness of addressing misconceptions explicitly, though Borun and her colleagues (Borun, Massey, & Lutter, 1993) have documented the difficulty in overcoming misconceptions about gravity in a series of exhibits at the Franklin Institute of Science in Philadelphia.

**Challenge the reader.** Another difficult task is to stimulate visitors to solve a problem: “Not all fishes need a buoyancy regulator; when a wolf-eel or sculpin swims, it doesn’t go too far from the bottom. But what do you suppose happens when a wolf-eel stops swimming?” (Rand, 1990). There is a danger in taking this approach, however. If the question is too difficult, the reader may lose interest and is unlikely to try additional challenges. It is also important to provide the correct answer once a visitor’s interest has been stimulated.

**Use effective writing style.** Rand (1990) has listed a number of label objectives that translate to good writing style. These include: (a) drawing analogies (“Flatfishes are quick-change artists.”); (b) using a reader-relevant approach to explain things (“Orca clans take care of their own.”); (c) communicating in a conversational tone that is approachable, familiar, often humorous, but not flippant or formal (“See the rock with ruffles? That’s the hornmouth, one of the more ornamental snails.”); and (d) addressing the reader directly (“The tentacles you see are sensitive to touch and help locate drifting algae.”).

**Identify high-interest content.** A survey during the planning stage can often identify information that is of interest to visitors (and it is not always what the museum staff thinks visitors are interested in).

**Use mental imagery.** Using mental imagery in text can also stimulate interest. Screven (1992) described this as “encouraging visitors to fantasize or project themselves into an exhibit situation.” For example, at the Anniston Museum of Natural History in Anniston, Alabama, some labels encourage the visitor to put themselves in place of a wolf or elk engaged in combat.

**Provide handouts.** Robinson (1928) used a handout giving more detailed descriptions of selected paintings than those found on wall labels. Visitors who used this handout showed decreased “museum fatigue” (i.e., increased total amount of time in museum and attention to art work).

**Use three-dimensional objects.** Two-dimensional labels by themselves attract less attention than labels associated with three-dimensional objects (e.g., Peart, 1984).
Consider label format. Labels can be designed using several formats (graphic panel with blocks of text, flip labels that can be raised to reveal an answer to a question or additional information, auditory labels either self-activated or visitor-activated, etc.).

Provide instructions. Assuming visitors are at all curious about the objects they are seeing, they generally welcome information that tells them what they should look for or do.

Use hands-on “flips.” Arndt, Screven, Benusa, and Bishop (1993), in a zoo study at a lion exhibit, found that flip labels increased the percentage of visitors who stopped as well as viewing time and learning. Flip labels, when carefully designed, are capable of sparking considerable curiosity.

Clarify the message. Written text can help to clarify the message. Bitgood, Cleghorn, et al. (1996) found a dramatic increase in attention and total time spent in the gallery when text was placed on life-sized photos. The text clarified both what was being said and who said it in recorded voices played through speakers.

Create opportunities for social interaction. Interpretive experiences are primarily social in nature. Design should consider how to motivate visitors to share information and ideas. Parents often read labels to children, and it is not uncommon for one adult to read to other adults in a group. Labels are likely to encourage social interaction if they are interesting, challenging, prompt parents to ask questions of their children, and so forth.

Minimize Distractions
Sensory distractions such as sounds from outside the interpretive area can take attention away from labels. In one of the first studies of label reading at a zoo, the author and some colleagues observed that each time the zoo train blew its whistle as it passed, visitors would stop reading labels. Once interrupted, visitors did not go back to complete reading of a label. They moved on to the next exhibit. Astoundingly, this phenomenon was observed for almost every visitor.

Here are distractions requiring attention in exhibit design:

Sounds. Sounds of all types can distract visitors from reading. Sound bleed from other exhibits is a common distraction in museums, zoos, and science centers.

Competition from other exhibit elements. Frequently two elements of the same exhibit compete for attention. An object may compete with a label, a label with another label, and so forth.

Novelty of the surroundings. The work of John Falk and his colleagues (e.g., Balling & Falk, 1980; Falk & Balling, 1980) suggests that, at least for school groups, a novel setting distracts students from the programmed interpretation. To some extent, this may also apply to all visitors in interpretive settings. Visitors may be concerned with where to go next and other distractions. Good orientation (visitor guides, direction signs, etc.) will minimize such distractions.

Principle of Limited Capacity
The third principle of attention states that the resources of attention have a limited capacity and are depleted over time with effort expended. The reserves are renewed slowly over time (e.g., with physical and mental rest periods). The reserves
of attention may also be more quickly renewed by cognitive-emotional arousal, such as a change to more interesting objects. Consequently three factors are of critical importance to this principle of attention: (a) the size of the reserve, (b) the rate of depletion, and (c) the rate of renewal.

Evidence for the depletion effect is provided by several studies of “museum fatigue” (Falk, Koran, Dierking, & Dreblow, 1985; Melton, 1935; Robinson, 1928; Serrell, 1999). For example, Robinson compared decreases in attention across time during visits to four museums that differed in size as well as other characteristics. He found similar decrements in attention (as measured by average viewing time per painting) at all museums. An even greater decrement in attention across viewing was found in a laboratory study in which subjects, seated at a table, were asked to view 100 prints of paintings. Subjects were allowed to view each print as long as they wanted. Dividing the viewing session into 10ths, Robinson found that there was a systematic decrement from the first to the last 10th of the prints. Clearly the decreased viewing time across art prints in this study could not be due to physical fatigue. Some type of mental satiation seemed to be taking place.

Size of Reserve
The total capacity of the attention reserve is assumed to be limited in terms of the physical energy available to the individual, condition of health, mental attitude, and so forth. Obviously the capacity would vary for different individuals and for each individual from one time to another.

Serrell (1999) reported total viewing time measures for 110 exhibitions from museums that differed in terms of size, topic, and geographical location. For 80% of the exhibitions, the average total time of visitors was less than 20 minutes despite size of exhibition or type of museum. The mean total time for all exhibitions was 11 minutes, and the median was 8 minutes (time distributions were skewed toward shorter times with few visitors spending a long time). Median stops for these exhibitions was 34%, with very few visitors stopping at more than 50% of the exhibit elements. Serrell’s data may suggest that the capacity of attention for a single, non-ordinary exhibition is about 20 minutes.

Falk, Koran, Dierking, and Dreblow (1985) described a decrement in visitor attention to exhibitions across time in a study at the Florida State Museum of Natural History in Gainesville. These investigators monitored visitors’ attention to exhibits, to the setting, to self, and to other people throughout the visit. They found that visitors’ attention to exhibits dropped rapidly after 30 to 45 minutes in the museum. According to the authors, “The primary change in visitor behavior during the observations was a change from moving slowly from exhibit to exhibit and reading labels to ‘cruising’ through the halls, stopping occasionally and only very selectively” (p. 254). Because this study did not divide the visit into exhibit galleries, it is not known if there were attention decrements within each exhibition. In terms of the total visit, however, the reserves of attention appeared to have been depleted within 30 to 45 minutes for this museum.

Rate of Depletion and Renewal
Although decrements in attention are well documented, it is not entirely clear what
mechanisms may be necessary to explain the process associated with a decrement in attention across time. At least two possibilities come to mind. First, the resources for attention could be depleted with mental and physical effort. A second possibility is that the capacity of attention remains relatively high, but some inhibitory mechanism prevents attending. For the moment, the latter explanation will be explored.

How quickly the reserves of attention are depleted is likely to be influenced by the amount of mental effort, by the number and strength of distractions (both setting and social), by information overload, by physical fatigue, by time pressures, and by the rate of pacing through the exhibition (e.g., rest periods allow renewal).

Several design recommendations might help reduce this inevitable attention decrement:

**Design heterogeneous exhibits with varied displays** rather than monotonous repetitions of similar objects laid out in a row. Displays of similar objects or animals all in a row create a rapid decrement in attention. By varying the displays in terms of content and appearance, greater interest is maintained.

**Minimize mental effort every way possible.** As noted above, there are many ways to decrease the amount of mental effort required by visitors. This is not “dumbing down.” It is having mercy on the limited resources of attention that visitors possess.

**Increase interest level** with methods described above under “Increase Cognitive-Emotional Arousal.” Provoking interest by the methods described above should also help to hold off object satiation.

Renewal rate refers to how fast the reserves of attention are replenished. It is assumed that a recovery period will renew these resources. Thus, taking a break to have a snack or eat lunch will rejuvenate the resources of attention. Increasing cognitive-emotional arousal (stimulating interest) also acts to renew the reserves. Thus, entering a new museum gallery on a new topic (especially one that is interesting) generally results in increased attention to exhibits.

Interpretive labels come in many forms and, in the form of handheld guides, may be used to slow down the rate of depletion of attention. Robinson (1928) reported a study (Study #4) in which pamphlets were handed out as a visitor guide to art work in a small museum. Those who used the guide spent more time in the museum (28 vs. 17 minutes), viewed a larger number of art works (46 vs. 30), and viewed a larger percentage of the art works (25 vs. 17). Those who did not use the guide showed the usual decrement in viewing time across their visitation. Thus, the handheld guide appeared to counteract the “fatigue” effect usually observed. Other studies have also found that self-guided handouts with questions or additional information can increase attention to exhibits (see Bitgood & Davis, 1991).

### Implications and Related Concepts

**Redistribution of Attention**

Any change to the interpretive setting creates a change in the pattern of visitor attention to the whole milieu. According to the attention framework suggested here, this redistribution is the result of a combination of moment-to-moment se-
lectivity, motivated focusing, and depletion of the reserves of attention. In an interpretive environment dense with stimulation, the capacity of attention is likely to be depleted before all elements have received an adequate level of attention. Also, in a densely stimulating environment, only the most distinctive elements are likely to receive attention because of the selectivity principle.

Given the limitations of attention, designers are wise to plan the interpretive experiences carefully so visitors distribute their attention to focus on important messages and objects. This is a difficult task. In addition to considering the moment-by-moment distribution of attention, the designer must, throughout the interpretive area, attempt to minimize mental demands that sap visitors of their resources for attending.

Redistribution of attention was demonstrated in a study by Melton (1935, 1972) in which the number of art works in a museum gallery were systematically varied. Melton found a decrement in attention (as measured by average viewing time per painting) when the number of paintings in a gallery was systematically increased from 6 to 36 in increments of 6. As the number of paintings in the gallery increased, the time per painting decreased. Total time in the gallery increased to a point and then stayed constant as if there was only so much time visitors were going to spend no matter how many paintings were displayed.

Bitgood and Patterson (1993) provide a more detailed analysis of the distribution of attention. Their study, conducted over a two-year period, systematically varied label characteristics and locations. The study was conducted in a small Egyptian mummy gallery at the Anniston Museum of Natural History in Anniston, Alabama. Labels were systematically changed, and a bronze bust was added to the gallery during the course of the study. Each change in the gallery resulted in a redistribution of visitor attention to all objects in the gallery. For example, when more labels were added, the percentage of stops at labels increased, but the total reading time decreased. In addition, when the percentage of label readers increased by label changes, average total time in the gallery for label readers declined, suggesting that the new label readers produced by making the labels more attractive did not influence the overall time in the gallery of these new readers. However, when a three-dimensional object (bronze bust of a mummy) was added to the gallery, the total gallery time as well as time viewing other objects in the gallery increased.

**Communicating Educational Messages**

Focused attention is necessary but not sufficient in and of itself for the interpretive messages to be communicated. Once visitors attend to the label and are motivated to read, the final task is to ensure that the interpretive message is communicated. The critical factor here is difficulty of comprehension. Anything that makes comprehension more difficult is going to increase mental effort, deplete the “power supply” of attention, and consequently decrease the chances of delivering interpretive messages. Note that many of the variables associated with interpretive labels seem to influence both motivation and communication. Text that is difficult to understand impedes visitor motivation to read.

Here are a few suggestions from the literature that may help to keep attention focused and facilitate the delivery of the interpretive message:
Minimize syntactic complexity. Screven (1992) described a group of variables he termed *syntactic complexity*. They include sentence length and number of sentences with phrases that lack any new information (e.g., “in summary”). As Rand (1990) points out: “Every word counts.” It is easier to understand if short, simple sentences are used.

Reduce semantic complexity. According to Screven (1992), semantic complexity includes: “number and level of propositions, causal structures, vague, abstract language, concept density (ratio of concrete to abstract concepts)” (p. 192).

Keep vocabulary simple. Difficult-to-understand vocabulary has frequently been noted as a problem in communicating interpretive messages (Bitgood, 1989; Screven, 1992; Serrell, 1983, 1996). The best advice is to keep it simple and test any questionable words/phrases on the target audience.

Practice a good writing style. Clarity, conciseness, and simplicity are assumed to facilitate understanding of the interpretive message. In addition, Rand (1990) suggests using an active voice and vivid language while addressing the reader directly.

Apply appropriate literary techniques. Rand (1990) suggests drawing analogies and using a conversational tone to “hook” readers. Serrell (1996) suggests that labels tell stories. Both of these techniques, when used wisely, are likely to increase label effectiveness.

Eliminate conflicting messages. At times, what visitors see and what they read are in conflict. If a sign at a zoo exhibit implores visitors not to feed the bears, it is inconsistent for a keeper to throw an apple to the bear when the bear begs.

Visitors can more readily attend to the educational messages if the labels are designed to minimize mental effort, increase interest level, and help them focus their attention on easy-to-understand information.

**Conclusion**

The cognitive processes of attention are among the most important factors in successful interpretive design. To be most effective, labels need to be designed with an understanding of these processes. Three principles of attention can go a long way toward predicting success in interpretation. Although these principles (selectivity, motivated focusing, and limited capacity) provide limiting parameters to interpretation, they need not doom us to interpretive failure. By understanding how the processes of attention work, more effective interpretive experiences can be designed. This article has attempted to identify factors that are likely to produce attention, hold and focus attention, and ultimately communicate the interpretive messages. It is hoped that this will help the interpretive designer improve the effectiveness of labels.

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Role of Attention in Design of Interpretive Labels


PHOTOGRAPHS AS A RESEARCH TOOL
IN VISITOR STUDIES

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Abstract:
Photographs provide valuable descriptive data when used as a research tool. Studies in informal settings have used photographs taken by researchers and visitors to (a) document physical behavior and movement within the setting; (b) learn more about the setting visit and what was learned or remembered from the visit; (c) determine visitor satisfaction, interest, and exhibition impact; and (d) determine exhibition preferences of diverse groups. This article reviews how photographs have been used in informal settings, describes a study at the Florida Museum of Natural History in Gainesville that used photographs to examine student attention in exhibitions, and discusses the advantages of utilizing Visitor Employed Photography (VEP) as a research tool.

Keywords:
Visitor Employed Photography, visitor studies, informal learning, research tools, informal settings, photographs.

INTRODUCTION
Museums, science centers, nature centers, zoos, national parks, and similar settings are important educational facilities that contribute to out-of-school learning (American Association of Museums, 1992; Bitgood, Serrell, & Thompson, 1994; Falk, 1999; Falk & Dierking, 1992, 2000). The AAM Standing Professional Committee on Education (1990) describes the contribution of museums as a "unique encounter with objects and ideas for people of many ages, interests, capabilities, and backgrounds" (p. 78). Prior knowledge and experiences, interests, cognitive ability, and

Note: Accepted September 2000. This paper is dedicated posthumously to John J. Koran Jr.
other characteristics influence how visitors interpret museum objects and exhibitions, and what they learn and remember (Bitgood et al.; Falk & Dierking, 1992, 1995, 2000; Koran & Koran, 1986). As Pankowski (1991) stated, “The way in which people extract meaning from objects, and reapply those meanings to new and unfamiliar objects, lies, I suspect at the heart of museum-based learning” (p. 220). In a similar manner, Pitman-Gelles (1985) describes learning in museums as beginning with a visual experience that then leads to a variety of learning experiences such as comparing and contrasting, or problem solving.

In recent years, some cognitive psychologists have proposed that most thinking and learning is situated in the specific physical and social contexts in which they occur (Greeno, 1998) and that these contexts should be considered in addition to individual perspectives (Anderson, Greeno, Reder, & Simon, 2000). Thus, when examining learning in museums and other informal settings and the transfer of knowledge and strategies from one setting to another, we must look at the processing characteristics of the learners as well as the social and physical contexts (Falk & Dierking, 1992, 2000; Koran, Pulido, & Hargis, 1999). Studying learning in informal settings provides many challenges, though using photographs as a research tool shows promise. One advantage of photographs is that they provide a concrete record of some of the physical and social contexts of these settings.

This article first reviews how photographs have been used as a research tool in visitor studies. It then describes a study at the Florida Museum of Natural History that used photographs taken by 7th-grade students to examine how the students directed their attention in the museum. It concludes with a discussion of the advantages of using Visitor Employed Photography as a research tool in informal settings and suggests areas for further research.

**Photographs as a Research Tool**

Photographs have been used as a research tool because of the valuable descriptive data they provide. Methodologically photographs have been used in two ways: the researcher takes the photos or the study participants take the photos, and from these photos insights about the participants’ particular points of view are inferred (Bogdan & Biklen, 1982). “While photos may not be able to prove anything conclusively, when used in conjunction with other data, they can add to a growing pile of evidence” (Bogdan & Biklen, p. 103). Studies in informal settings have utilized both approaches.

**Photographs Taken by Researchers**

*Using Photographs to Assess Physical Behaviors*

Photographs taken by researchers have been used to study visitors’ physical behaviors and movement in museums (Braaksma, 1992; Gilman, 1916; Hood, 1986; King & Marshall, 1977; Klein, 1993; Nielsen, 1946). Braaksma called these photographs deferred observations. An early study by Gilman (1916) used photographs of visitors looking at objects and reading labels to document the physical effort required for different types of exhibit installations. As a result, design criteria for exhibitions were suggested that would decrease the amount of museum fatigue from physical
efforts during the visit. Gilman’s photographs of visitors stooping, standing on tip-toe, and straining to see objects and labels that were too high, too low, or in other awkward positions provide powerful evidence that both objects and labels need to be placed where they are easily accessible from a physical standpoint. Nielsen (1946) and Hood (1986) suggested the use of time-lapse photography as a method for gathering information about visitor behavior, and Klein (1993) suggested the use of ceiling cameras as a method for tracking visitor movement.

King and Marshall (1977) collected data on film and sound tape to examine the experiences of museum visitors. They obtained photographic records of three types: the building or façade, the signage or graphic presentation, and visitors and their reactions or interactions. They found that the reactions and interactions of visitors were dependent on the environment created by the museum and the expectations of the individual or group. King and Marshall cautioned though that photographing people might affect their activities, and thus this potential influence must be considered when examining photographic data.

The preceding studies illustrate how photographs taken by researchers of visitors in informal settings provide evidence of the physical efforts and movements of visitors within these settings. This information can be used to improve exhibition design so that museum fatigue due to physical efforts is decreased and the visit itself enhanced. Researchers must be careful though that when visitors are photographed, it is done in a manner that does not influence visitor behavior and thus the photographic data obtained. Other studies have used photographs taken by researchers to examine the cognitive and affective experiences of visitors.

Using Photographs to Assess Visitor Learning and Experiences
Photographs taken by researchers also have been used as a stimulus or part of an activity during interviews to learn more about museum visits and what was learned or remembered (Anderson & Roc, 1993; Fivush, Hudson, & Nelson, 1984; Rosenfeld & Terkel, 1982; Staisey & Needham, 1993; Stevenson, 1991). In addition, they have been used to determine visitor satisfaction (Crane, 1988), interest and exhibition impact (Lakota, 1975), and exhibition preferences (Hammitt, 1978; Thompson, 1992; Wurtak & Bremner, 1992).

The Museum Impact and Evaluation Study (Anderson & Roc, 1993) examined the role of affect in visitor learning and used photographs for some of the data collection. For example, photographs were used as a stimulus during interviews, and visitors were asked to sort photographs into categories of their choice. The purpose of this approach was to understand how visitors think about and remember exhibitions.

Fivush, Hudson, and Nelson (1984) used photographs to examine kindergarten children’s long-term memories of a field trip to a museum of archeology. At both 6 weeks after and 1 year after the field trip, the children were given six photographs and asked to first identify what was occurring in each photograph and then to put the photographs in order of what happened during the trip. Although the children recalled less detail 1 year after their museum field trip compared to 6 weeks after the field trip, their recall was extremely accurate.

Rosenfeld and Terkel (1982) conducted systematic observations and interviews
to document what visitors to the interactive mini-zoo at the Lawrence Hall of Science in Berkeley, California, did, said, and considered important during their visit. The interviews included three types of questions: sentence fill-ins, open-ended questions, and photograph-stimulus questions. The photograph-stimulus questions used photographs to examine what the children felt they experienced and what they learned. The photograph-stimulus questions were the most effective question type to use with the children, as their responses were longer and more detailed compared to their responses to the other question types. However, the responses did demonstrate that the children did not differentiate between what they experienced and what they learned at the mini-zoo. The photograph-stimulus questions also were more successful in eliciting what visitors disliked about the mini-zoo than were the other two types of questions. Rosenfeld and Terkel suggested that using methodology like the photograph-stimulus questions can result in responses that may not be elicited by more conventional questionnaires.

An evaluation of the Children's Museum within the Canadian Museum of Civilization in Ottawa, Ontario, included evaluation forms, visitor surveys, focus groups, and a mail-out teacher survey (Staisey & Needham, 1993). One of the focus groups consisted of children who had visited the museum. The children could name many specific things that they had learned at the museum and when shown photographs of exhibitions and artifacts, they could recall the related activities in which they had participated. Photographs of exhibitions also were used with adults and children 6 months after their visits to the Launch Pad, London’s Science Museum, to prompt their memories (Stevenson, 1991).

These studies illustrate how photographs may be used during interviews or sorting activities to examine visitor interests, learning, experiences, and memories. Photographs have been used in this manner in a variety of institutions, including a children's museum, mini-zoo, archeology museum, and science museum. The technique has been used successfully with both children and adults.

Using Photographs as an Evaluation Tool

In addition, researchers have used photographs in exhibit evaluation studies. Photographs of components in a traveling exhibition were used with potential visitors to determine their interests and elicit suggestions for areas that needed modification (Crane, 1988). As part of a front-end evaluation, Wurtak and Bremner (1992) asked visitors to sort photographs into categories of exhibitions that they really liked, thought were okay, and did not like. Then they asked the visitors to talk about the exhibitions they really liked. The Australian Museum in Sydney also used a variety of data-collection techniques during the front-end evaluation of a new permanent exhibition about indigenous peoples of Australia (Kelly, 1997). One technique was photograph sorting, used with general museum visitors to determine the communication strategies they preferred in exhibitions.

Lakota (1975) unobtrusively tracked and recorded the movement of visitors in the National Museum of Natural History in Washington, D.C. The visitors who were tracked were then asked to sort photographs into two piles: exhibits they saw and exhibits they did not see. He found that 40% of the adults and 69% of the families were able to correctly classify the pictures. For both the adults and the
families, the errors in classification were generally the inclusion of photographs of exhibits that they did not see. Rarely did they leave out photographs of exhibits that the tracking data showed they had seen. Hammitt (1978) studied visitors’ preferences for a bog habitat in the Cranberry Glades Botanical Area in West Virginia. Some visitors were asked to rate photographs of the area both before and after they had seen it, whereas other visitors were asked to rate photographs only after their visit. All of the photographs had a higher preference rating after the visit experience. Thus, photographs taken by researchers have been used in a variety of institutions to obtain information for the development of exhibitions or to assess the effectiveness of an exhibition.

**Visitor Employed Photography**

With Visitor Employed Photography (VEP), visitors take the photographs. In addition to using photographs taken by researchers as described earlier, *The Museum Impact and Evaluation Study* (Anderson & Roe, 1993) asked 6- to 10-year-olds at the Children’s Museum of Indianapolis to photograph exhibitions that were interesting to them. An analysis of the photographs taken by the children revealed that the children liked exhibitions that were related to their prior knowledge or interests and/or actively involved them. Wolf and Tymitz (1978) found that visitors most frequently photographed large objects.

VEP has been used most often in natural environments as a technique to quantify common perceptions and preferences of recreation visitors (Cherem & Driver, 1983; Schulhof, 1990; Taylor, Sexton, & Czarnowski, 1995). With this technique, what is photographed has been found to vary depending on the instructions given by the researcher (Cherem & Driver, 1983).

In a study by Taylor, Sexton, and Czarnowski (1995), visitors at Rocky Mountain National Park in Colorado were asked to photograph 12 scenes that had the most important positive or negative effect on their experience in the park. The researchers were interested in the importance of water and water-related resources to the visitor experience and wanted to see the frequency at which these features would be the subject of the photographs. The study participants maintained a photo log that included the subject, location, and reason for taking. From the more than 2,000 photographs obtained, the researchers were able to identify 12 main categories of features and determine that the most often photographed features were mountain vistas, water bodies, wildlife, and management features. They also identified differences between user groups, such as campers finding management features more than twice as important, as indicated by the number of photographs taken, compared to the other user groups. Few photographs were taken of features reported to have a negative effect on the visitor experience. Those that did have a negative effect were such things as crowding, litter, or other human impacts on the park. The data from this study provided critical information for management decisions. For example, it confirmed the importance of protecting water resources in the park. Taylor et al. described the advantages of VEP as providing a firsthand look at what is valued by visitors, a more objective measure of the importance of specific resources of interest when the research focus is left unstated, results from the par-
participants themselves, and an unobtrusive measure. In addition, VEP does not rely on the potentially inaccurate after-the-fact recall.

VEP also was used at the North Carolina Botanical Garden in Chapel Hill (Schulhof, 1990) to assess visitor response to a native plant habitat exhibit. Visitors were asked to photograph features that they thought were the most interesting or that attracted their attention. The study participants were told they could take between 0 and 24 photographs, depending on how many scenes they thought were interesting. After completing the task, they were asked to describe the scenes and their reasons for taking the photographs. Approximately a third of the photos were of water scenes and a fourth was of scenes that showed novelty in the landscape.

The preceding studies illustrate how photographs have been used in informal settings as a research tool to examine visitor behavior, memories, learning, satisfaction, interest, and preferences. Researchers took the photographs in some of the studies, whereas visitors took the photographs in other studies. Both methods document some of the social and physical contexts of these settings and may be used to increase our understanding of learners and learning in these settings. Visitor Employed Photography was used in a study at the Florida Museum of Natural History (FLMNH) in Gainesville, Florida, to better understand student attention in exhibitions. This study is briefly described below.

VEP at the Florida Museum of Natural History

Visitor Employed Photography was used to examine student attention in the Florida Museum of Natural History’s Dickinson Hall facility. The permanent and temporary exhibitions in Dickinson Hall, prior to their closing in December 1997, reflected the museum’s collections and research expertise in the natural sciences and anthropology of Florida and the “circum-Caribbean.” The permanent and temporary galleries covered more than 17,000 square feet and included interpretive panels and object cases; hands-on, interactive exhibits; and full-scale, three-dimensional environments.

Methods

The methodology for this study was adapted from other research employing VEP (Cherem & Driver, 1983; Schulhof, 1990; Taylor, Sexton, & Czarnowski, 1995) and from Damico (1985). Damico used photography in the formal setting as a research tool to examine student perceptions of school. She gave middle-school students a task description that first asked them to pretend they were writing to a pen pal they had not met and that in their letter they would describe their school. The task was for the students to take photographs that might be included with their letters. The photographs taken by the students were analyzed to determine who was included in the photos, the type taken, the location within the school, and the themes.

The task description used by Damico (1985) with adolescent students in three middle schools was modified for use with middle-school students in the Florida Museum of Natural History. The study participants were 128 7th-grade students who visited the Florida Museum of Natural History on a school field trip. Approximately 46% of the students were African American, and 54% of the students
were white. There were an equal number of male and female students. Additional data about each student were obtained from school records and included socioeconomic status (SES), general achievement, and science achievement.

On an activity worksheet, students were asked to rate their interest in science and indicate whether they had visited the museum before. Prior to the museum field trip, standardized presentations were made in the science classes about trip logistics, student worksheets, and operation of the one-time-use flash cameras. As an incentive for participating in the study, students were told that they would receive a copy of the photographs they took. The students were not given the activity description until they arrived at the museum. They could visit as few or as many of the exhibitions as they wished and take their six photographs within the exhibition halls as they wanted. The instruction given to the students to guide their photography was to pretend they were writing a letter to a pen pal and wanted to take photographs of the museum to include with their letters. The intent of the activity was to determine how students directed their attention toward the exhibitions and to determine if student characteristics (gender, ethnicity, SES, general achievement, achievement in science, interest in science, prior visitation) had an influence on the types of photographs taken.

Results
Out of the 768 possible photographs (128 students x 6 photos each), 667 photographs (86.8%) were developed. The student worksheets provided descriptions for 736 photographs (95.8%). The difference between the total possible number of photos and the actual number of usable printed photographs was due to improper use of cameras, poor image quality, or students not taking all of their six pictures. The student-written descriptions of the photographs varied widely—from detailed, precise information copied from exhibition labels, to one- or two-word descriptions with misspelled words, to no description.

The students took the most photographs (more than 25% of the total number) in the Fossil Study Center exhibition. The next highest percentage of photographs, almost 20%, was taken in the Object Gallery. Thus, these two exhibitions account for approximately 45% of the photographs taken by the students. Both exhibitions were object-rich, and each contained some of the most photographed exhibit components, such as the shark jaw, sloth skeleton, and T. rex skull in the Fossil Study Center, and the bears and live snakes in the Object Gallery. In terms of location, the Fossil Study Center was the second closest exhibition to the museum lobby, and the Object Gallery was the farthest exhibition from the museum lobby.

Some of the students’ photographs included people. A picture was coded “people” if it appeared that a person was included in the photograph intentionally. A picture was coded “object” if no people were in the photograph or if people were present but did not appear to be a planned part of the photograph. Using Yates Correction for Continuity, significant differences ($\chi^2=361.442$ at $\alpha=.05$ and $df=1$) were found between the number of object-oriented pictures and the number of people-oriented pictures taken. More than 86% (579 photos) of all of the photographs had an object orientation, whereas only 13% of the photographs had a people orientation.
More than 59% of the students (n=75) did not take any photographs with people in them, whereas 41% of the students (n=53) took one or more photographs with people in them. A variety of variables, including the students’ gender, race, SES, general achievement, science achievement, interest in science, and previous visitation to the museum, was investigated to determine if one or more of these variables resulted in a significant difference in the “object” or “people” orientation of the photographs. Regression analysis revealed that from these variables, two were statistically significant at $\alpha=.05$. African-American students took more people photographs than white students, while reduced-lunch-status students took fewer people photographs than no-lunch-assistance students.

DISCUSSION

The photographs taken by the students throughout the museum exhibitions demonstrate the individual nature of the museum visit and the differences in the ways attention is directed. The learning in this informal setting was free-choice, and how time was spent and what was photographed varied among the study participants (Bitgood, Serrell, & Thompson, 1994; Koran & Shafer, 1982). Characteristics of visitors should be considered when developing exhibitions and programs for diverse populations because of the ways they can influence attention and subsequently learning outcomes (Koran & Koran, 1986). Characteristics of exhibitions—including the topics, location, exhibit type, and characteristics of the objects, such as size and movement—must also be considered. The number of photographs with people in them documents the social nature of museum field trips for some of the students. Thus, both social and physical contextual factors and individual characteristics influence how students and visitors direct their attention (Falk & Dierking, 2000).

CONCLUSIONS

The study at the Florida Museum of Natural History illustrates the advantages of Visitor Employed Photography as the photographs provided a relatively unobtrusive measure of how students directed their attention in this museum. The photographs were firsthand products from the study participants, and they provided a record of the social and physical contexts of the setting as well as the individual nature of the museum visit. Further research is needed to examine (a) how the task description influenced the type of photographs taken as suggested by Cherem and Driver (1983), (b) why the students took the particular photographs they did, and (c) the extent of learning that occurred in relation to each of the photographs. The social nature of the museum visit and its impact on how the students direct their attention also need to be explored further. This is consistent with the increased emphasis in cognitive psychology on the importance of sociocultural perspectives in learning (Bereiter, 1994; Phillips, 1995) and that both individual and social perspectives must be considered (Anderson, Greeno, Reder, & Simon, 2000). For museums, this emphasis on individual and social perspectives may result in the development of exhibitions and programs that will broaden our audiences so they are more inclusive.
Museums are rich institutions for learning—natural history museums for science learning in particular because of the presentation of both the products and processes of science. The findings from this study illustrate the primary role objects play as the foundation of museums, their centrality to exhibitions, and their importance to museum visitors as has already been described by numerous authors (e.g., Falk & Dierking, 1992; Melton, 1935). However, even though many of the photographs were of the same objects, very different kinds of learning may be occurring due to individual differences in prior knowledge and experiences, interests, and cognitive ability (Bitgood, Serrell, & Thompson, 1994; Falk, 1999; Falk & Dierking, 1992, 1995, 2000; Koran & Koran, 1986). The cultural backgrounds of visitors (Damico, 1985; Herrmann & Plude, 1995; Jacobson, Arana, & McDuff, 1997; Ogbu, 1995) also must be considered when developing exhibitions and programs for informal settings because of the ways they can influence both who comes to these settings and what occurs during the visit. As shown by this study, photography shows promise as a tool for visitor research because it allows the examination of both individual perspectives as well as the social and physical contexts of informal settings. Information learned can in turn be used to attract diverse audiences to and increase the effectiveness of exhibitions and programs in informal settings for all visitors.

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RESEARCH BRIEF

SUMMATIVE EVALUATION OF GOLDEN GATE
CANYON STATE PARK VISITOR CENTER

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CONTEXT
Golden Gate Canyon State Park is located approximately 25 miles west of Denver and attracts over half a million visitors each year who enjoy the scenic, natural, and recreational values of the park. A visitor center, located just inside the southern boundary of the park, was remodeled in 1998 to contain a variety of interpretive exhibits and interactive educational materials. Colorado State Parks was interested in how visitors use the exhibits, how visitors benefit from their experiences in the visitor center, and how successes and failures with these exhibits might be translated into future state park interpretive planning.

STUDY PURPOSE
The specific purpose of this summative evaluation was to:

- Identify exhibit and/or interpretive elements in the visitor center that attract and hold visitor attention
- Understand how visitors perceive the interpretative media presented in the visitor center
- Use observation data to support exhibit recommendations for future Colorado State Parks visitor-center planning

METHODS
Data were collected between late July 1998 and August 1999 using (a) an observation form to determine which exhibit areas in the visitor center are most used by visitors and (b) a self-administered visitor survey to determine preferences for and satisfaction with visitor center goods and services.

Data were captured using a stratified (by day of week and time of day) random-sampling plan during the highest visitation months (late July through early September). Sampling was changed to non-probability, purposive sampling for

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fall (late September through late November) and winter (December through June) due to decreased visitor numbers during these times. All data collection was completed by volunteers and staff at the Golden Gate Canyon State Park Visitor Center.

Observation Form
To understand how visitors allocated their time and attention to visitor center exhibits, an observation form was developed to record holding times for each of 24 separate exhibits and visitor use areas, including an information desk, bookstore, and bathrooms. Date, time of day, gender, age, group size, weather, and observer comments were also recorded using this form.

Self-Administered Survey
In addition, a 2-page, 16-item self-administered survey was developed to understand (a) visitor motivations for coming to the park and the visitor center, (b) visitor satisfaction with the visitor center and its exhibits, (c) usefulness of the visitor center exhibits, and (d) certain visitor demographics. A combination of open-ended, Likert-scale, and forced-choice items were used on the survey.

RESULTS
A total of 715 observations and 336 surveys were completed between July 1998 and August 1999. The following is a summary description of visitors to the visitor center and a synthesis of holding times and exhibit use by visitors to the visitor center.

Descriptive Results
Almost half (49%) of respondents were male. Most visitors (80%) were from Colorado, but a number (18%) were from out of state, and a few (2%) were international visitors. Almost two-thirds (66%) of the visitors traveled to the park as a family. Nearly a quarter (22%) traveled to the park with friends, and 11% traveled there alone. Only a very few (1%) traveled to the park as part of an organized group.¹

Golden Gate Canyon State Park is a popular outdoor recreation destination approximately 25 miles west of Denver. As might be expected, many visitors (60%) cited recreation as their primary reason for visiting the park. Other reasons included: to obtain maps/directions/information (9%), just curious (5%), want to be outside in nature (5%), and other reasons (20%).² Nearly half of all visitors (40%) suggested that information and maps were their main reason for visiting the visitor center. Almost another quarter (22%) stopped at the visitor center to purchase their annual park pass. Some (7%) stopped because they were curious, some (3%) indicated they wanted to learn something, and others (28%) gave additional reasons³ for stopping at the visitor center.

¹Although groups visit the state park often, due to logistics they were not surveyed systematically in this research.
²Other reasons included: time with family, close/convenient, learn more, get away, and so forth.
³Other reasons included: spend time with family, use the bathrooms, first-time visit, and so forth.
Visitors discover the visitor center in a number of ways. Over a third of visitors surveyed (38%) had been to the park previously and were returning to the visitor center. A little more than a quarter (29%) discovered it by simply driving by. Almost that many (20%) were referred by a friend or family member, and only a few (4%) discovered it by calling the park. An overwhelming percentage of visitors (98%) indicated they were either satisfied or very satisfied with their visit. No one indicated dissatisfaction with her or her visit.

**Timing and Tracking Results**
Observation data of 715 visitors were gathered for 24 separate exhibits and visitor use areas (Table 1). Overall visitors spent about 6 minutes on average in the visitor center. By exhibit, visitors spent less than a minute with many (about half) of the 24 exhibits. Average holding times for exhibits ranged from 15 seconds (drawer in the Tree Trunk area) to 186 seconds (Lincoln Logs in the history area). The bathrooms (142 seconds)

\[1\]

the bookstore (139 seconds), and the touch-screen video (130 seconds) all had average holding times greater than 2 minutes. The largest percentage of visitors stopped at the bathrooms (57%), the information desk (54%), the map (32%), the bookstore (31%), and the elk habitat (31%) (Table 1).

Holding power was calculated by dividing the holding time in seconds for each of the 24 exhibit/visitor use areas by the mean time needed to “process” that particular exhibit/use area. Mean time needed to process was mean seconds from five park staff who were instructed to “read each exhibit as if you were going to be asked test questions over the material presented.” Although more than adequate time (>100%) was devoted to three exhibits—the drawer in the snag (100%), the relief map (120%), and the touch/scent boxes (130%)—holding power for many exhibits was lower than 50%. When exhibits were segmented by holding power (%) and visitor use (%) (Figure 1), data suggest that overall visitor use of exhibits is low overall, but holding power of interactive exhibits is relatively high.

**Conclusions**
From these data, a number of conclusions can be drawn:

- Overall, visitors to the visitor center are satisfied with their visit, though visitor use of the exhibits is less than might be expected or desired.
- The information desk, bookstore, touch-screen video, and bathrooms have the highest holding times, which seems consistent with visitor reasons for visiting the visitor center—for information, directions, and bathrooms. Informal learning and exploration seem to be secondary to comfort and information needs.
- Although visitor use of the exhibits was minimal overall, many of the interactive exhibits had greater holding power than some of the non-interactive exhibits. This is somewhat consistent with earlier

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\[1\] Although the bathrooms and the chairs near the fireplace are not truly exhibits, they were included to compare time spent on care and comfort needs versus time spent on informal learning and exploration.
Table 1. Holding times and visitor usage of each visitor center exhibit

<table>
<thead>
<tr>
<th>Exhibit area</th>
<th>Holding time, mean in seconds (min., max)</th>
<th>Time to process$^a$</th>
<th>Holding power (%)</th>
<th>% stopped (n of 715)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1=Audiotapes$^b$</td>
<td>101 (3, 405)</td>
<td>297</td>
<td>34</td>
<td>7 (48)</td>
</tr>
<tr>
<td>H2=Family album</td>
<td>91 (2, 405)</td>
<td>373</td>
<td>24</td>
<td>8 (61)</td>
</tr>
<tr>
<td>H3=Wall panels</td>
<td>74 (2, 727)</td>
<td>229</td>
<td>32</td>
<td>16 (115)</td>
</tr>
<tr>
<td>H4=Lincoln Logs$^b$</td>
<td>186 (2,999)</td>
<td>n/a</td>
<td>n/a</td>
<td>8 (61)</td>
</tr>
<tr>
<td><strong>Tree trunk area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1=Snag exhibit</td>
<td>45 (2, 684)</td>
<td>60</td>
<td>75</td>
<td>9 (64)</td>
</tr>
<tr>
<td>T2=Drawer in snag$^b$</td>
<td>15 (4, 32)</td>
<td>15</td>
<td>100</td>
<td>1 (9)</td>
</tr>
<tr>
<td><strong>Information services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I1=Daily information board</td>
<td>30 (2, 720)</td>
<td>35</td>
<td>86</td>
<td>22 (158)</td>
</tr>
<tr>
<td>I2=Information desk</td>
<td>116 (2, 999)</td>
<td>n/a</td>
<td>n/a</td>
<td>54 (387)</td>
</tr>
<tr>
<td>I3=Bookstore</td>
<td>139 (3, 999)</td>
<td>n/a</td>
<td>n/a</td>
<td>31 (222)</td>
</tr>
<tr>
<td><strong>Relief map</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1=Relief map/light panel$^b$</td>
<td>71 (1, 720)</td>
<td>60</td>
<td>120</td>
<td>32 (227)</td>
</tr>
<tr>
<td>M2=Geology panels</td>
<td>32 (4, 114)</td>
<td>77</td>
<td>42</td>
<td>7 (54)</td>
</tr>
<tr>
<td><strong>Wildlife diorama</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1=Elk habitat</td>
<td>40 (2, 345)</td>
<td>170</td>
<td>23</td>
<td>31 (223)</td>
</tr>
<tr>
<td>W2=Scat and notebook$^b$</td>
<td>35 (3, 280)</td>
<td>47</td>
<td>74</td>
<td>7 (52)</td>
</tr>
<tr>
<td>W3=Animals sounds phone$^b$</td>
<td>54 (5, 248)</td>
<td>145</td>
<td>37</td>
<td>13 (95)</td>
</tr>
<tr>
<td>W4=Touch/scent boxes$^b$</td>
<td>39 (2, 205)</td>
<td>30</td>
<td>130</td>
<td>5 (38)</td>
</tr>
<tr>
<td>W5=Wildlife viewing</td>
<td>43 (3, 187)</td>
<td>62</td>
<td>69</td>
<td>10 (69)</td>
</tr>
<tr>
<td>W6=EcoPuzzle$^b$</td>
<td>72 (5, 363)</td>
<td>83</td>
<td>87</td>
<td>13 (94)</td>
</tr>
<tr>
<td><strong>Recreation wall</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1=Care of parks</td>
<td>34 (4, 587)</td>
<td>102</td>
<td>33</td>
<td>8 (60)</td>
</tr>
<tr>
<td>R2=Touch-screen video$^b$</td>
<td>130 (2, 734)</td>
<td>222$^c$</td>
<td>59</td>
<td>14 (100)</td>
</tr>
<tr>
<td>R3=Recreation choices</td>
<td>82 (3, 999)</td>
<td>167</td>
<td>49</td>
<td>16 (112)</td>
</tr>
<tr>
<td>R4=Weather</td>
<td>42 (2, 219)</td>
<td>134</td>
<td>31</td>
<td>6 (43)</td>
</tr>
<tr>
<td>R5=Kids panel and cubes$^b$</td>
<td>45 (3, 210)</td>
<td>56</td>
<td>80</td>
<td>8 (56)</td>
</tr>
<tr>
<td><strong>Care and comfort</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1=Chairs by fireplace</td>
<td>113 (5, 730)</td>
<td>n/a</td>
<td>n/a</td>
<td>5 (38)</td>
</tr>
<tr>
<td>C2=Bathrooms</td>
<td>142 (6, 999)</td>
<td>n/a</td>
<td>n/a</td>
<td>57 (408)</td>
</tr>
</tbody>
</table>

Average total time in VC=358 sec., or 6 min. (av. min. visit=6 sec.; av. max. visit=49 min.)

$^a$Time needed to process was calculated using mean time from five park staff who were instructed: “to read the exhibits as if you were going to be asked test questions over the information presented.”

$^b$Interactive exhibits.

$^c$Time needed to process video was mean of five staff responses to the narrative: “You have come to the park to fish. Use the touch screen video to learn about fishing at the park and to decide where to fish.”
studies (e.g., Washburne & Wagar, 1972; Countryside Commission, 1978) which suggest that visitors like dynamic, animated, and changing exhibits.

- Motivation to visit the visitor center was primarily for information and comfort reasons. Seeing exhibits (although they were minimally explored), may be correlated with high levels of satisfaction as suggested by other related studies (e.g., Zube, Crystal, & Palmer, 1978).

**Implications**

Although studies of visitor centers do exist (Washburne & Wagar, 1972; Zube, Crystal, & Palmer, 1978; Countryside Commission, 1978; Moscardo, & Pearce, 1986), few visitor studies have been conducted in state park visitor centers. This preliminary work would suggest that state parks (and other similar agencies) must consider carefully the extent to which indoor exhibits should be developed for visitors whose primary motivation is outdoor recreation. In this case, significant time and money were spent on visitor-center exhibits. In addition, the costs associated with building construction and interpretive master planning need to be considered. Infusing visitor studies into the interpretive-planning process is essential for maximizing efficiency and effectiveness.

Finally, although visitor satisfaction was very high in this study, few visitors took the time needed to sufficiently process the material presented in exhibits. In this park setting, exhibits varied by theme and type of interactivity. Two research questions are relevant for additional study: (a) what level of cognitive processing is

![Diagram](image)

**Figure 1.** Separate exhibits mapped by holding power and percentage visitor use.
desired or realized by visitors in situations where only brief encounters with park exhibits takes place, and (b) what holding power percentages are “reasonable” for visitors where informal learning may be secondary or tertiary to their initial reason for park visits. Further study to answer these questions may be useful.

REFERENCES


BOOK REVIEW

Exhibit Labels: An Interpretive Approach
By Beverly Serrell
Walnut Creek, CA: AltaMira Press

The title of this book undersells it. Although the book is directed toward beginning and intermediate label writers, its objective—to help us recognize quality and make informed decisions—is important for everyone involved in the creation of exhibitions. The author’s thorough discussion of the micro-level details of creating interpretive labels appropriately corresponds with the macro-level issues of creating exhibitions. This book is not merely about choosing words to put on exhibit labels; it is about attracting, communicating, inspiring, and helping visitors get what they are seeking.

The book has been used in college courses in museum studies and serves as a thoughtful commentary on exhibition theory and design. Chapters sometimes overlap and include cross-referencing so that the book can be read in any order, making the book a useful reference tool. The book is divided into four parts, moving from an overview of museum exhibitions to a more focused discussion of the museum audience and a detailed description of the tasks involved in creating labels. The final summary section builds on the “eight deadly sins” of Serrell’s earlier book, Making Exhibit Labels. Serrell follows her own prescriptions, beginning each chapter with a clear title, a summary or take-home message, and following up with frequent subheads to organize the text. She is careful to discuss issues pertinent to all types of museums and indicates exceptions that are unique to a particular context.

Part 1 of the book is an overview of interpretive and other types of labels but focuses on the issue that has arguably become Serrell’s calling card: the “big idea.” Labels, as well as exhibitions, should be guided by a big idea, or statement of what the exhibition is about. Creating a summary statement such as “Most of what we know about the Universe comes from messages we read in light” seems simple. But like many of the seemingly simple recommendations in the book, this is difficult to do well. Serrell provides good and bad examples, and returns to the issue of the big idea throughout the book.

Only after introducing the critical issue of establishing a big idea does the author move on to the focal issue of the book—interpretive labels. She argues that labels should tell stories, provoke, present contrasts, and change people’s attitudes. Serrell focuses on labels that tell meaningful stories and uses narratives from the work of Neil Postman to illustrate the point. Although inspiring, I found few connections between Postman’s visionary narratives and the issues I am likely to deal with in my everyday work with museums. Despite this, it did not take long for me to buy into the interpretive approach. Once you agree with the nature and importance of the

Note: Accepted September 2000.
big idea and the interpretive approach, the rest of the book follows naturally.

It is awkward then to find so much of the second part of the book devoted to a
discussion of visitors’ learning styles. Serrell warns that school-based research on
the different strategies people prefer to use in a learning situation has limited appli-
cation to the museum environment—yet an entire section is devoted to learning
styles. It would have been helpful, instead, to have a more detailed discussion about
how labels can accommodate the social nature of museum experiences. The rest of
Part 2 highlights a variety of useful topics, including visitor-friendly and bilingual
labels, as well as creating labels that ask questions.

Part 3, which deals with the specific task of creating labels, takes up less than
half of the book, underscoring the fact that Serrell places as much emphasis on
“what to write about” as “how to write about it.” Part 3 is the section that I return
to frequently when I need to refresh my memory about typeface or electronic
labels. This part of the book is peppered with frequent examples but wisely shies
away from making absolute conclusions about those unanswerable questions such
as, “How long does it take to write labels?” and “How many words should a label
contain?” Instead, Serrell provides guidelines backed up by years of evaluation work
and case studies that detail successes, failures, or hypothetical situations to facilitate
making decisions about these difficult issues.

In the final part of the book, Serrell provides a list of 10 sins to abstain from and
14 research and evaluation findings to consider while creating labels. These lists,
along with a glossary of general, evaluation, and technical terms, can do much to
facilitate communication within an exhibition team.

Serrell is careful to illustrate critical points throughout the book with photo-
graphs of exhibits and labels, but in many cases the actual label text is unintelligible
due to the quality of the image. More critical is the lack of thoroughness in the
index, making it difficult to use the book as a reference. On more than one occa-
sion, I have not been able to return to useful information in the book using the
index or the detailed subheadings in the table of contents.

I would have also liked to see some discussion about museum label anomalies. It
is not too difficult to guess why the text-heavy Baseball Hall of Fame in
Cooperstown, New York, holds visitors’ attention. But how is it that the Holocaust
Museum in Washington, D.C., succeeds with floor-to-ceiling labels? All of us have
seen exhibit labels that succeed despite breaking “the rules.” I had hoped Serrell
might have drawn on her extensive experience to comment on the anomalies that
raise interesting questions for our field.

Once you have read this book, it is impossible to ignore it. I find that Serrell’s
commentary comes to mind during all of my writing activities. One of the most
notable qualities that gives the book its lingering nature is Serrell’s personable
voice throughout the text. At times, she is even self-deprecating about her past
work, making it easier for me to be critical about my own past work as an exhibit
developer and to make informed decisions for my future work. This is an impor-
tant text for anyone who is involved with the creation of exhibitions.

Reviewed by Kirsten Ellenbogen, King’s College London, School of Education, Waterloo
Road, London SE1 9NN, kirsten.ellenbogen@kcl.ac.uk.
APPENDIX:
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FOR AUTHORS

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In recognition of how difficult it is for interpreters to keep up with the growing and diverse body of relevant literature, JIR will publish reviews of recent books, professional meetings and workshops, government publications, and original literature reviews and bibliographies dealing with heritage interpretation. Additionally, JIR will publish thought pieces that exhibit excellence and offer original or relevant philosophical discourse on the state of heritage interpretation. Review articles and thought pieces are reviewed internally by the JIR editorial staff.

JIR also includes a “Research Briefs” section. This section will accept reports of ongoing interpretation research. It will also provide an outlet for summaries of research studies with limited scope. Much heritage interpretation research consists of small “in-house” program evaluations and basic visitor studies. The purpose of this section is to communicate current research activities and allow readers to identify colleagues with similar interests.

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- Margins should be 1” on all sides.
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**References and Citations.** Include only references to books, articles, and bulletins actually cited in the text. As with all other matters of style, references must follow the *Publication Manual of the American Psychological Association* (4th ed.). References in the text should cite the author's last name, year of publication, and page (if appropriate). All references used in the text should appear at the end of the typed manuscript in alphabetical order according to APA style.

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*All other questions should be directed to:*

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