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dissertation entitled

An Attention Model for Museum Exhibits:
A Study of Motivation to Pay Attention by Free-Choice
Learners in Informal Learning Environments

presented by

John William Lightner

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Educational Psychology

Major professor

Date April 5, 2000

An Attention Model for Museum Exhibits: A Study of Motivation to Pay Attention by Free-Choice Learners in Informal Learning Environments

By

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Educational Psychology
and Special Education

2000

ABSTRACT

**An Attention Model for Museum Exhibits:
A Study of Motivation to Pay Attention by Free-Choice
Learners in Informal Learning Environments**

By

John William Lightner

Human attention and its motivational prerequisites receive a great deal of scrutiny in formal education but have not been the subject of comprehensive research in informal learning settings, such as museums. Even researchers who study formal settings use terms such as attention, interest, and curiosity interchangeably, or at least imprecisely. Based on research in varied fields such as attention, interest, relevance, and reading, I formed a theoretical model for use in informal learning settings which I call, *The Attention Model for Museum Exhibits*.

The purpose of this study was to identify those factors that motivate free-choice learners acting in informal learning environments to pay attention. These factors comprise an Attention Model for Museum Exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits.

I observed and interviewed forty-six groups of museum visitors to test the theoretical model. These visitors came from two studies that I conducted, one in 1998 and the other in 1999. They visited one of four exhibits from one of three

institutions: The Henry Ford Museum in Dearborn, Michigan; The Detroit Institute of Arts in Detroit, Michigan; and the Michigan State University Museum in East Lansing. I used theoretical (or purposive) sampling in order to generalize to theory and selected groups to the point of redundancy to ensure saturation.

The findings from this pair of studies support the choice of Interest and Relevance as categories for the factors that describe the dynamics of attention on the part of free-choice learners. The factors within each category, i.e., Enduring Personal Interest, Situation-Specific Interest, Curiosity, Personal History, and Group Influence, were able to describe the dynamics of the motivation to attend for the visitors who participated in this study. Further, the findings show that the attention model applied to visiting groups across the four exhibits and three institutions that were included in this study.

The Attention Model as proposed and refined by this study may be a viable theoretical tool in describing motivation in informal settings. The Attention Model has potential for guiding practice as well as further inquiry.

To my mother, Phyllis Lightner,

for her love and support.

And, posthumously, to my father,

George Lightner, who

was anxious to see the completion

of my graduate work, but never did.

ACKNOWLEDGMENTS

Every study is the cumulative effort of many individuals who have made a variety of contributions. I would like to thank the following people:

My committee chairperson and doctoral advisor, Steve Yelon, for his continued support throughout my graduate studies at MSU–first a second Master's and now the Doctorate. This study would not be a reality without him.

My committee, Jere Brophy, Doug Campbell, and Kris Morrissey, for their input and support.

The staff at Henry Ford Museum–especially Bob Casey, Curator of Transportation–who went out of their way to accommodate this study.

The staff at the Detroit Institute of Arts–Tara Robinson, Curator of Exhibitions; Matthew Sikora, Associate Educator; and Jennifer Czajkowski, Associate Educator–for their willingness to grant access and for their support.

The staff at the Michigan State University Museum–Kris Morrissey, Curator of Interpretation and Judy Smyth, Visitor Programs Coordinator–for their support and their flexibility.

The visitors to the Henry Ford Museum, the Detroit Institute of Arts, and the Michigan State University Museum who participated in this study, for taking time from their visit to help advance our knowledge about motivation and attention in informal learning settings.

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List of Abbreviations

Abbreviations	
C	Curiosity
DIA	Detroit Institute of Arts
EPI	Enduring Personal Interest
GI	Group Influence
GV	Greenfield Village
HFM	Henry Ford Musuem
MSUM	Michigan State University Museum
PH	Personal History
S-SI	Situation-Specific Interest

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CHAPTER I

INTRODUCTION TO THE STUDY

ATTENTION

Learning is a natural activity that begins at birth, or before, and continues throughout life. Educators depend on this natural human propensity in order to assist learners in achieving learning goals that are considered important to our society. But whether learning occurs in formal institutions, such as schools; in less formal settings, such as museums; or just as a part of daily life, learners must expend some level of psychic resources on the objects of learning. One sort of expenditure of psychic resources is called *attention* and is considered a prerequisite for learning.

Paying attention comes at a cost, however, since attentional resources are limited. A learner must conserve these limited attentional resources and will, therefore, choose to pay attention to stimuli that he or she considers meaningful. Educators are concerned about how a learner chooses to pay attention. They seek to better understand which conditions in the environment and which processes within the individual result in attention.

Both psychologists and educators agree that motivation influences attention. Motivation may be motivated either extrinsically or intrinsically.

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Educators often rely on rewards to motivate an individual to pay attention to learning outcomes that are considered important to society. These rewards may be extrinsic rewards, such as a good score on a test, or intrinsic rewards, such as allowing a student to freely choose to study a topic of interest to themselves.

Educators work in two types of learning environments: formal or informal. The formal environment, best represented by the school, is considered more controllable. Attendance is mandatory, graduation is necessary for many jobs, and schools have the mandate of society to assist students to achieve minimum learning goals. The informal environment, which may be represented by institutions such as museums, does not enjoy the level of control over learners that is characteristic of the formal institution. An individual may choose to visit the museum, but is not required to do so, and does not earn a degree. The museum carries no formal mandate from society to produce minimum learning outcomes for every member of society. The informal institution depends upon the motivation of individual learners who freely choose to visit and, ultimately, attain some of the institution's learning goals.

STATEMENT OF THE PROBLEM

Educators know a great deal about motivation in the formal learning setting; but much less is known about the motivational factors affecting attention in the informal setting. Museum professionals, including curators and educators,

hold personal opinions concerning motivation and attention in a particular exhibit within their institution; however, they have done little systematic research to verify these "hunches." Even less evidence exists that permits these phenomena to be connected to theory. The question they need to answer is, exactly which factors result in potential learners choosing to pay attention to the exhibit?

Museum educators must identify the motivational factors leading to attention if they are to design exhibits that attract attention. Without this knowledge of the environmental and psychological factors affecting visitor attention, even the most carefully constructed and adequately financed exhibits may fail to achieve the learning goals envisioned for them. Thus, a first step is to identify and verify the motivational factors leading to visitor attention.

PURPOSE AND OVERVIEW OF THE STUDY

The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention and to construct an Attention Model for Museum Exhibits that incorporates those factors. A secondary purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits of varying types. I drew from the literature in the fields of interest research, instructional design, cognitive psychology, reading research, and motivation in order to develop a model to guide the research. I refined the model based on the information obtained during the course of the

empirical studies.

I conducted two studies that were identical methodologically. I conducted a study in 1998 (fieldwork in 1997) in the transportation section of the Henry Ford Museum in Dearborn, Michigan. I observed and interviewed fourteen groups after they had visited the Chesapeake and Ohio #1601, a large super-power steam locomotive. In 1999, I observed and interviewed visitors at exhibits in three institutions. These were: The Luminist Gallery of American landscape painters at the Detroit Institute of Arts, a portion of the Aviation exhibit at the Henry Ford Museum, and a wildlife exhibit called "Our World: Diversity and Evolution" at the Michigan State University Museum in East Lansing. The 1999 study added thirty-two group interviews to the fourteen from the 1998 work. These observations and qualitative interviews formed the basis for determining the factors affecting the dynamics of attention, for verification and refinement of the Attention Model, and they provided the evidence for the model's application to diverse exhibits.

RESEARCH QUESTIONS

At the outset of the study I asked this question: **Which factors result in attention being expended on the exhibit?** The specific questions which arose from this overarching question were:

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1. What are the dynamics of motivation amongst free-choice learners in an exhibit-based, informal learning environment? Specifically, what are the elements of a psychological/social-psychological attention model for free-choice learners in an exhibit-based, informal learning environment that describes the dynamics of attention for these learners?

2. Can the attention model be substantiated across varying exhibits?

These questions, along with the review of the literature, guided my development of a qualitative study using theoretical, or purposive, sampling (Diers, 1979; Morse, 1986) to accomplish a deductive test of the theory. Visitors were first observed, then interviewed (see Chapter III), to discover the dynamics of their attention and then to see how those results fit the theoretical model and, if not, how the model needed to change in order to accommodate what was discovered in the field.

RATIONALE AND SIGNIFICANCE

This study was designed to make contributions to the fields of lifelong learning, educational psychology, and museum education. Practitioners in each of these areas share an interest in motivation leading to paying attention and the readiness for learning that attention signifies. The findings of this study will contribute to these fields by providing a refined Attention Model for Museum Exhibits to guide current practice and future research.

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Scholars in the fields just mentioned are all interested in human learning and the requisite conditions that make such learning possible. To date, there has not been any systematic research conducted in informal learning environments, such as museums, to validate the prerequisites of attention and move such findings closer to a connection with theory. This study launches a program that will make contributions to the practice of museum education and connections to theory.

These studies were conducted in four unique environments. These environments contained objects that are fascinating, historical, beautiful, exotic, and significant. However, the Attention Model may be adaptable to all museum exhibits and, I would suggest, to informal learning in general. The model encompasses the motivational dynamics of most human encounters with objects and phenomena.

STUDY CONTEXT AND METHODS

The context for this study was three museums with varying collections and audiences. The 1998 study was conducted in a museum of American history and technology. I chose a specific exhibit, the Chesapeake and Ohio locomotive #1601, at which to conduct the study (See Appendix G, Photo 1, and Drawing 1). This locomotive is a part of the larger railroad exhibit within the transportation section of Henry Ford Museum in Dearborn, MI. The Ford Museum is in turn a part of the larger Edison Institute that also includes Greenfield Village, an outdoor

museum that includes many historic homes and buildings that have been moved to the site.

The #1601 is located within the Great Hall of the museum. There are 12 acres of exhibit space in this Hall. Other display areas in the Hall are: Communication, Lighting, Agriculture, Home Arts, as well as major exhibits such as "Made in America" and "Henry's Story." There is also an "Innovation Station" and a hands-on area. The transportation section in which the locomotive is located also includes carriages, trucks, Presidential vehicles, and a major exhibit called "Automobile in American Life." Attached to the Great Hall is the front of the museum, the facade of which is a copy of Independence Hall, but much larger. In this area are exhibits on silver and pewter, clocks, jewelry, ceramics, and glassware. There is also a major exhibit called "The Motown Sound: The Music and the Story." The remaining public spaces within the museum are a theater, museum store, and café.

The participants in this portion of the study were fourteen groups who visited the C&O #1601 on the days that I spent on the floor of the exhibit during the month of March, 1997. I first observed these groups as they worked their way through the exhibit to see if they displayed any behaviors that would indicate their expenditure of attention on the locomotive. After I observed them displaying behaviors indicative of attention, I approached them to explain what I was doing

and ask their permission to engage in a short conversation about their visit to the locomotive.

The 1999 study added three additional exhibits to the study, where I employed identical methods. One of these was in the same institution as the 1998 study, the Henry Ford Museum. This exhibit was a portion of the larger Aviation exhibit. The aircraft included were a 1931 Pitcarin Autogiro, the 1939 Sikorsky helicopter, and the 1928 Ford Tri-motor that Admiral Byrd navigated over the South Pole. The participants in this portion of the study were twelve groups who visited these aircraft on the days I spent on the floor of the exhibit during the month of August, 1999.

The two additional sites that I used were located at institutions that displayed and interpreted different objects. The first of these was the Detroit Institute of Arts. I chose one of the galleries in the American art section that displayed paintings from a school of American landscape artists called the Luminists. The participants in this portion of the study were ten groups who visited the gallery on the days that I spent on the floor of the exhibit during the month of July, 1999.

The final site was a wildlife exhibit at the Michigan State University Museum. I chose an exhibit called "Our World: Diversity and Evolution." This exhibit displayed birds, animals, and reptiles from a variety of habitats around the

world and which represented many topics related to diversity and evolution. The participants in this portion of the study were ten groups who visited the exhibit on the days that I spent on the floor of the exhibit during the month of August, 1999.

A total of forty-six groups, or 119 individual visitors, participated in this study across the four sites. These visitors were encountered during two visiting seasons: winter (1998) and summer (1999).

The data collection and analysis methods for this study are drawn from the qualitative tradition. Field notes and conversations with subjects are the data. The researcher was the instrument used for data collection and analysis.

ANALYSIS

I used the components of the theoretical Attention Model as a preliminary set of coding categories. Other categories were sought during the analysis process. Management of the data during the analysis phase was facilitated by the use of the QSR NUD*IST®[1] qualitative data analysis software.

I extracted patterns and trends as well as connections to the Attention Model from the coding and analysis. I report research findings according to the major themes that emerged from the analysis and their connections to the Attention Model; I refined the Model on the basis of the analysis. I provide a more detailed description of the methods in Chapter III, "Methodology."

SCOPE AND LIMITATIONS

The scope and limitations of this study result from the choice of method, setting, and participants. There are at least four limitations, three from choice of method and one based on setting and participants: 1) The sample was not randomly chosen. Instead, groups exhibiting attention-like behaviors were asked to consent to a conversation about their visit. The results of the study cannot be generalized to a population, only to theory. 2) I relied on one contact with the participants. I did not ask them to provide me with their names and contact information, negating my opportunity for follow-up on areas that might benefit from clarification after the fact. 3) I spent a very short period of time talking with each group of people. These participants had paid admission to the museum (in all but the MSUM) and were there to get their money's worth. I spent from 5 to 10 minutes with each group, on average. 4) The interviews were conducted while the visitors were still in the exhibit or gallery. There was the temptation for them to want to continue with their visit and there were the distractions of other visitors moving past during the interview. Each of these limitations–method, setting, and participants–will be briefly discussed in turn.

Limitations from Method

Qualitative studies, like their quantitative counterparts, have strengths and weaknesses. One of those weaknesses is the inability to generalize to a population

using sampling and probability theory. But I chose the method based on the question, which called for theory building and chose to go one step further by not using random sampling at all. This loss of the ability to generalize is offset by the theory building power derived from theoretical, or purposive sampling (Diers, 1979; Yin, 1993). I selected cases (groups) at each site until I reached redundancy (Lincoln & Guba, 1985), thus ensuring that I had reached saturation (Morse, 1994). I wanted to generalize to theory and use theory to make predictions and confirm those predictions.

I made the choice to forego sampling because the thrust of this study was to determine what people who were demonstrating attention-like behaviors were thinking and what motivational dynamics might be at work. It was, therefore, essential to choose people who were paying attention (topical relevance; Yin, 1993) in order to investigate those factors. Although the sample could have been randomly selected from groups paying attention, I thought there seemed to be nothing to be gained by doing so.

A further limitation was the inability to follow-up after the initial conversation. It is most useful in a study such as this one to be able to contact the participants during the analysis phase to clarify a point or to verify the researcher's emerging conclusions. Questions arise after the fact that can only be adequately answered by querying the participants themselves. I purposely chose not to make

provisions for follow-up. I thought visitors would feel more free to talk if they were assured anonymity and that it was unnecessary to follow-up due to the preliminary nature of this study.

The final limitation of method was the short time spent with each group. I spent varied times with each group. I gauged the time spent with the groups based on the clues I perceived during the interview concerning the group's apparent desire, or not, to move along to the next exhibit. Additional insight may have come from extended conversation, but the information they shared seemed adequate.

Limitations from Setting and Participants

I chose to conduct the interviews at the point where I encountered the group–as they left the exhibit–recognizing that this choice had the potential to impose limitations. All interviews were conducted in the exhibit or gallery, on the museum floor. The strength of this approach is that groups had just experienced their visit when our conversation began and they were still within the exhibit environment, allowing them to glance back at the exhibit and providing them with a sense that they could continue their visit to the other exhibits in the museum by merely stepping away from the interview.

There was also the possible temptation for the group to want to step away prematurely. The ease of stepping away from the conversation to move along to

the next exhibit may well explain the shortness of a few of the conversations. Another weakness was the overall noise level and activity of other visitors. These temptations had the potential to interfere with participants' concentration as they provided their information.

The reader may refer to Chapter IV, "The Participants and Setting" for additional information that may assist in determining strengths and limitations of the study. The foregoing is provided as a preview.

SUMMARY AND OVERVIEW OF THE STUDY

Attention is one way in which learners willfully direct their psychic resources. Attention is only discernable to an observer when visitors engage in behaviors indicative of their sensory orientation. These behaviors may include looking, touching, pointing, circling, approaching, or stopping. Informal environments, such as those found in museums, allow learners to freely choose to engage in these behaviors.

I posed the question, "Which factors result in attention being expended on the exhibit?" This question represents the gap in our knowledge about motivation and attention in museum exhibits. I introduced the research questions, rationale for and significance of the study , study context and methods, and scope and limitations.

In *Chapter II*, I present a "Review of the Literature" in order to establish the origins for the research questions. Chapter II will also describe the construction of the Attention Model for Museum Exhibits that I built from the literature to provide the theoretical basis for this study.

In *Chapter III*, "Methodology," I discuss the methods used in this study. I also present a brief description of the research sites and participants as well as more information on data collection procedures.

In *Chapter IV*, "Research Findings," I explain the patterns and trends extracted from the information provided by the conversations with the participants. This is presented in two parts: 1) A description of the emerging themes from each group and, 2) The flow through the Attention Model exhibited by each group.

In *Chapter V*, I present "Conclusions and Discussion" and include a review of the major conclusions and hypotheses based on my interpretation of the data. These conclusions and hypotheses may become the basis for future research and discussion.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention. These factors comprise an Attention Model for Museum Exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits. I reviewed literature from the areas of attention, interest, and relevance to integrate what is known about attention. It is from this literature that I developed the attention model that forms the basis for the field study and I refined the model on the basis of the analysis of the data from the field study.

Schunk (1996), Gagné (1985), and Keele (1973) consider attention to be a prerequisite for learning. Information processing theorists in particular focus on how people attend to environmental events and are concerned with the sequence and execution of the cognitive events related to attention. This study looked at the events that precede a visitor's attending behaviors in the museum context. From these events we may infer motivators to pay attention.

Many writers use the term attention and some of its prerequisites, such as interest, somewhat loosely and interchangeably. This review developed clear

distinctions between these terms by calling for their strict use. I built the attention model based upon these distinctions.

ATTENTION TO MUSEUM EXHIBITS

Attention is a critical prerequisite for learning whether in the formal classroom or in the informal museum exhibit. Koran and Koran (1983) state that attention is a critical factor in visitor learning and that, to be effective, the exhibit must ". . . attract visitor attention, maintain that attention, and provide useful information" (p. 14). My two studies concern themselves with attracting visitor attention. Attention must, however, be purposeful.

James (1890/1950) contends that attention ". . . is the taking of possession . . . [of] the mind, in clear and vivid form . . . [by] 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" (p. 403-404). James elsewhere calls this selective attention *selective interest.* He describes attention as a choice on the part of the learner:

> Millions of items of the outward order are present to my senses which never properly enter into my experience. Why? Because they have no *interest* to me. *My experience is what I agree to attend to.* Only those items which I *notice* shape my mind--without selective interest experience is utter chaos . . . It varies in every creature but without it the consciousness of every creature would be a gray chaotic indiscriminateness, impossible for us even to conceive [italics in the original] (James, 1890/1950, p. 402).

Attention is a limited human resource. Museum professionals need a firm understanding of the motivational prerequisites to attention if they expect their visitors to budget scarce attentional resources on a particular exhibit. I envision the attention model as a psychological tool that will encompass salient factors that describe the dynamics of attention in museums.

ATTENTION RESEARCH IN MUSEUMS

Research in museums has been predominately quantitative and focused on exhibit evaluation rather than theory-based research. The study of attention in museums has historically been approached in terms of the time visitors spend within an exhibit. Robinson, in a classic study, *The Behavior of the Museum Visitor* (1928), coined the term *Holding Power*. An exhibit having high holding power was, and still is, considered more successful than one that has low holding power. One of the most unobtrusive ways of measuring holding power is by observing the length of time a visitor stays at the exhibit. The exhibit with high holding power ostensibly has the visitor's purposeful attention for a longer time than does the exhibit with low holding power.

Time is an easy and unobtrusive way of measuring attention and learning if a correlation can be verified between time spent at an exhibit and learning. Falk (1983) measured time and coded behavior in an attempt to correlate them with cognitive learning from the exhibit, measured by a pre- to post-test score.

Videotapes were used to time the visit and to categorize visitors' behaviors. Falk concluded that ". . . the results provide a strong endorsement for developing an evaluation procedure based upon unobtrusive parameters such as time on task and observable nonverbal behavior" (p. 274). But are gains on a pencil-and-paper test the outcomes in which we are interested? Many museum educators may only be concerned that their exhibits are well "used," not that a visitor can recall the ten main points from the exhibit label. If so, the holding power may not be based on the correct premises.

Beverly Serrell (1997) has compiled data from 108 exhibitions in order to study allocation and duration of visitors' time. She posits that the amount of time and number of stops are systematic measures that can be indicators of engagement with the exhibit (p. 121). Serrell developed two indices, sweep rate and percentage of diligent visitors. The first measures the speed at which visitors "do" the museum, the second determines how effectively the exhibit was used in terms of visitors who spent significant time there. She concludes, "Visitors who spend relatively more time usually are the ones who stop at more elements and become engaged in more of what the exhibition has to offer . . . the pattern seems to be to spend more time by making more stops" (p. 121). There is, however, still no way to assess the visitor's experience by coding behavior and timing stops. We must ask visitors about their experience and identify any significant psychological

outcomes.

These researchers, and the many others who use time as a measure of success, insist that time spent at an exhibit correlates with learning. These studies do not, however, always identify the kind of learning that results from time spent in a museum exhibit with the learning objectives established for that exhibit. More importantly, related to this study, they do not identify what creates the holding power. Are we only interested in cognitive outcomes? What about affective outcomes? Or, are there psychomotor outcomes from some exhibits? The museum community has not come to consensus on what outcomes indicate an exhibit's success or, for that matter, whether social, attitudinal, or psychomotor outcomes might be the most appropriate indicators of success (c.f. Laetsch et al., 1980). Perhaps it is enough that visitors have used the exhibit. But museum educators and educational psychologists are interested in psychological outcomes such as motivation and learning. We need to also determine the indicators of success once these outcomes are identified and agreed upon.

Time spent with an exhibit does not, however, provide any explanation for the motivations that lie behind attention. Very little has been done since Robinson's 1928 study to add to our knowledge of motivation to attend in museum exhibits. Instead, museum researchers have been seemingly enamored by this concept of measuring attention with a stopwatch, citing its unobtrusive nature

as their rationale. I would like to make an initial contribution toward filling this gap in our understanding of the motivation that lies behind the psychological factors of attention in the museum through the results obtained from this study.

DEVELOPMENT OF AN ATTENTION MODEL

"Hooking" Attention

I began this project when I was in the motivation seminar (CEP 910, "Current Issues in Motivation and Learning") at Michigan State University with Carole Ames and Jere Brophy in 1996. It was about that time that I began to develop an interest in motivation and learning in informal settings, such as museums. I chose to study the work of Mihaly Csikszentmihalyi for a project in my motivation class that required us to "shadow a researcher." I chose Csikszentmihalyi because he had been involved in a planning conference, held in 1994, that explored the long-term influence of museums. The conference was hosted by John Flak and Lyn Dierking and was funded by the National Science Foundation.

Mihaly Csikszentmihalyi and Kim Hermanson, a graduate student of his, wrote a chapter called, "Intrinsic Motivation in Museums: Why Does One Want to Learn?" in the book that Falk and Dierking (1995) wrote as a result of the

conference. That chapter had a figure, reproduced here as Figure 1, that inspired me to undertake the pair of studies that are reported here.

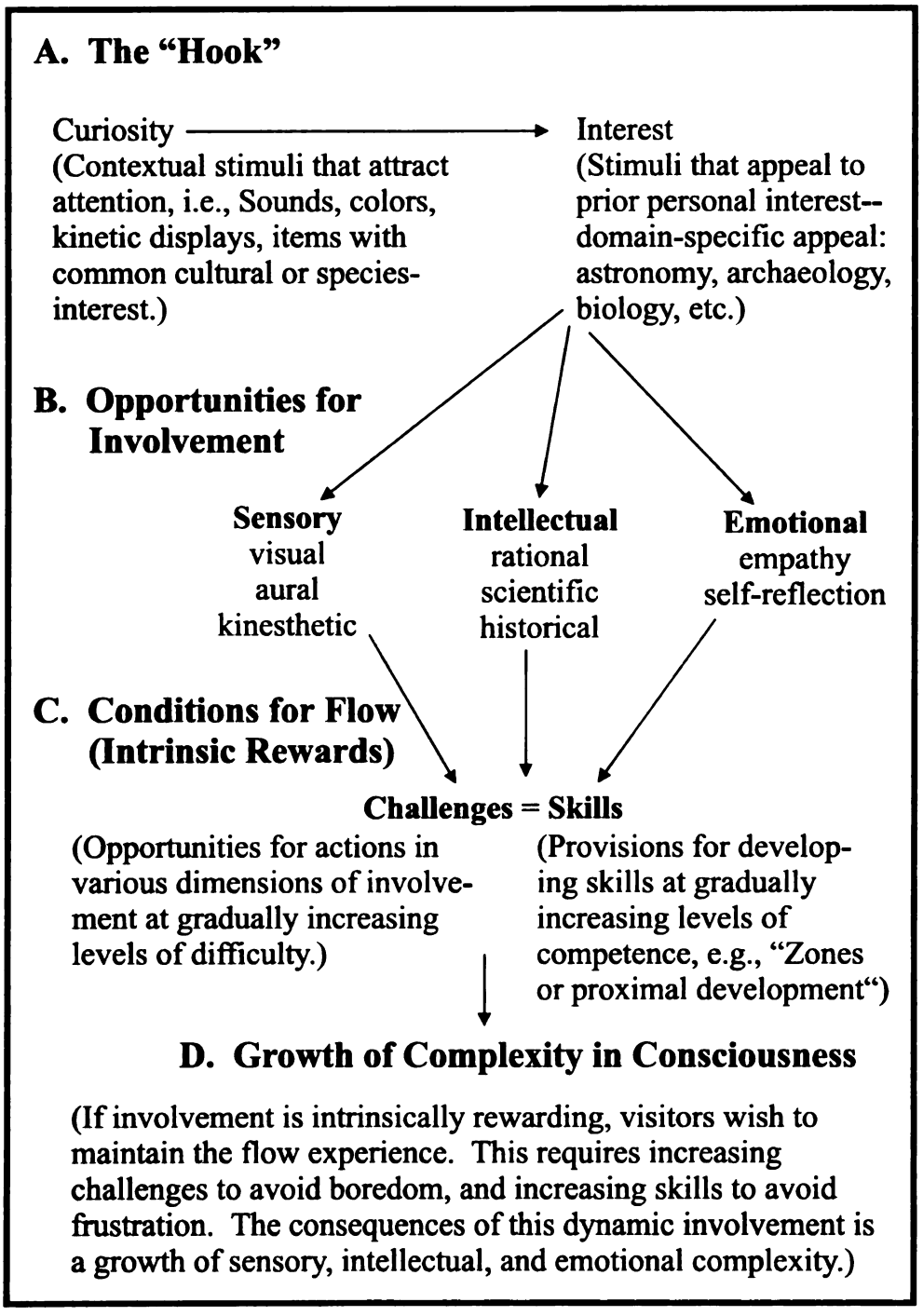


Figure 1 Csikszentmihalyi and Hermanson Motivation Model (Adapted from Csikszentmihalyi & Hermanson, 1995)

It was the "hook" in their figure that gave birth to my thinking about attention in museums. The "hook" is the first step in the process of attention; it describes how the museum exhibit "captures" (Csikszentmihalyi & Hermanson, 1995, p. 72) or attracts the visitor's attention. It is my opinion that Csikszentmihalyi and Hermanson hurried over this portion of the figure in their haste to discuss levels B, C, and D where they discuss "flow" and some of its conditions. They describe the process of attracting visitors in terms of the exhibit "hooking" the visitors' attention by appealing to their curiosity or propensity to attend to novel stimuli. They go on to place arousal of prior interest as the next event which keeps the visitor engaged long enough to permit any possibility of learning. But it simply is not logical to expect a person with a previous interest would need some novel stimulus in order to engage his or her attention in something that is already meaningful to them. Csikszentmihalyi and Hermanson's haste in connecting these two factors can be corroborated by reference to the text in their chapter, where curiosity and interest are discussed quite thoroughly and accurately.

The real "hook" also seemed to me to be much more complicated than the way it was shown. For example, I see curiosity often leading directly to attention (and, possibly, subsequent learning), while an individual's prior interest almost always leads to attention in the objects of interest (also with the possibility of

subsequent learning). It was my concern over the inconsistencies between the Csikszentmihalyi and Hermanson "hook" and my observations of people that led to the attention model and the studies reported in Chapter IV.

Building a New "Hook"

I believe that the curiosity-to-interest pattern of Csikszentmihalyi and Hermanson must be replaced by a more viable model if we are to understand how we can capture, or "hook," visitor's attention in museum exhibits. I believe a case can be made for a model that uses *Interest* and *Relevance* as its organizing categories.

Interest

Many researchers consider interest to be a phenomenon that emerges when individuals interact with their environment. Krapp, Hidi, and Renninger (1992) divide interest ensuing from person-environment interaction into *Individual Interest* and *Situational Interest*. Individual interest is specific to the individual, relatively stable, associated with increased knowledge, positive emotions, and increased reference value (Krapp, Hidi, & Renninger, 1992, p. 6). For example, a person with an individual interest in stained glass may not share that interest with any of her co-workers, continues to have that interest for many years, is always learning more about stained glass, and even is known to many of her close friends

and acquaintances by this interest. Situational interest, on the other hand, emphasizes the role of the environment and is generated by stimulus characteristics, is most generally evoked suddenly by an event in the environment, tends to be short lived, but may have a more permanent effect that could lead to the emergence of individual interest. For example, a person might encounter an exhibit on raccoons and pay attention based on characteristics of the exhibit that he finds intriguing, only to walk away after a few minutes and never give another thought to raccoons or the issues presented in the display. Csikszentmihalyi and Hermanson (1995) use *Curiosity* to refer to situational interest and *Interest* to refer to individual interest (See Figure 1).

Enduring Personal Interest (EPI)

Csikszentmihalyi and Hermanson maintain that curiosity moves to interest. They state, "After the individual's curiosity is aroused, the exhibit must engage sustained interest in order for learning to take place" (p. 73). But sustained interest need not necessarily begin with curiosity. The visitor who has an individual interest in the subject matter of a particular exhibit will be interested in it without requiring some novel stimuli to generate curiosity. Instead, the individual with an enduring personal interest will seek out specific exhibits that correspond to that interest. I will call Csikszentmihalyi and Hermanson's interest and Hidi's individual interest *Enduring Personal Interest.* This enduring personal

interest is a viable "hook" for the visitor with a stable personal interest.

Situation-Specific Interest (S-SI)

Csikszentmihalyi and Hermanson's curiosity, as opposed to enduring personal interest, is a phenomena that could appeal to the individual who has yet to develop an enduring interest in the subject matter of a particular exhibit. Curiosity is also what Hidi (1990) calls situational interest. Situational interest does not refer to individual differences, but refers to commonalities; most individuals in the population manifest an interest when presented with interesting objects. Maw and Maw (1968) define curiosity in terms of behavioral indicators. A person who is curious

> Exhibits a need or a desire to know more about himself and/or his environment . . . scans his surroundings seeking new experiences . . . persists in examining and exploring stimuli in order to know more about them (p.462).

This exploratory behavior, then, reflects the human desire to know more about one's environment when it is unfamiliar–it reflects the desire to learn about things and is more of a 'scientific curiosity.'

I'm choosing to call Csikszentmihalyi's and Hermanson's curiosity as well as Hidi's situational interest, *Situation-Specific Interest.* This is because Hidi's term comes closer to describing the phenomena and because curiosity has a more delimited definition in the literature. This situation-specific interest is a viable

"hook" for the visitor who encounters something interesting.

Curiosity (C)

The literature on curiosity is best represented by the work of David Berlyne. Berlyne's (1963) collative motivation best describes the activity resulting from a person's curiosity about objects or events in the environment. Collative motivation describes the initiation of exploratory or epistemic exploratory behaviors upon an encounter between an organism and collative stimulus properties in his or her environment (p. 316),. Berlyne's collative stimuli, or variables, include: novelty, surprisingness, change, ambiguity, incongruity, blurredness, and power to induce uncertainty (p. 290). Thus, paying attention based on collative variables is a function of the biological drive of humans to explore and understand their environment when it presents surprises[2]. The variable that elicits the attention under colative motivation is the exhibit environment where something novel or out of the ordinary is encountered by the visitor. The visitor is passive until he or she encounters something novel and incongruous. Curiosity is relatively stable across the population of human beings. That is, most human beings would exhibit curiosity in response to a unique stimulus. However, it could also be argued that curiosity is affected by the values of the society, thus further refining the idea of 'population' to those groups that share a common heritage and, therefore, find similar things curious. I call this

interest variable *curiosity*, as does Berlyne.

Summary–Interest.

Three factors that fall beneath the larger category of interest emerge from this discussion. First, enduring personal interest–a stable characteristic of the individual to be interested in particular things. Next, situation-specific interest–a common attribute of the population to pay attention to things that are perceived to be interesting. Last, curiosity–that occurs when the individual encounters surprises or incongruities, resulting in attention. For the purposes of this study, therefore, I will consider interest to be either *enduring personal interest, situation-specific interest,* or *curiosity.*

Relevance

Csikszentmihalyi and Hermanson do not discuss the relevance of the exhibit to the visitors' personal backgrounds and immediate setting, but relevance deserves consideration in a discussion of intrinsic motivation. True, an exhibit is relevant to the visitor with an enduring personal interest in the subject matter of that exhibit, but there are additional relevance factors that could work as the "hook" to draw visitors to a particular exhibit. Keller (1979, 1983, 1987a) defines relevance as, ". . . sustained motivation [that] requires the learner to perceive that *important personal needs* are being met by the learning situation [emphasis in the

original]" (Keller, 1983, p. 406). Examples of important personal needs in the museum may include Maslow's[3] (1954) *belonging needs*. I interpret the ability to connect the objects to one's own personal history and sharing an engagement with the object with one's group as being representative of these belonging needs.

The interest-plus-relevance distinction comes from the work of John Keller. Keller's ARCS Model (1987b) of instructional design includes the elements of Attention, Relevance, Confidence, and Satisfaction. Keller posits that any instructional unit must include these elements if motivation to learn is to occur. The reader will immediately notice that the first two elements of ARCS are Attention and Relevance, not Interest and Relevance.

In Keller's earlier work (1983), the model was Interest, Relevance, Expectancy, and Satisfaction; certainly not as memorable as the ARCS acronym, but the interest component is in its proper place as a prerequisite for attention. He equates interest, however, with curiosity, so even here Keller falls victim to the muddled distinction between attention, as an outcome, and its prerequisites; a common trap that is so prevalent in the literature.

A visitor's own personal history would seem to be a potentially powerful factor in helping the visitor to make a connection to the exhibit. People are always fascinated to find something that relates to their personal lives. Roberts (1997) succinctly says, "Visitors' interest and attention is determined not by an

object's inherent appeal but its *relevance* to their own framework of knowledge and *experience* [emphasis added]" (p. 69). Any object that bears on a visitor's personal experience is likely to be judged relevant and result in the visitor paying attention.

Group influence constitutes another possible relevance factor. Individuals who are members of a visiting group influence other group members in a variety of ways. Diamond (1986) talks about reciprocal influence of group members, where interactions with the exhibit are effected by interactions with other group members. Sterry (1994) characterizes visitors as active participants who recognize a connection with their own history through personal experience and recollection, resulting in a sense of the group's own history and identity (p. 131). Dierking and Falk (1994), in a review of family behavior and learning research, give support to Sterry's position that visitors–especially adults–attempt to relate information to their prior knowledge and experience. Dierking and Falk also spend some time talking about group agendas. They say, "Visitor 'agendas' are shaped by a variety of factors including prior knowledge and experience with the content of the informal science setting, motivation, and interest and can result in a variety of expectations. . ." (p. 61). The group, therefore, appears to exert tremendous influence during museum visits.

Summary–Relevance

This discussion leads to the conclusion that two factors fall beneath the larger category of relevance. First, personal history–a possible connection with the visitor based on the becoming aware that he or she shares history with the object. Second, group influence–the power of the group to influence the attention of individual members. For the purposes of this study, therefore, I will consider relevance to be either *personal history* (PH) or *group influence* (GI). Personal history and group influence are also viable "hooks" for visitors with affiliation and social needs, i.e., belonging needs.

Summary–Interest & Relevance

I believe *Interest* and *Relevance* are viable replacements for the curiosity-to-interest description of Csikszentmihalyi and Hermanson's "hook" in Figure 1. Figure 2 illustrates the motivational roles of interest and relevance as I envision them from the literature. The individual casually scans the environment for potentially interesting or relevant stimuli. However, the person does not begin to pay attention to the exhibit until they have "connected" with the exhibit through either interest or relevance. From an information processing point of view, interest and relevance are two motivational mechanisms that help the individual select among several competing inputs for his or her attention (Schunk, 1996).

According to a consensus of theoreticians, interest and relevance appear to be viable constructs that describe the dynamics at work when a visitor makes connections to a museum exhibit, resulting in attention. Either of these connections could result in the visitor directing his or her attention toward the exhibit. Interest and relevance may also work interactively.

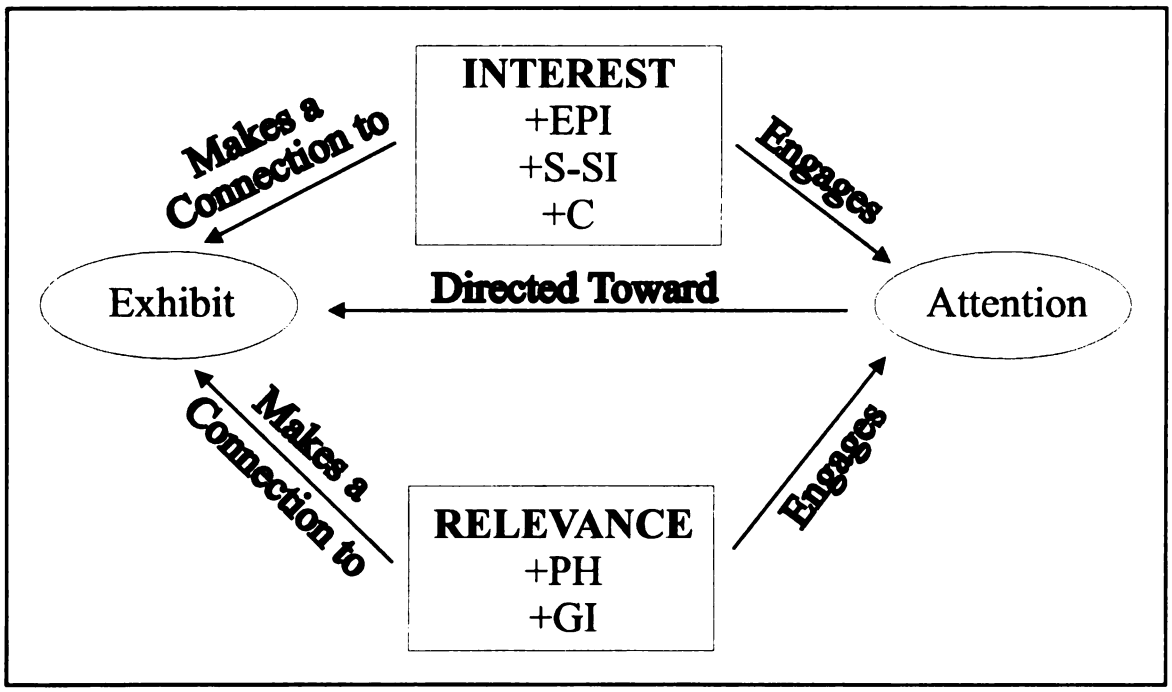


Figure 2 Motivational Roles of Interest and Relevance

THE ATTENTION MODEL FOR MUSEUM EXHIBITS

The proposed Attention Model for Museum Exhibits is shown here as Figure 3. The museum visitor is represented by the dashed circle in the model. The psychological attributes of visitor interest and relevance just discussed are shown inside the dashed circle while the influence of the group is shown outside

the circle. Interest is depicted as being Enduring Personal Interest, Situation-Specific Interest, or Curiosity, while relevance is depicted as Personal History or Group Influence[4]. Connections to the exhibit are shown by the dashed lines with arrowheads (paths #1, #2, & #3, in Figure 3). That is, a visitor may connect to the exhibit through Enduring Personal Interest, Situation-Specific Interest, Personal History, or Curiosity. The possible psychological interaction between interest and relevance factors is depicted by the solid lines with arrowheads on both ends inside the circle.

For the purposes of this study I conceived group influence as being initiated when one, or more, individual(s) within the group connect(s) to the exhibit (path #5 in Figure 3) and influence another group member (paths #6, #7, #8, #9, & #10 in Figure 3) to attend to the exhibit. The group member being influenced by his or her peers might simply be curious about what others find interesting, be reminded of a shared connection to their personal history, or simply be directed to look at the exhibit by another group member. It is quite likely that group interaction through discussion is very powerful in mediating attention. The possible result is that the influenced individual will be motivated to pay attention to the exhibit by the activities of the group.

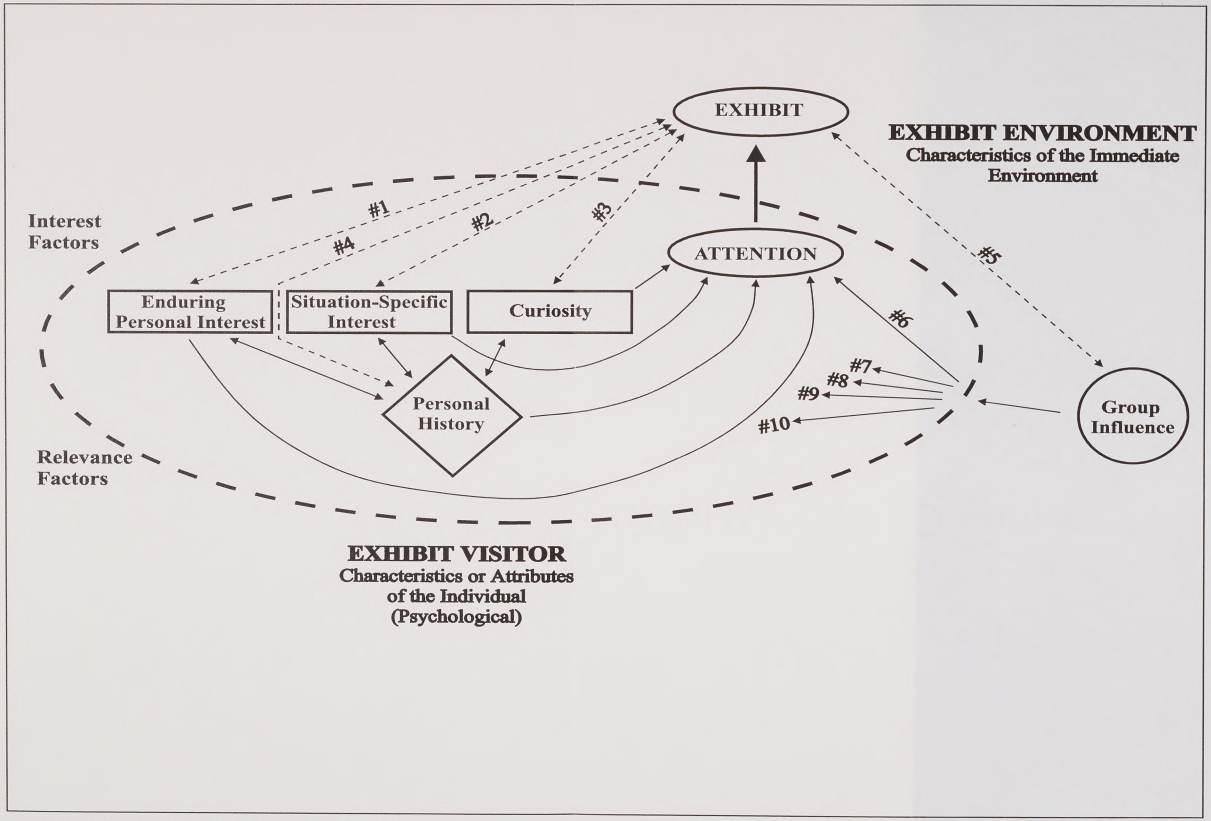


Figure 3 Attention Model for Museum Exhibits

The interest and relevance factors from Figure 3 are further described in Table 1:

INTEREST	A differential likelihood that an individual will choose to pay attention to a particular object based on his or her idiosyncratic interests. These different kinds of interest are described by the factors of the attention model: enduring personal interest, situation-specific interest, or curiosity.
Enduring Personal Interest	A durable characteristic of the individual to be interested in specific objects and, as a result, to pay attention to them. This factor includes the kinds of interests that friends would list if they were describing this person, i.e., clocks, painting, trains, etc.
Situation-Specific Interest	An opportunistic likelihood that an individual will choose to pay attention to a particular object based on his or her perception of the object's interestingness. This factor is based on the individual's desire to know more about his or her environment. This is what most people mean when they say someone is a *curious* person. Situation-specific interest is, however, more like scientific curiosity–the propensity to probe and discover.
Curiosity	A characteristic of the individual to choose to pay attention to objects that are novel or incongruous. This factor is based on the individual's desire to reduce uncertainty and to resolve ambiguity. Curiosity is a general characteristic of the population, but certain individuals may exercise more or less curiosity than others.
RELEVANCE	A differential likelihood that an individual will choose to pay attention to a particular object based on their idiosyncratic perceptions of relatedness. These different kinds of relevance are described by the factors of the attention model: personal history and group influence.

Relation to Personal History	Refers to the likelihood that an individual will choose to pay attention to an object based on a perceived connection between the object and his or her own past. This factor is based on the individual's awareness that the object has some degree of personal meaning.
Group Influence	Refers to the likelihood that an individual will choose to pay attention to an object based on a perceived association between the object and his or her group. This factor is based on the individual's awareness that the object has some degree of shared meaning amongst group members.

Table 1 Definition of the Interest and Relevance Factors of the Attention Model in Figure 3.

How the Model Might Work

A visitor who became interested in locomotives, landscape art, historic aircraft, or wildlife through previous experience would come to the museum with an enduring personal interest in such things. Such a visitor would have decided to come to a specific museum because of the objects in the collection or, if not, the visitor would purposely seek out such an exhibit once he or she learned that the museum had these objects.

Situation-specific interest, on the other hand, is not related to an enduring interest on the part of the visitor. Instead, situation-specific interest is a more general interest, a more universal trait in the population that is triggered by situational factors. In the museum, a visitor who has no enduring personal interest in the objects may become interested when particularly interesting objects are

encountered, or, for that matter, such a visitor may view almost any object in a museum as interesting. The visitor then pays attention on the basis of the interest elicited by the encounter.

Curiosity is a response to a novel object or an incongruous placement of objects. An individual's curiosity is raised when the objects introduce ambiguity. Curiosity is elicited when the individual finds himself or herself in an uncertain situation, surrounded by objects that just "don't make sense" when considered from the visitor's usual frame of reference. Curiosity is a drive that motivates the individual to gather information in order to reduce or eliminate the uncertainty created by the environment.

Connections to personal history vary from individual to individual–they are idiosyncratic. Any given visitor may or may not have personal linkages through family, family friends, or personal friends who have historical connections to exhibits or to the historical context that the objects represent. For some visitors this connection will become known when they encounter the exhibit and will form the basis for attention; this is a direct connection. For others, connections to their personal history are mediated by their enduring personal interest, situation-specific interest, or curiosity in that they chose to pay attention based on one of the three interest factors and then discover a connection to their past. The connection is an indirect one, going first from an interest factor, then to relevance.

An example of direct connection to personal history would be the case of a visitor to a locomotive exhibit who remembers, as a by-product of the encounter, that steam locomotives were still running on the tracks through their hometown when he or she was a child. The visitor might be moved to recall many childhood memories relating in some way to the trains. One such memory might be the ritual of going to the depot every afternoon with a group of friends to see the passenger train arrive. The visitor might remember seeing the loading and unloading of baggage, recall mingling with passengers arriving and departing, reminisce that the station master was their neighbor, etc. This rush of memories might result in attention being directed toward the locomotive in the exhibit. Another visitor might have been attracted by situation-specific interest when she saw the locomotive's bell, wondering why locomotives had bells. She might then remember a trip to her sister's where the trains passed nearby. Only then does she remember hearing the locomotive bell ring as the train neared the crossing. She was already paying attention based on her situation-specific interest but the connection to her personal history caused her to attend longer and probably left a deeper impression of the exhibit.

Outside the dashed circle that represents the visitor is the visitor's immediate environment. This environment is limited, in this study, to the exhibit and the visitor's group. The exhibit has characteristics that make it potentially

interesting, and it thus may appeal to the visitor's enduring personal interest, situation-specific interest, or curiosity. A connection is also possible as a visitor makes links to their personal history.

Another aspect of the immediate environment for each person are the other members of their visiting group. Many visitors come to the museum as a member of a group and may be influenced to pay attention by others in the group. One person in the group may remember an uncle telling about seeing an Autogiro. He relates that story to the others in the group and a discussion of such early aircraft ensues. All group members are now paying attention and engaged with the exhibit as a result of the attention of one other person.

The Complexities of Group Influence

Group influence may occur in one of four ways (paths #6, #7, #8, #9, & #10 in Figure 3). First, a member of a visiting group may have their curiosity aroused directly as he or she makes an attempt to discover what someone else finds so interesting. Second, someone could explain how he or she finds the exhibit to be so interesting. Third, someone in the group could express his or her own enduring personal interest in the artifact. Fourth, someone in the group might express a connection to personal history that also affects another group member. And, last, the individual's attention may be directly focused on an object if another group member directs them to look at it or describes it. In all cases, it is

the activity of the group that results in the non-attender ultimately choosing to pay attention.

To some extent, the individuals in the group act like members of a single body, in the same way that hands and feet are both members of the human body. One member may be attracted to an exhibit by enduring personal interest and, thus, focus the other member's attention on the basis of the non-attending member's curiosity, situation-specific interest, connections to personal history, or by focusing attention directly. Take, for example, an attending group member simply saying, "Look at that!" and pointing to the object. Others in the group will pay attention on the basis of that direct appeal to look. One individual's connection may, therefore, apply to the entire group. The result is attention on the part of previously non-attending members of the group.

SUMMARY

I have reviewed literature from the areas of attention, interest, and relevance to integrate what is known about attention. It is from this literature that I developed the attention model that forms the basis of the field study. Csikszentmihalyi and Hermanson posited a model for museum motivation, but that model did not explain the way the "hook" operated, and although Keller offered great promise in proposing Interest and Relevance, he explained interest as curiosity. Representative interest research from the field of reading[5] was

brought into play to fill the gaps in the museum literature. I developed the Attention Model from this eclectic mix of literature to form the basis for a more complete explanation of the "hook."

Researchers have undertaken studies in museums primarily to accomplish formative or summative evaluations of specific exhibits. These studies use time as a measure of attention but the results do not provide information that will help in understanding the psychological factors that motivate visitors to pay attention to exhibits. It appears, therefore, that a gap exists in the museum studies literature that can only begin to be filled by providing a better understanding of what the dynamics of attention really are. Specifically, we need to know which factors motivate free-choice learners acting in an informal learning environment to pay attention, what kind of an attention model organizes these factors, and whether the attention model is applicable across multiple exhibits.

CHAPTER III

METHODOLOGY

INTRODUCTION

The literature on attention in museums is limited to measurement of time and observation of behaviors. Little is known about the events that precede a visitor's decision to pay attention to the exhibit, or about the psychological factors that motivate that decision. The museum literature also proved inadequate in assisting with the development of the attention model. I found it necessary to reach out to the areas of instructional design, reading research, and work in the field of artificial intelligence in order to amass sufficient theory to develop the model.

A significant contribution can be made to the field of museum studies by developing a better understanding of the factors which result in attention to a museum exhibit. This chapter describes the research sites, samples, procedures used, and data coding and analysis.

THE RESEARCH SITES

The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention. These

factors comprise an attention model for museum exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits. I chose four museum exhibits as representative of informal learning environments and their visitors as representative of free-choice learners.

This study incorporates field data resulting from two separate studies using identical methodologies–a 1998 study and a 1999 study. I selected the Chesapeake and Ohio steam locomotive #1601 located in the transportation section of the Henry Ford Museum in Dearborn, Michigan for the 1998 study. The 1999 study used three sites: the Luminist Gallery of American landscape art at the Detroit Institute of Arts in Detroit, Michigan; three objects from the Aviation exhibit at the Henry Ford Museum; and a wildlife exhibit called "Our World: Diversity and Evolution," at the Michigan State University Museum in East Lansing.

THE EXHIBITS

1998 Study-Henry Ford Museum (locomotive)

I conducted the first study (1998) entirely within the railroad exhibit at the Henry Ford Museum, using a single exhibit. The Chesapeake and Ohio locomotive #1601 is a "modern" steam locomotive. This locomotive was built late in the steam era and represents the highest level of mechanical engineering to be realized in the design and construction of steam locomotives. It also represents

the scale of motive power needs required by the railroad companies in the 1940s.

Locomotive #1601 was built in December, 1941, by the Lima Locomotive Works in Lima, Ohio, for the Chesapeake and Ohio Railroad. In the railroad's classification system the #1601 was an H-8 or Allegheny[6] type. Hence, it is often referred to as "The Allegheny." Using a 2-6-6-6[7] wheel arrangement (See Appendix G, Drawing 1), the Allegheny is an articulated locomotive, meaning that the frame, under the rigid boiler, could flex as the locomotive negotiated curves.

The locomotive weighs in at nearly 600 tons when its tender and boiler are full. It is 11' 1" wide, 16' 5-1/2" tall, and 125' 8" long. It is, in short, a huge locomotive and, according to David P. Morgan, editor of *Trains*, ". . . regarded in certain circles as the most perfectly engineered articulated ever built, bar none" (quoted in Huddleston & Dixon, Jr., 1996, p. 13).

Without doubt the Allegheny represents what Leo Marx (1964) had in mind when he coined the term *Technological Sublime*. Marx protégée David Nye recounts the origin of the term:

> In nineteenth-century America certain machines began to receive the same kind of attention [as did objects within the aesthetic theory of the sublime]. Leo Marx has termed this response to displays of new railroads and steamboats as the "technological sublime," in which "the awe and reverence once reserved for the Deity and later bestowed upon the visible landscape is directed toward technology, or rather the technological conquest of matter" (1990, p. 59).

The Allegheny is a perfect example of this technological conquest of matter. This is not only so in its construction and great size, but in its ability to move tremendous quantities of freight,[8] conquering time and distance.

The awe, romance, and patriotism, typical of people's response to sublime objects, is expressed by Henry B. Comstock in an article in *Railroad*, as he compares the Allegheny (2-6-6-6) with the Union Pacific "Big Boys" (4-8-8-4):

> 'The last word in articulated power? [referring to the Union Pacific "Big Boys"]. Not quite.
>
> Turn time ahead a few months from their date of delivery [UP Big Boys] to December 9th, 1941--two days after Pearl Harbor. Out in Lima, Ohio, an office car has just pulled in from Cleveland. Chesapeake and Ohio motive-power officials cross the cinder-ballasted nickel Plate yards, pick up their 'dog tags' at the gates of the Lima Locomotive Works, and cut through the sprawling erecting shop to the open test-track beyond.
>
> Down where the rails curve to the right is another building, fresh with the smell of paint and dryer. They shove open the door and stop abruptly. The small builder's photo which each member of the party received with his identification card has given no hint of the spectacle within one hundred and twenty-eight feet of Appalachian tonnage mauler; a height from tire to smokestack rim of sixteen and one-half feet; twin sand domes with a combined capacity of eight tons of seashore; six pair of sixty-seven inch drivers and--that's right--a six wheel trailing truck. That extra axle wasn't put there for ornamentation. It had to be added to keep one hundred and thirty-five square feet of grate area below the level of the rear main wheel.
>
> Even the men who have watched this engine take shape from a score of tracing paper layouts cannot conceal a certain degree of pleased amazement. They climb into the cab's green interior; look down the long barrel, rolled from steel plate that measures an inch and one-eighth in thickness; drop back to the ground to inspect the tender trucks--one six- and one eight-wheeled unit, for better absorption of weight.
>
> Nobody doubts the word of D. S. Ellis, chief mechanical officer of the road, when he casually states that the 1600 will handle 5750 tons between Clifton Forge, Virginia, and Hinton, West Virginia, unassisted.

> There is further talk of a tractive effort of 110,200 pounds and an engine weight [without tender and water] of three hundred and forty-eight tons. But it takes a veteran newspaper man named Joseph Doherty to sum up the thought that is uppermost in everybody's mind. Turning to Walter Jackson, originator of 'Chessie,' the cat, he shakes his head and says:
>
> 'When people have the will to build an engine like this, they're bound to win a war!' (quoted in Huddleston & Dixon, Jr., 1996, p. 11-12).

Locomotive #1601 continues to make a lasting impression on the visitors who see it in the 1990s.

The locomotive has a prominent position within the railroad exhibit. This exhibit is on the far right side of the building as visitors enter by the center entrance (See Figure 4). Upon arrival, visitors receive a brochure called "Finding Your Way." This brochure includes a perspective floor plan with major objects shown; the Allegheny is shown on this perspective view. The locomotive is also listed in a section called "Historic Objects You Must See!"

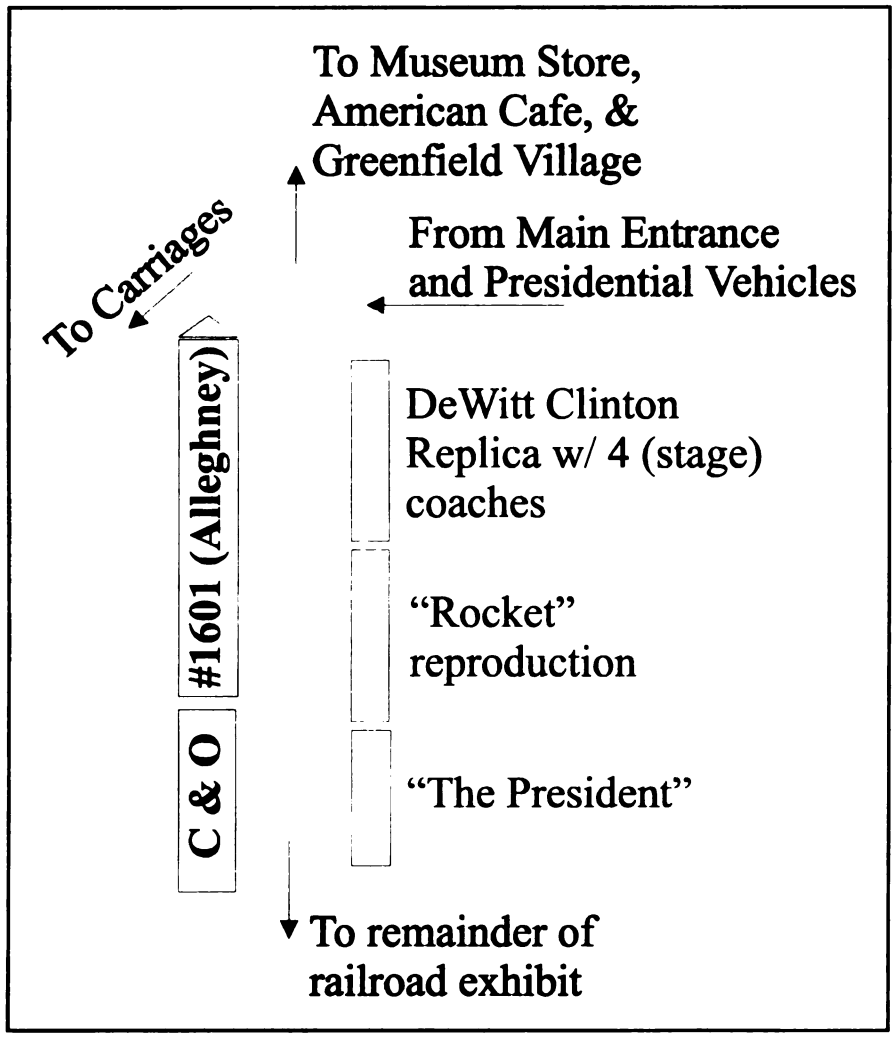


Figure 4 Allegheny Exhibit Area

As visitors move from the museum's main entrance to their right, they encounter the museum's collection of Presidential Vehicles. At the end of this display they come face-to-face with the Allegheny. Actually visitors have three choices at this point: 1) they can turn left and enter the railroad exhibit; 2) they can go straight and visit the carriages, which is not a very clear choice since the carriages are not visible; and 3) they can turn right to access the Museum Store,

American Café, or go to Greenfield Village.

Henry Ford Museum-Visitors

Henry Ford Museum and Greenfield Village operate five program seasons: Winter, Spring, Summer, Autumn, and December. According to a 1990 study by Hood Associates [Marilyn "Molly" Hood], the visitors do show some variations in psychographics from season to season. See Table 2 for some examples of variations that might impact this study (Note: n = 2,095).

Characteristic	Winter	Spring	Summer	Autumn	December
First-time visitors to Museum	23%	42%	47%	37%	16%
Attended on weekday	35%	31%	43%	28%	50%
Attended on weekend	65%	69%	57%	72%	50%
Respondents lived in Detroit metro area	53%	32%	22%	35%	56%
Respondents lived outside Detroit metro area	43%	63%	76%	64%	43%
Males	55%	56%	50%	55%	50%
Females	43%	44%	49%	45%	50%
Companion on visit to Henry Ford Museum/Greenfield Village on survey date:					
Family	58%	52%	64%	55%	57%

Friends	21%	15%	12%	16%	17%
Family and friends	4%	8%	6%	7%	12%
Came alone	14%	12%	7%	12%	10%
Organized group, other	2%	14%	10%	10%	4%

Table 2 Representative Audience Characteristics (Hood Associates study, August 1991)

I highlighted the winter column to represent the visiting season in which I conducted this study. Note that 65% of the winter visitors attend on weekends and that 58% of the winter visitors are family groups. I conducted my study on the weekend and encountered predominately family groups. In the autumn, visitors are even more likely to visit during the weekend (72%) and almost as likely to be family groups (55%). In fact, visitors to Henry Ford Museum and Greenfield Village tend to prefer weekend visits, ranging from 57% to 72% during the standard weather-based seasons (winter, spring, summer, and fall). Only during the December season is there a 50-50 split between weekdays and weekends. Family groups dominate the psychographics, being 52% or greater. The next highest percentage of visitors is the "friends" groups, what I call social groups. The winter portion is 21%. Between family and social groups, therefore, the portion of visitors represented is 79%.

The Sample-Henry Ford Museum (locomotive)

I observed and interviewed fourteen groups who visited the museum during the month of March, 1997. See Table 3 for a brief description of the groups. I selected each group included in this study on the basis of their attending behaviors. I interviewed these groups on two dates, March 1, and March 29, 1997, both Saturdays. I chose weekends in order to avoid conflicts with school trips. I visited the museum during days when school trips were being conducted and I noted that the entire atmosphere of the museum was radically changed by these large, noisy groups. There seemed to be an energy that made every visitor more intent on rushing through their visit and, therefore, much less likely to spend time looking at the locomotive and more prone to cut their conversations with me quite short. The noise level was also increased remarkably, making transcriptions of tape recorded interviews more problematic.

Group Number	**Description**	**Number of People**
1	Mechanical engineers from Italy. In town for the SAE (Society of Automotive Engineers) convention, which just concluded.	3
2	Older father and mother up from Toledo, OH. Visiting with adult son/daughter and daughter/son in-law.	4
3	Mechanical engineers from the U.S. Visiting as a follow-up to the SAE Convention.	3

4	Retired husband and wife. Here with family, but family was not with them during the interview.	2
5	Grandparents and adult granddaughter.	3
6	Grandparents with minor grandson	3
7	Family group. Husband, wife, minor son and daughter.	4
8	Older couple from Canada	2
9	Father and adult son. In museum with additional family.	2
10	Husband and wife.	2
11	Two brothers from Canada.	2
12	Two retired men.	2
13	Father with minor son and daughter.	3
14	Parents with adult son and daughter in-law.	4
Table 3 Groups Interviewed (HFM–Locomotive)		39

I did not randomly select the sample (as noted in Chapter I) for three reasons. First, this study focused on the dynamics of attention, making any group paying attention a viable candidate for the sample. Second, I was not relying on statistical methods that demanded a random sample in order to generalize to a population. Third, and last, this study was exploratory in nature, seeking to tease out the traits and attributes that are present in groups and individuals who are paying attention to the locomotive and to give the attention model its initial test. It was not necessary, therefore, to work with non-attending groups.

1999 Study-Detroit Institute of Arts

The 1999 study was conducted in three different exhibits, in three different institutions. The first of these was the Luminist Gallery of American landscape painters, located at the Detroit Institute of Arts, in Detroit. This is a specialized gallery of landscape art that features paintings by artists who used light to create paintings with a "timeless" quality.

The gallery contains one dozen paintings that range in size from 37.47 cm x 31.75 cm (height & width) [Gifford, "Kaaterskill Falls"], to 142.24 cm x 215.9 cm [Church, "Syria by the Sea"]. The paintings are displayed on the four walls of the almost square room that has two archways and is furnished with a pouffe in the center. See Figure 5 (the painting numbers refer to the key numbers in Table 4). I also reproduce the gallery label in Figure 6; it gives additional information concerning the art, artists, and genre:

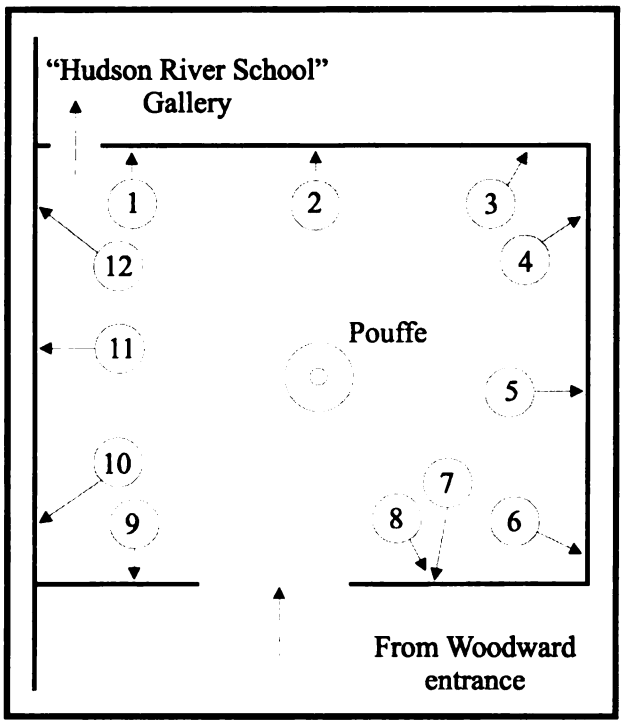


Figure 5 DIA–Luminist Gallery

This gallery contains works by a group of American landscape painters known as the Luminists.

The Luminists were especially interested in capturing the quality of light and the effects of atmosphere. Because of this they painted landscapes with low horizon lines so they could show large areas of sky.

These painters worked largely on the East Coast, but drew their inspiration from distant lands, which they saw as exotic. For example, for a largely urban audience the American West and South America represented vast expanses of untamed and unspoiled land. Mediterranean scenes offered romantic views of ruins from ancient Greek and Roman civilizations that evoked a melancholy sense of past glory.

For 19th-century American audiences, painting represented the highest level of artistic achievement, and landscape was considered the most important subject matter. Most valued were large paintings, such as those seen here, featuring dramatic lighting effects, awe-inspiring scenery, and the opportunity to glimpse the wonders of faraway lands.

Figure 6. Luminist Gallery, Gallery Label

The two largest paintings in this gallery are by Frederic Edwin Church. "Cotopaxi" is 121.92 cm x 215.9 cm and "Syria by the Sea" is 142.24 cm x 215.9 cm [the largest]. Sweeney (1991) says, "America's leading landscape painters at midcentruy [19th] were Frederic Edwin Church and his arch-rival Albert Bierstadt" (p. 158). The DIA did not have any Bierstadt on display during this study. Sweeney goes on to say, "Church vied for the title 'monarch of landscape painting' with Albert Bierstadt and later Thomas Moran. These artists built their reputations on theater-sized paintings of western scenery inspired by Church's own grandiose expressions of sublimity and nationalism" (1991, p. 158). One Moran piece was on display, "The Fisherman's Wedding Party." Table 4 gives a list of the paintings in the Luminist Gallery.

Key to Fig. 6	Artist	Painting (All are Oil on Canvas)	Year	Size (in Cm.) (H x W)
5	Frederic Edwin Church	Syria by the Sea	1873	142.24x215.9
8	George Inness	Hudson River Valley	1867	60.96x87.63
12	Martin Johnson Heade	Sunset	c. 1880	43.82x92.39
1	Martin Johnson Heade	Hummingbirds and Orchids	1880s	36.2x56.52
7	Sanford Robinson Gifford	Kaaterskill Falls	1871	37.47x31.75
9	Albert Bierstadt	The Wolf River, Kanssa	c. 1859	122.56x97.16
4	Thomas Moran	The Fisherman's Wedding Party	1892	60.96x83.82
3	Louis Remy Mignot	Lagoon of the Guayaquil River, Ecuador	1863	61.6x96.52
2	Frederic Edwin Church	Cotopaxi	1862	121.92x215.9
10	Martin Johnson Heade	Seascape: Sunset	1861	66.04x111.76
6	Robert S. Dluncanson	Ellen's Isle	1871	72.39x124.46
11	Stanford Robinson Gifford	Mt. Mansfield	nd	76.2x152.4

Table 4 Inventory–Luminist Gallery, Detroit Institute of Arts

The gallery is one of a maze of rooms that house the museum's American art collection. Visitors enter by the Woodward Avenue Entrance, on the west side of the museum. Upon entering they face three choices. A right turn will take a visitor to a maze of rooms housing the European Art. A left turn would take a visitor into one of the American Art rooms; and going straight, and through one other room, would put them into the Luminist Gallery. Going straight immediately after entering and up some steps would take the entering visitor to the Ford Great Hall that has a high, vaulted, ceiling. This hall contains the museum's armor collection providing visitors with three additional chances to find their way to the Lumist Gallery through doors on the left. See Figure 6 for a simplified map.

The Sample-Detroit Institute of Arts

I observed and interviewed ten groups who visited the museum during the month of July, 1999. See Table 5 for a brief description of the groups. I interviewed these groups on two dates, July 30, and July 31, 1999. This was a Friday and Saturday. The weekend days appear to see heavier visitor traffic than do the weekdays.

Group Number	Description	Number of People
1	Young husband, wife, and daughter (perhaps age 8). Visiting to see specific pieces.	3
2	Young man and woman. She was visiting from Dayton, Ohio. Visiting to see the American art.	2
3	Young man and woman. Stopped on their way to find something to eat.	2
4	Young husband and wife. This is his favorite section of the museum.	2
5	Older husband and wife with two granddaughters. Came to show the girls some of their favorite paintings.	4
6	Young husband and wife. They had taken a trip to western New York state and looked for familiar scenes.	2
7	Young man and woman. They were on their way elsewhere but stayed and looked at everything.	2
8	Young man and woman. Visiting from out of town. Looked at everything.	2
9	Young man and woman. He likes American landscape art.	2
10	Young man and woman. Art students from the Center for Creative Studies.	2
Table 5 Groups Interviewed (DIA)		23

The DIA did not have a comprehensive study of their visitors' psychographics. It can be deduced from the information in Table 4, however, that the visitors were mostly young, 40% family groups, 60% social groups. I sampled in exactly the same way as in the 1998 study.

1999 Study-Henry Ford Museum (Aircraft)

The second site in the 1999 study was again, as in the 1998 study, in the Henry Ford Museum in Dearborn, Michigan. I chose a second technological exhibit to insure that such a site be considered when summer visitors were present. The exhibit chosen was three aircraft in the Aviation exhibit.

The three aircraft chosen were The 1931 Pitcarin Autogiro; the 1939 Sikorsky Helicopter, Model VS-300; and the 1928 Ford Tri-motor, Model 4-AT, the "Floyd Bennett." These comprise the entire side of one of the multiple sections of the larger Aviation exhibit. See Figure 7 for a simplified floor plan. The Aviation exhibit is one of the major exhibits shown on the map that visitors receive at the door upon entering. The Sikorsky helicopter is shown on the map. Also shown is the Fokker Tri-motor, the plane that Byrd is reputed to have navigated over the North Pole, although the Ford Tri-motor is not shown on this map. Visitors must go to the rear of the museum to find the aircraft. The most logical path for them to follow, according to the map, is to go through the "Automobile in American Life" exhibit, where a serpentine path is depicted.

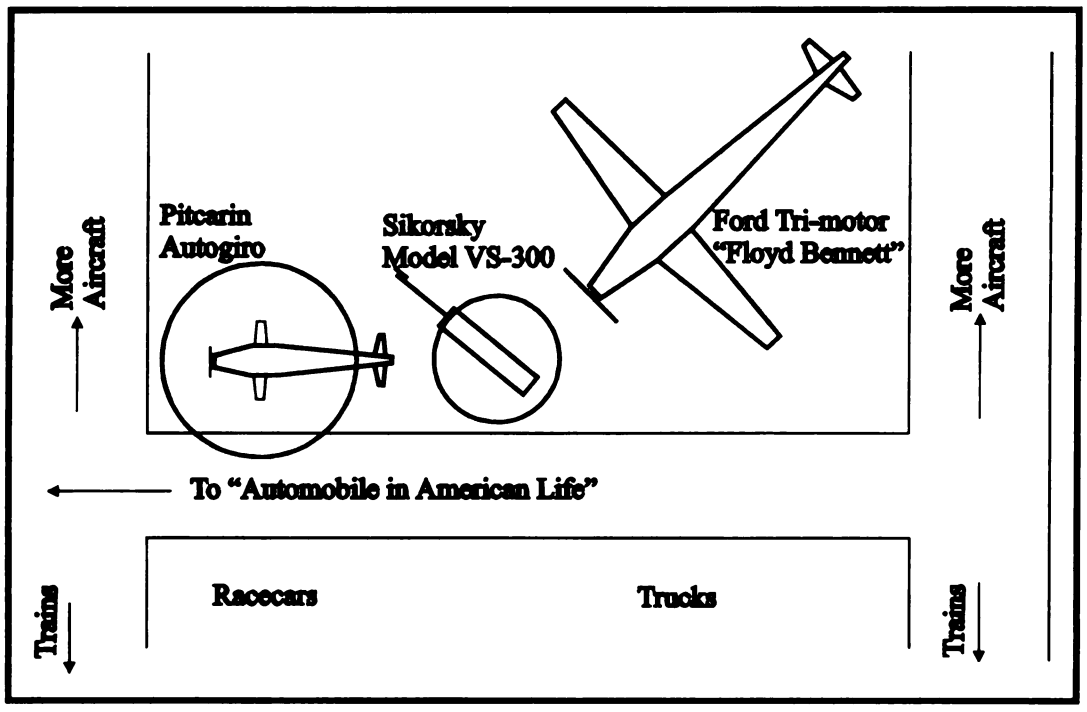


Figure 7 HFM–Aircraft Exhibit

The Sample-Henry Ford Museum (aircraft)

I observed and interviewed twelve groups who visited the museum during the month of August, 1999. Table 6 provides a brief description of these groups. I interviewed these groups on two dates, August 6, and August 7, 1999. This was a Friday and Saturday, which corresponds to the days of the week used at the DIA. Visitor traffic was very heavy on both days and I could have easily interviewed all of the groups needed to reach saturation on the Friday.

Group Number	Description	Number of People
1	Young husband, wife, and daughter (about 8 years old). Spent time with all of the exhibits and even looked at the DC-3 which sits outside the museum window.	3
2	Husband, wife, daughter (about 7 years old), daughter (about 12 years old). Spent considerable time with all the aircraft, especially the Sikorsky helicopter.	4
3	Middle-aged husband and wife. Conversed as they stopped at each aircraft.	2
4	Husband and wife, with teenage son, son, and daughter. Stayed together as a family (somewhat out of the ordinary for a family with teenagers).	5
5	Older husband and wife. Looked at each aircraft, read the labels, and conversed.	2
6	Middle-aged husband and wife. Exhaustively read labels.	2
7	Two middle-aged women. Spent considerable time reading labels and discussing what they saw.	2
8	Older husband and wife. Looked at labels and aircraft with some intensity.	2
9	Husband and wife with teenage son. They spent considerable time looking and reading.	3
10	Young man and woman. He did most of the talking while they looked at the aircraft and labels.	2
11	Husband, wife, daughter (about 7 years old), and son (about 9 years old). Demonstrated a fair amount of interaction and gesturing.	4
12	Middle-aged husband and wife. Moving steadily through but did attend to the aircraft and real labels.	2
Table 6 Groups Interviewed (HFM–Aircraft)		33

The Hood (1991) study applies to this exhibit. Please refer back to Table 2 under the "summer" column. Forty-three percent of the summer visitors attend during the week and 57% attend on weekends. Sixty-four percent are family groups, while 12% are friends (social) groups. Ninety-seven percent of the visitors who participated in this study were family groups, 3% were social groups. I sampled in exactly the same way as in the 1998 study.

1999 Study-Michigan State University Museum

The third and final exhibit used in the 1999 study was a wildlife exhibit at the Michigan State University Museum in East Lansing. The exhibit was called "Our World: Diversity and Evolution." This exhibit area contained cases with displays on eleven different topics: "What's Happening in Your Backyard?"; "Animal Diversity in Our World;" "Island Life;" "Gone Forever;" "The Art of Camouflage;" "The Art of Advertising;" "Day and Night Shift;" "Refined by Nature;" "Arctic Animals;" "A Diversity of Ducks;" and "Wetland Animals of Michigan." There was also a wetlands mural that depicted several of the nearby animals in their habitat. One case was under construction during the research. It later became a display featuring Whitetail deer. See Figure 8 for a sketch of the exhibit.

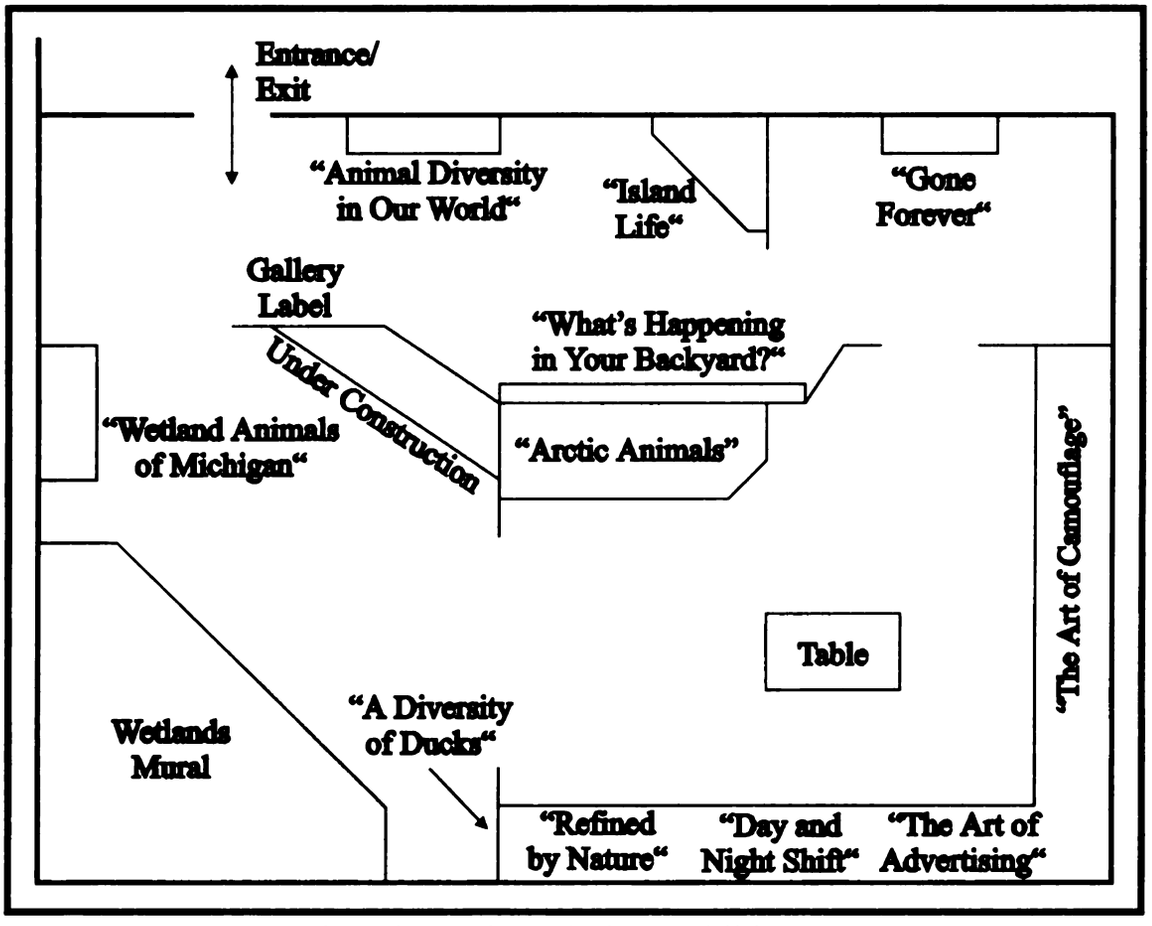


Figure 8 MSUM–Diversity and Evolution Exhibit

The Sample-Michigan State University Museum

I observed and interviewed ten groups who visited the museum during the month of August, 1999. I interviewed these groups on four days, August 19, 21, 22, and 28, 1999. These were a Tuesday, Sunday, Sunday, and Saturday. These days were at the end of the summer visiting season, just before Labor Day, and it was, therefore, difficult to find sufficient numbers on a Friday and Saturday as at the DIA and the HFM.

Group Number	Description	Number of People
1	Man and woman. Read labels and talked about the exhibits. She was speaking about the flocks of Cedar Waxwings that were around her home while growing us as I approached for an interview.	2
2	Two men, a grandfather and grandson. Moving steadily through but taking time with several exhibits.	2
3	Young husband, wife, and daughter (about 10 years old). Took quite a bit of time and even quickly made the circuit again before heading for the door.	3
4	Young husband, wife, and daughter (about 7 years old). Spent time reading labels, read several aloud.	3
5	Husband and wife. Spent considerable time with several exhibits, reading and talking.	2
6	Young husband and wife. They initially split-up and did a "scan" before coming back together and moving through the exhibit together, talking and pointing.	2
7	Middle-aged husband and wife. Sent above average time and talked extensively.	2
8	Middle-aged woman with teenage son and daughter. I'm guessing that he's a new MSU student. The group remained engaged.	3
9	Young husband, wife, and son (about 6 years old). Spent average time and talked amongst themselves.	3
10	Young husband and wife. Spent considerable time and conversed at length.	2
Table 7 Groups Interviewed (MSUM)		24

The MSUM did not have a comprehensive study of their visitors' psychographics. It can be deduced from the information in Table 7, however, that the visitors were mostly young, 90% family groups, 10% social groups. I sampled in exactly the same way as in the 1998 study.

DATA COLLECTION PROCEDURES

1998 Study-Henry Ford Museum (locomotive)

I observed groups visiting locomotive #1601 to look for behaviors indicating that they were paying some level of attention to the exhibit. I then approached groups who I judged were exhibiting behaviors indicative of their paying attention and requested permission to talk with them about their visit. I used an interview guide (Appendix B) to direct the conversation. I tape recorded the conversations and then transcribed them immediately after the day was concluded. I also maintained field notes containing observations made while the groups were interacting with the locomotive prior to the interview and thoughts that occurred to me during the interview. The later were recorded immediately after the interview.

I visited the museum on two occasions prior to beginning the actual data collection. I thoroughly inspected the exhibit on the first visit. I observed traffic patterns through the exhibit, selected a position where I could observe the behaviors of visiting groups, and located possible points to intercept these groups

to ask for and conduct an interview.

I used the second visit prior to actual data collection to pilot the preliminary interview guide (Appendix A). I interviewed two groups that exhibited attention-like behaviors. During these interviews I determined that the original interview questions were not adequate in the following ways: 1) The questions did not "feel" right. That is, they seemed awkward; and the conversation didn't seem to flow well from question to question. 2) Some of the questions seemed to be more appropriate as follow-ups to other questions. 3) The guide itself was difficult to use. It was not easy to navigate visually during the interview. And the fact that it was longer than one page made things awkward when the time came to turn the page. 4) The actual act of turning pages seemed to send a message to the interviewees that the interview might take longer than they had originally thought, making them give more hurried answers for questions on the second page.

I dressed as a 1940s railroader during both the pilot and the actual data collection. My costume consisted of a dark blue work shirt with long sleeves, matching dark blue trousers, and work shoes. Dark blue and yellow were the C & O colors in the 1940s and the clothing was chosen for that reason. Also, the "C & O for Progress" logo appeared above my left shirt pocket, as it does on the tender of the locomotive. My first name, "John," appeared above my right pocket and my museum business pass was placed below the C & O logo.

On both March 1 and 29 I observed the first group that arrived on the scene in the morning for attending behaviors.[9] If they exhibited such behaviors, I intercepted them at the rear of the locomotive and asked them if they would consent to participate in an interview. When I concluded the interview, I recorded brief notes explaining the group's make-up and my impressions. I then looked for and observed the next group to begin their visit for attentional behaviors, asked for their consent, and repeated the sequence.

I informed each group of my identity and the purpose of the study. I asked about the presence of parents or guardians of minors and if tape recording for note-taking purposes was acceptable. I informed the participating visitors that they could refuse to answer any question or terminate the interview at any time; then I asked for their informed consent. See Appendix C for the Informed Consent procedure.

Fourteen out of the fifteen groups I approached consented to the interviews. The sole refusal was from a woman with five minor children. She indicated that she had just driven many hours to arrive here and wanted to see as much of the museum as possible. She apparently arrived around 2:00 P.M.

At the conclusion of the interview I thanked the groups for their time and offered an informed consent letter that they could keep for their records. This letter is reproduced in Appendix D and contains a written version of the

introduction plus a phone number at the University where they could make a contact, should they wish to do so. No one accepted a copy of the letter.

Also at the conclusion of the interview I offered my participants a complimentary bookmark as a token of my thanks for their time. This bookmark was 5-1/2" x 2-3/4" and contained additional information about the #1601; it is reproduced in Appendix E. All participants accepted the bookmark.

1999 Study-Detroit Institute of Arts/Henry Ford Museum (Aviation)/ Michigan State University Museum

I followed the same procedures for this group of exhibits that I used in the 1998 study in terms of observation, informed consent, interview, and follow-up. The only difference was that I was dressed "business casual" rather in any kind of costume that would help me fit into the exhibit. There was really no need to do so in these exhibits as there was plenty of space and less likelihood of my being conspicuous. Most visiting groups probably didn't even notice me or, if they did, thought I was just another visitor who was studying the objects a bit more carefully than most. Thirty-two groups out of the 32 groups that I approached for an interview consented to be interviewed. None of them expressed any interest in keeping a copy of the informed consent letter.

I modified the interview guide slightly in order to make it appropriate for each of the exhibits. When at the DIA, I called the exhibit a "gallery," at the HFM

I referred to "aircraft" rather than "locomotive," etc. I did not, however, change it in any substantive way.

Each group member was offered a "thank-you" token at the end of the interview and, as before, they were not told ahead of time they would be getting anything for their time. I gave visitors at the DIA a nice bookmark that was provided by the museum (which just happened to have a small image of "Cotapaxi" on one side) and a copy of the museum's July/August member's magazine. My token gift to each group member at the Henry Ford Museum was a bookmark that I manufactured. Mr. Bob Casey, Curator of Transportation, at the HFM loaned me a photograph of the Pitcarin Autogiro. I scanned this image and used some informational text, also supplied by Mr. Casey, to make an exhibition-specific bookmark as I had done in the 1998 study for the locomotive. Visitors at the MSUM received a nice color poster (21 ½" x 32 ½") called "Michigan Jack Pine: A Heritage Worth Understanding" that identifies plants and animals in the Jack Pine ecosystem. The backside has educational text concerning the ecosystem and its plants and animals. I also gave the visitors a handout describing upcoming events at the museum that had a 10% discount coupon for the museum store. Both items were provided by the museum. The offer of these tokens was very much appreciated and most of the visitors accepted them. Often, however, not all people in a group took everything.

DATA CODING AND ANALYSIS

Facilitation of Data Access and Manipulation

Data for this study came from two sources: 1) interviews conducted on the exhibit floor, and 2) field notes written immediately before and after each interview. I elected to use the QSR NUD*IST software to manage the data that was generated by the interviews and the notes. I was looking for a software product that would function as a specialized database that would archive the data, allow me to categorize data, and generate reports according to these categories. I decided, therefore, that only a limited number of the many features included in the NUD*IST software were needed to manage the data from these studies efficiently. I will describe here only the features actually used to analyze the data. If interested, the reader may consult the QSR web page for a description of NUD*IST's additional and advanced features[10]. I will also describe the process or sequence of steps that the actual analysis took.

QSR NUD*IST is a powerful qualitative analysis software program that places the power of the computer at the researcher's disposal to analyze the data generated from a qualitative study. Qualitative Solutions and Research in Melbourne, Australia, developed the software to meet the unique needs of qualitative researchers in analyzing the type of data generated by their studies. The acronym NUD*IST stands for **Non-numerical, Unstructured Data,**

Indexing, Searching, and Theorizing.

Qualitative data is by its nature predominately non-numerical and largely unstructured. A major activity that qualitative researchers employ in data analysis is the process of coding, or the assigning of date to categories. This was the major feature of the software that was used in the analysis of the data collected in these studies. This coding involves looking for recurring patterns and naming these patterns. NUD*IST calls these patterns *nodes*; and each node is assigned a name. NUD*IST permits the creation of nodes that are free of organization and are thus called *Free Nodes*. Nodes can also be linked hierarchically to form an index tree which is suitable for more complex projects. When linked, they are no longer free of organization, i.e., no longer free nodes. I did not use linking in these studies due to the limited number of nodes generated and their relatively simple relationships; only free nodes were used. Miles and Huberman (1994) suggest beginning with a provisional or "start list" of codes. In this research the start list came from the theoretical attention model. Additional codes emerged from the data and were assigned node names as they were encountered. A listing of the free node names used can be found in Appendix F along with examples of visitor comments that were so coded.

Before nodes can be assigned, however, the original word processing text must be prepared for importation into NUD*IST. NUD*IST does not permit the

data to typed directly into the program. Instead, the researcher must employ word processing software to prepare the data for importation into NUD*IST. The text must also be in an appropriate format in order to be useable for coding. To do this the researcher must first decide what the *text unit* should be. The text unit is the smallest part of the document that can be coded and retrieved once it has been imported into NUD*IST. For this project the paragraph was chosen as the text unit and the response of each group member to my questions became the paragraph. In order to format these responses as the text units, they must be typed into the word processor without the use of hard returns, i.e., the text must be allowed to word-wrap. The appearance of hard returns is interpreted by the NUD*IST software as a demarcation between text units. The final step taken while still working in the word processor is to save the text in an ASCII or DOS text format that does not add hard returns. The text for these studies was saved in 46 documents, one for each group interviewed.

Additional coding and searching capabilities are available in NUD*IST through the use of inserted text units that attach to the primary text units that were imported into NUD*IST. Inserted text units allow the researcher to make interpretative comments while analyzing the data and to place the inserted text next to the document text to which the comments pertain. These inserted text units can later be coded and searched in the same way as the document text itself.

There are other tools, such as the creation of memos, but none of these features were used to manipulate the data for these studies. The only additional feature used was the ability to generate reports.

I generated two kinds of reports from the NUD*IST software after coding and adding inserted text units . The first was a transcript in text unit format which includes the document text, the inserted text units, and the associated text unit numbers that are automatically generated by NUD*IST. The second was a listing of text units coded according to each of the 18 free nodes listed in Appendix F. The transcript provided a sense of context within the overall interview while the clustering of data according to nodes provided the specific evidence necessary to validate the use of the nodes themselves as viable factors within the attention model.

The NUD*IST software helped me access both the data and the indexing associated with that data. This access was my goal. I saved a great deal of time by having random access to the data and index categories and by avoiding the awkward data manipulation that is inherent in non-electronic data management techniques. This flexible access also carried over to the writing of this report by allowing me easy access to any of the data or indexing as needed and allowing simple copying and pasting of selected data.

The Process of Coding and Analysis

Data coding and analysis was an ongoing process in these studies. This process began when a group of visitors walked into the exhibit and was not complete until the final draft of this report. I will divide the process into three steps for convenience of description.

The first step in the process of coding and analyzing data occurred while I was still on site. My observations of a group that was paying attention began the process. I wrote brief field notes documenting their behaviors, speculated about their motives and even their relationships to each other. This process of organizing data continued during the actual interview. I noticed mannerisms and began to connect their comments to possible factors (nodes) and categories. I thought about the larger study and it began to come into better focus as each additional question was answered. This first phase of coding and analysis continued as I wrote a brief summary or, sometimes, just a phrase about the group just after the interview concluded.

The second step was the formal analysis phase. I found myself thinking even more about the data and the study as I transcribed the interviews into the word processor. I also found myself becoming more familiar with the data and beginning to realize the nature of the "big picture." These preliminary steps took on formal organization as I started inserting text units into NUD*IST, linking

various visitor comments, and inserting text units to the nodes. In the process, new nodes, which I ultimately called sub-factors, came into being. The last step in this formal analysis step was the generation of the reports by the NUD*IST software. The reports provide a clear presentation of visitor comments from each of the exhibits in a single document. This gave me a clear indication of the viability of the factors (nodes) of the attention model.

The third, and final, step in the coding and analysis phase was the writing of this report. More than once I found myself remembering a visitor comment that didn't get coded under a particular node and taking the time to rethink its place in the study. The researcher is the primary data analysis instrument in a qualitative study and it is this process of spending time thinking about and reorganizing the data that is so important. This need to spend time thinking about the data was met, in part, by my previous report on the 1998 study (Lightner, 1998). I found that the thinking that went into that report was far from static. It was still quite alive and growing as I gave additional thought based on the new data from the 1999 study.

Thus, the coding and analysis can be conveniently thought about as three steps: On-site analysis, formal analysis, and analysis through writing. These are natural and productive ways of thinking about the rather complex process of data coding and analysis in a qualitative study.

SUMMARY

In this chapter I presented the research design and methodology used in this study. I included the setting of the research in the context of the museums; the psychographics of the visitors, where known; the characteristics of the exhibits; the make-up and size of the groups that I observed and interviewed; and my coding and analysis of the data, including the three stages into which the process naturally fell. In Chapter IV, I will present the findings that resulted from this methodology.

CHAPTER IV

RESEARCH FINDINGS

INTRODUCTION

The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention. These factors comprise an Attention Model for Museum Exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits. The 1998 study was undertaken to substantiate this model. I interviewed fourteen visiting groups at the Chesapeake and Ohio steam locomotive #1601, the Allegheny, at the Henry Ford Museum to learn what influenced their attention to the exhibit. This 1998 study was followed by an additional (1999) study of visitors at three new exhibits: the aircraft within the Aviation exhibit at the Henry Ford Museum, the landscape paintings in the Luminist gallery of American Landscape painters at the Detroit Institute of Arts, and a wildlife exhibit at the Michigan State University Museum called "Our World: Diversity & Evolution." I interviewed 32 groups in this 1999 study. The purpose of this broader study was twofold: 1) to add detail to the 1998 study, if any, and 2) to substantiate the applicability of the model across varying exhibits. I will present the new sub-factors that I've added to the theoretical model based on

the findings from the combined 1998 and 1999 studies. The findings that I will present from the 1998 study are patterns, or stories, along with a mapping of each group's path through the theoretical model, and evidence from the study to support these findings. For the 1999 study I take a parallel approach, tracking the path of each group. Finally, I will compare the results by research site.

FINDINGS FROM THE 1998 STUDY

I will organize the findings from the initial 1998 study into two categories: group patterns and evidence that authenticates the theoretical model. First, the group patterns will be organized as stories that describe patterns which were shared by the visiting groups. Second, these group patterns will also be represented by the path that each group took through the theoretical model; these will be clustered according to similarities. I will then present evidence from each group to substantiate the elements of the theoretical model. Last, I will address themes that emerged from the study which will further develop the theoretical model.

Group Patterns (Stories)

I observed each of the fourteen groups who visited the C&O #1601, looking for overt evidence of attention. Each group certainly experienced something uniquely different, but four typical 'stories' seemed to emerge from the

observations of these groups.

Each group entered the exhibit area from the front of the locomotive (see Figure 4). I observed their behavior from a vantage point located near the small locomotive called "The President" (see Figure 4). Groups exhibiting behaviors indicating that they were paying attention to the exhibit became candidates for an interview. However, I did not consider interviewing any groups that just casually strolled through the exhibit area.

I considered behaviors as indicative of attention when the group was interacting with the locomotive and others in their group. Attending behaviors included stopping to read the label, stopping to look at different areas of the locomotive, discussing something with other group members in a manner that would lead an observer to conclude that the locomotive was the subject of the discussion, gesturing toward the locomotive, going back to take a second look at something, and similar behaviors. Granted, they could be talking about lunch while pausing, but behavior was being exhibited that would lead most observers to conclude that the locomotive was the subject of their attention.

My notes indicate similar patterns of interaction for several of the groups, i.e., groups tend to cluster around common 'stories' that describe their visit. Each group within each story exhibited slight variations, of course, but the commonalities outweighed the differences. Here are the stories of their visits:

Story #1 - An Engineering Visit

Both groups of mechanical engineers who were a part of this study were in town for the Society of Automotive Engineers convention that had just concluded the day before their visit. Each of these groups consisted of three unrelated male colleagues who chose to come to the museum in order to achieve social goals and to look at mechanical engineering technology from the past. The large locomotive acted as a magnet for these engineers who saw it as they entered the museum. They immediately became engaged in conversations about the locomotive, the engineering that went into it, and the logistics of its construction. They were drawn primarily due to their interest in mechanism and mechanical transportation.

They were observed congregating in front of one of the locomotive's components to discuss functions, frequently pointing to various components and tracing pipes from point-to-point. Next, one of the group members would walk a short distance from the group to scrutinize another component, call the group over, and the process would begin anew. Frequently, they would retrace their steps to revisit an area where they had already been. They discussed the engineering, functionality of components, and expressed amazement that such a machine could be designed, laid-out, and built without the use of computers. [Groups 1 & 3]

Story #2 - A Tale of Two Brothers

The Henry Ford Museum does not have a Great Lakes freighter on display. If there was a lake boat, then the Allegheny would have been a second choice for two brothers who came over from Canada for the day. As it was, however, the #1601 was the closest thing to their own particular interests in steam powered transportation; it consumed their interest, just as a great lakes freighter might have done.

These men were observed circling the locomotive again and again, occupied in a discussion of the function of each of its components. At first, their behavior would lead an observer to think of them as devoted steam locomotive aficionados. But when they revealed their interest in lake boats during the interview their behavior regarding the locomotive became clear; they made many comparisons to the boilers and steam engines aboard boats. Their passionate interest interfered with their ability to concentrate on my questions. They constantly asked questions about the locomotive. In fact, it became obvious that it would not be possible to have our conversation around the interview questions first and return to their questions at the end of the

interviews. Therefore, we mingled questions relating to the research with their questions about the locomotive as our conversation proceeded. [Group 11]

Story #3 - A Docent in the Group

Two of the family groups that were a part of this study had one member, a male in both cases, who had worked as a locomotive engineer. One gentleman was currently employed by Conrail and another had operated a locomotive in an industrial setting, but is now retired. In both of these groups this knowledgeable group member pointed and explained, assuming the role of a 'docent.' This docent member was clearly leading the group during their visit to the locomotive exhibit. The remaining group member, wives in both cases, was either relatively passive or a bit more engaged, asking questions and also interacting. These groups spent close to ten minutes of their visiting time with the locomotive, which was almost double the average time for most of the other groups. [Groups 8 & 10]

Story #4 - A Family/Social Visit

Most of the groups observed attending to the locomotive were in the museum for a family or social outing. These groups made a decision to visit the locomotive once inside the museum and, upon arriving at the exhibit, spent time looking at the locomotive, engaged in conversation amongst themselves, and seemed to be in no particular hurry to leave the exhibit. The locomotive is one hundred twenty-five feet from coupler to coupler and these groups leisurely made their way along its length, engaged with the exhibit.

There was some variability in the group dynamics from group to group but each group was similar enough to consider their visit to be a social outing. Only one of the groups was not composed of related family members, this singular group was comprised of two retired gentlemen, possibly long time friends. All of the groups in this category interacted with the locomotive in a very natural way, integrating it into their social group and conversing very naturally amongst themselves and talking about it and the place that trains held in their shared histories. [Groups 2, 4, 5, 6, 7, 9, 12, 13, & 14]

The two groups of mechanical engineers conducted their visit according to the first story. One group's visit, which was the most unique pattern that I

encountered, is represented by the second story, and two groups by the third story. Of the fourteen groups studied, therefore, only five were specialized enough to require a relatively unique story (stories #1, #2, & #3) to describe their behaviors prior to the interview. Nine of the groups, or 64%, behaved according to the scenario depicted in story number four–a family/social visit.

Paths Taken Through the Attention Model in the 1998 Study

Each group, regardless of story, exhibited variations in the way their attention was motivated. Therefore, each took their own path through the attention model (shown in Figure 3). The descriptions which follow are grouped according to the story: "Engineering Visit," "A Tale of Two Brothers," "A Docent in the Group," and "A Family/Social Visit." Next, groups within each story are clustered according to similarities amongst the major path(s) that each group took through the model.

The models which follow show the variety of paths which were taken by the various groups which were a part of this study. Each path is identified in the accompanying text and is shown in the figures according to the Legend shown here in Figure 9.

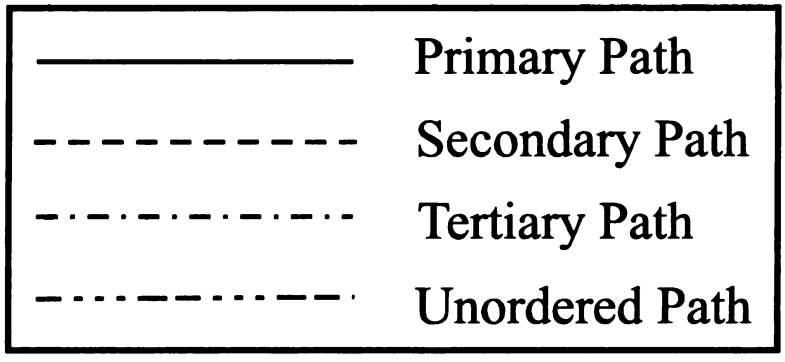


Figure 9 - Legend for Individual Path Figures.

Group paths are classified along the dimension of similarity. The three classifications are: Identical, Similar, and No Commonalities. Identical paths are those which are identical in both paths taken and the order of the paths (primary, secondary, or tertiary). Similar paths are those which share common elements but do not share the same order and/or where one or more groups adds an additional model element to the basic pattern. The unordered path shown in Figure 9 is used in the models to follow to represent this kind of relationship. No commonalities classifies those group patterns that are unique enough that they don't conveniently fit into the either of the other two patterns.

An Engineering Visit

Groups 1 & 3 (similar)

These two groups of engineers followed similar paths through the exhibit. Each used the elements of **Enduring Personal Interest, Situation-Specific Interest,** and **Personal History** as they interacted with the locomotive and each other. The primary path through the model was the same for both groups: **Enduring Personal Interest**.

Group 1 consisted of three European mechanical engineers who were drawn by an intersection of their own **Enduring Personal Interest** in mechanism ["Since we are engineers, we are interested in mechanism."]. A connection to **Personal History** also came into play when one considers their experiences in European museums ["Like this kind of locomotive very much from museums in Europe."]. Their **Situation-Specific Interest** seems to have become peaked after they arrived as they posed all of the mechanical engineering related questions about its construction and function ["How it works."].

Group 3 consisted of three American mechanical engineers who were first attracted also by Enduring Personal Interest ["Mechanical transportation in general."], but quickly expressed a secondary attraction based on size (**Situation-Specific Interest**)["What's the steam pressure?""How much steam are we talking about, this seems an outrageously big size!"]. Members of the group also had a connection to **Personal History** in having ridden some of the historic railroads in the western United States ["Ridden some the historic ones they run out in Colorado."].

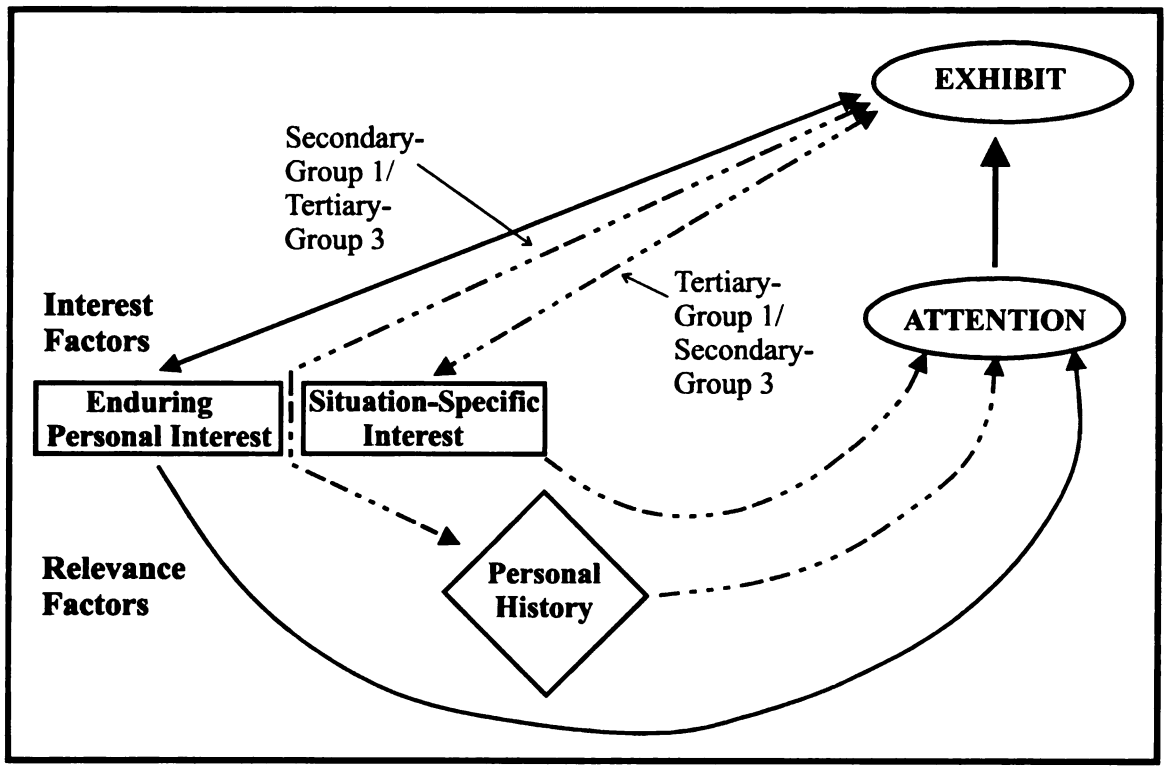


Figure 10 HFM–Locomotive, Groups 1 & 3.

Group 11

There was only this one group in this very specialized story. The visit experienced by these two brothers is truly unique among all of the visits documented by this study.

For these two brothers, **Group Influence** played a small, but initial, role in that one brother brought the other ["I knew it was here, he's never been here before."]. But in terms of their knowledge of and interest in Great Lakes boats, it was a strong combination of **Enduring Personal Interest** in steam transportation ["If you go way back, this country...everything was done since 1830."], connections to **Personal History** ["My young lad works for the Hanjin steamship lines."], mechanism, and efficiency ["It's a fairly inefficient system of using the steam. The freighters use the steam up to three times."].

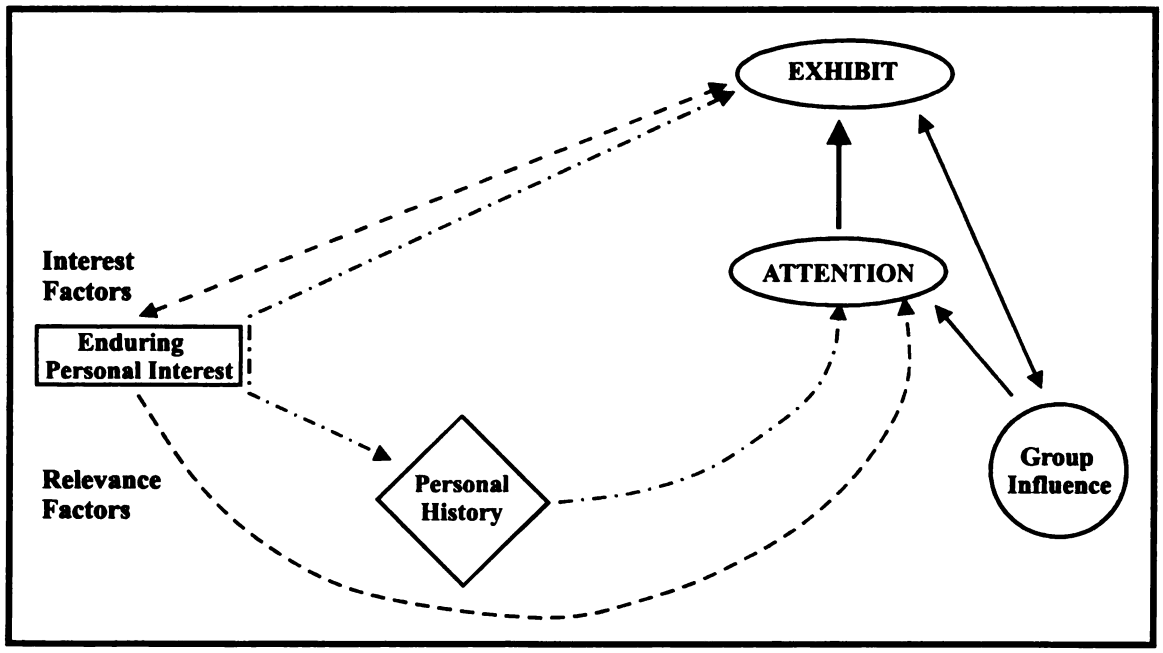


Figure 11 HFM–Locomotive, Group 11

A Docent in the Group

Groups 8 & 10 (similar)

The two groups in this story took similar paths through the model as they visited the exhibit. The paths taken had different priorities for each group. Group 10 added the element of **Enduring Personal Interest** that wasn't expressed by Group 8.

Group 8 was an older couple from Canada who were primarily influenced by **Personal History** ["I used to be an engineer in a steel mill in Hamilton, Ontario."] and his assuming the "Docent" role (**Group Influence**). **Situation-Specific Interest** played a role when the group entered the museum and saw the locomotive ["I came in the front door and saw this."].

Connections to **Personal History** provides the entre for the husband and wife in Group 10 in that the gentleman is currently a Conrail locomotive engineer ["My dad worked for the old Nickel Plate. My grandfather worked before him, and he had two uncles who worked on the Illinois Central, down South. My brother for the NS {Norfolk Southern}."]. I suspect some interplay with **Enduring Personal Interest** as he works for the railroad ["I work for Conrail."]. **Group Influence** of a specialized kind occurred here in that his experience allowed the gentleman to play 'Docent', explaining some of the locomotive's features to his wife. There was some level of **Situation-Specific Interest** with regards to the features not understood ["How did they get it in here?"].

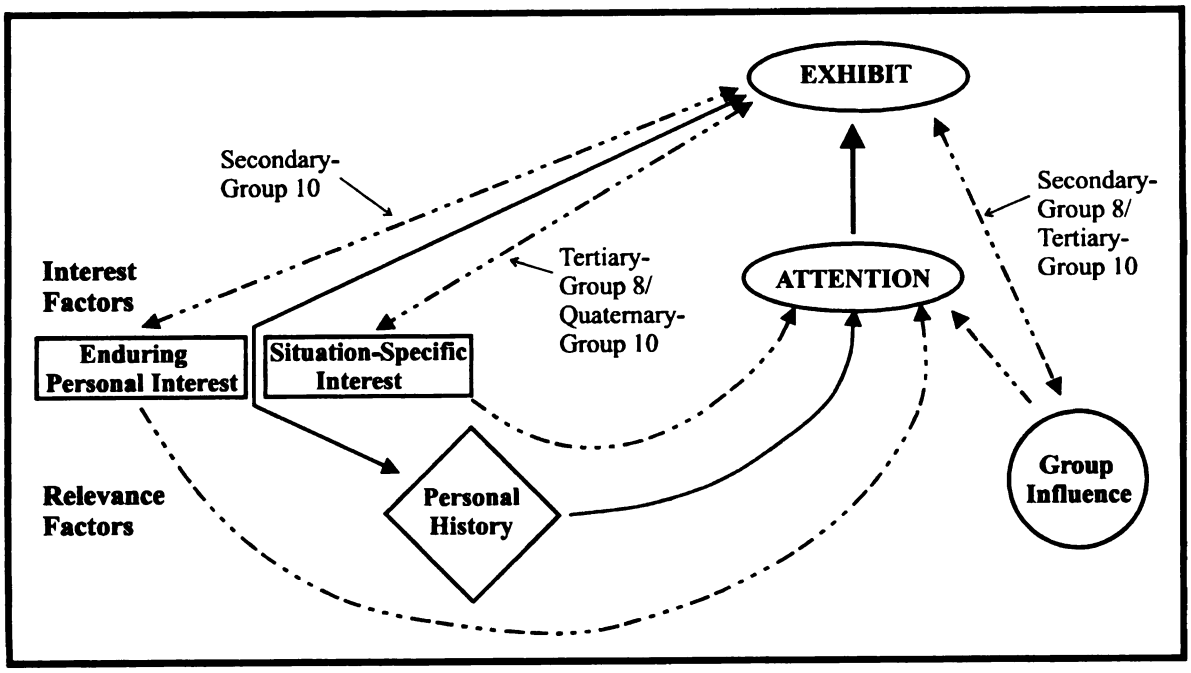


Figure 12 HFM–Locomotive, Groups 8 & 10

A Family/Social Visit

Group 6 & 12 (identical)

These two groups shared elements of the model, with Group 12 adding an element to the shared paths. Also, these two groups demonstrated different priorities for the shared elements. This is shown by the notations on the paths in Figure 14.

Group 6 was an extended family group (grandparents and grandson) who also came to the exhibit based on connections to **Personal History** ["It's built in Lima {Ohio}, which is just north of where we live."] and **Situation-Specific Interest** ["Just the engineering. The plumbing. How they run what pipe to go to where."]. But the stimulus was the grandson's **Group Influence** effect ["The grandson brought us over here."].

Group 12, on the other hand, demonstrated **Group Influence** as the factor that brought these two retired gentlemen into the exhibit ["I knew it was here. He's from out of town. I knew this was here and I wanted to see it again."]. **Personal History** quickly took over, however, as they began to reminisce ["The train whistles {from the audio label at the front of the locomotive} took me back to the days when I was growing up. I grew up alongside the railroad."]. The other major factor at work was **Situation-Specific Interest** ["How long did it take them to build just this one engine?"].

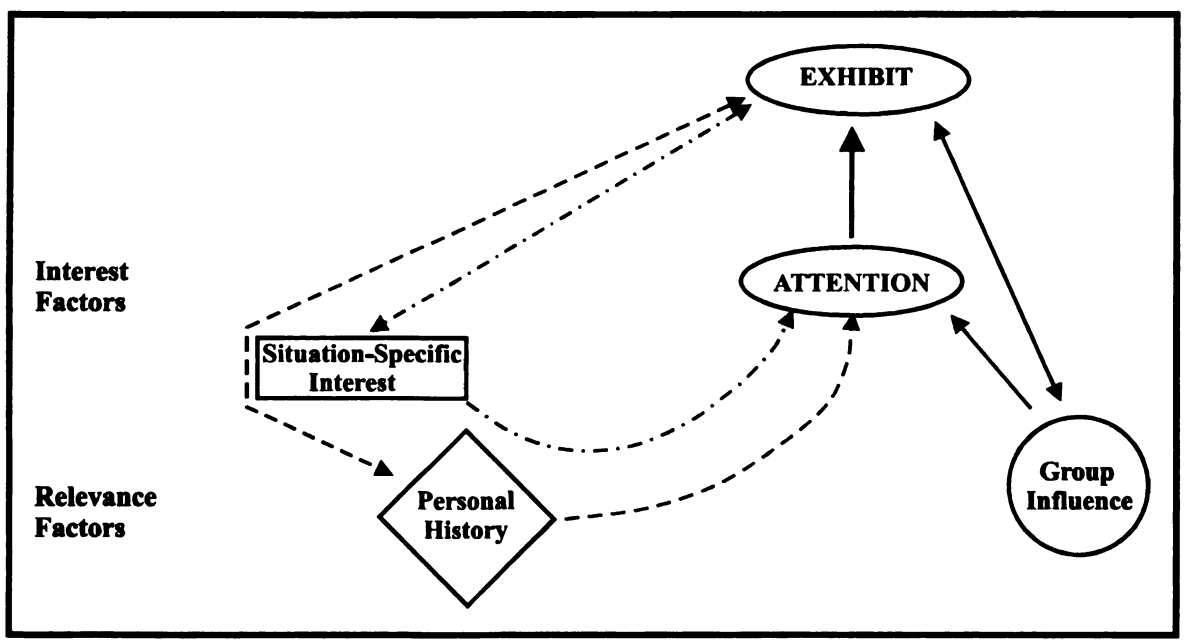


Figure 13 HFM–Locomotive, Groups 6 & 12

Groups 13 & 14 (identical)

Groups 13 and 14 both used a combination of **Personal History** and **Situation-Specific Interest**.

The largest influence for the father, minor son, and minor daughter that constituted Group 13 was their **Personal History** ["My grandfather {the father's} worked for the Grand Trunk; he was a fireman."] **Situation-Specific Interest** was the next most influential ["I was curious how they thought of all this stuff for it."].

Group 14 was a railroad family (parents, adult son, and daughter in-law), so **Personal History** ran high as the factor that motivated their attention ["I used to work for the Illinois Central."]. There was also a large contribution from the element of **Situation-Specific Interest** ["I had two uncles who was engineers. I'm sure they're just about as inquisitive about it as I am."].

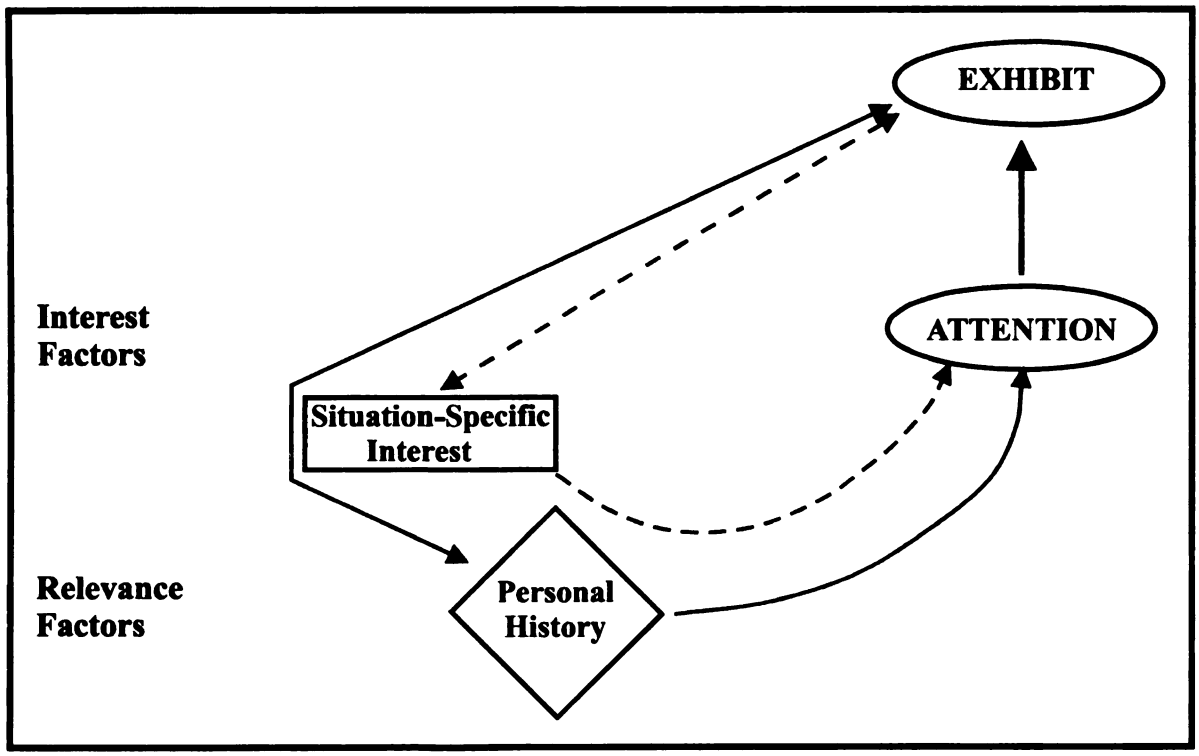


Figure 14 HFM–Locomotive, Groups 13 & 14

Group 2 (no commonalities)

Situation-Specific Interest was probably the biggest draw for this older couple ["How much does it weigh?""How does the track support it?"]. They were primarily interested in the size of the locomotive but had a geographical connection in that it was build in Lima, Ohio, not too far from where they lived (**Personal History**). The locomotive caught their eye as the browsed the museum, since it was so different from the automobiles (**Curiosity**)["It caught our eye. . . the sheer size and strength of it."].

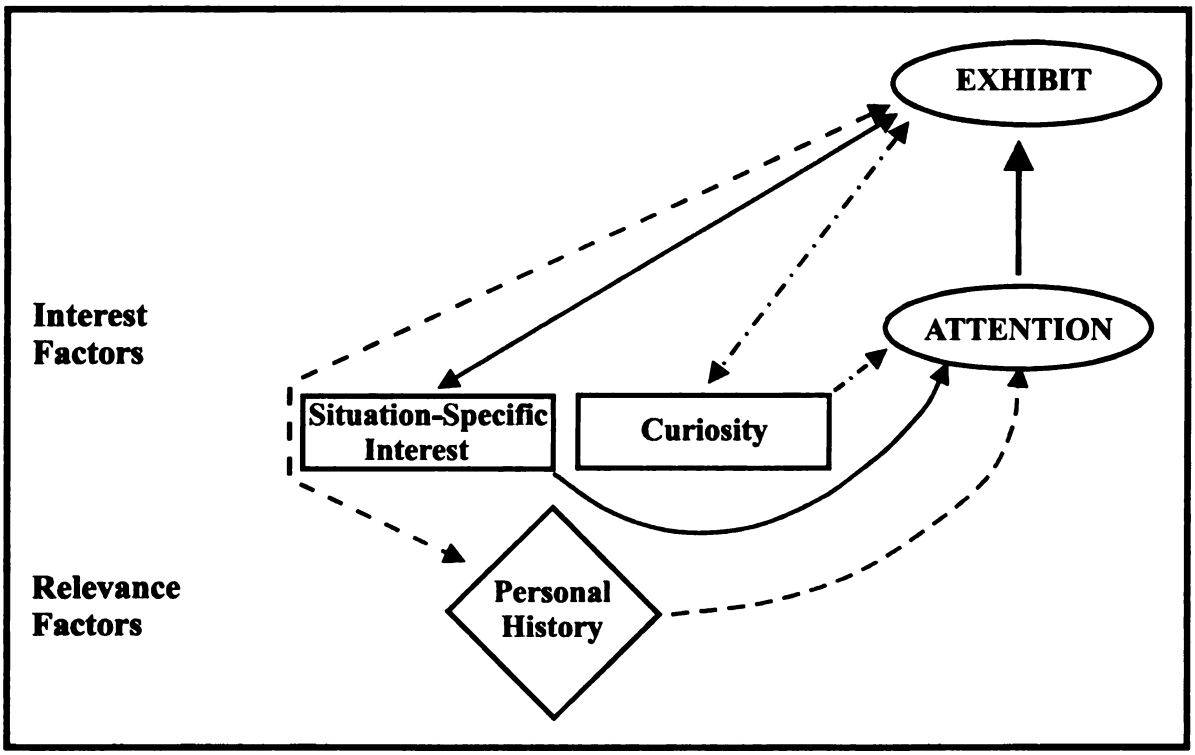


Figure 15 HFM–Locomotive, Group 2

Group 4 (no commonalities)

This retired husband and wife clearly entered into the model through their **Personal History** ["My dad worked on the railroad when I was young."] and **Situation-Specific Interest** ["Is it run by coal?""How fast do these trains go?"].

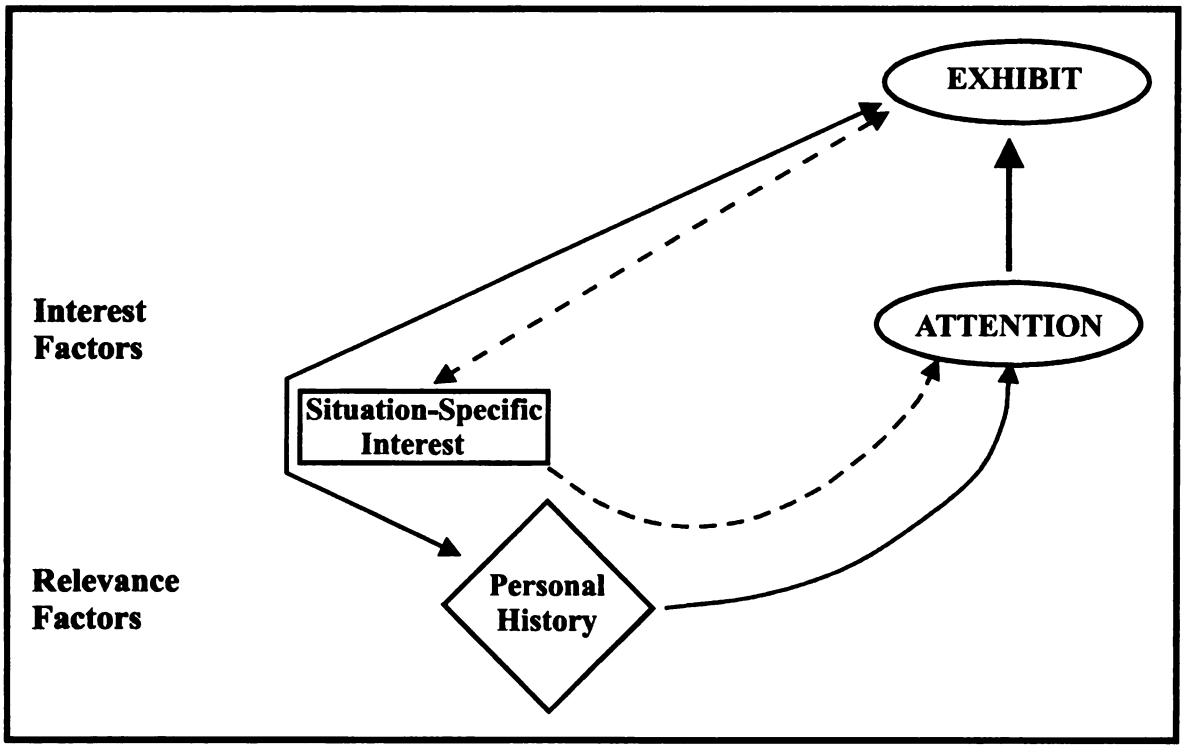


Figure 16 HFM–Locomotive, Group 4

Group 5 (no commonalities)

Personal History was a factor for these grandparents and adult granddaughter ["I grew up around trains."] as well as their **Group Influence** decision to look at trains as a part of their visit ["Looked at the brochure and thought we'd take a look at trains."].

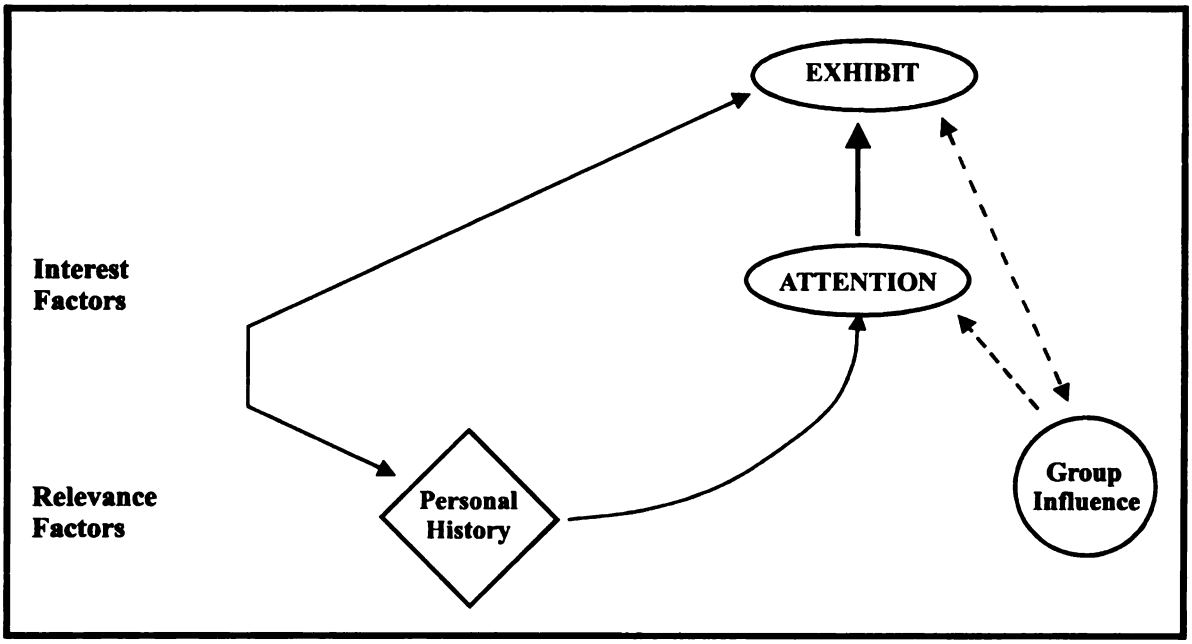


Figure 17 HFM–Locomotive, Group 5

Group 7 (no commonalities)

Here is another example of **Group Influence** (husband, wife, minor son and daughter) in that the boy brought them over to the exhibit. There also appeared to be a component of **Enduring Personal Interest** in trains ["Being a locomotive. Being a train."] and a healthy level of **Situation-Specific Interest** ["How much water it used. How the water got into the steam engine."].

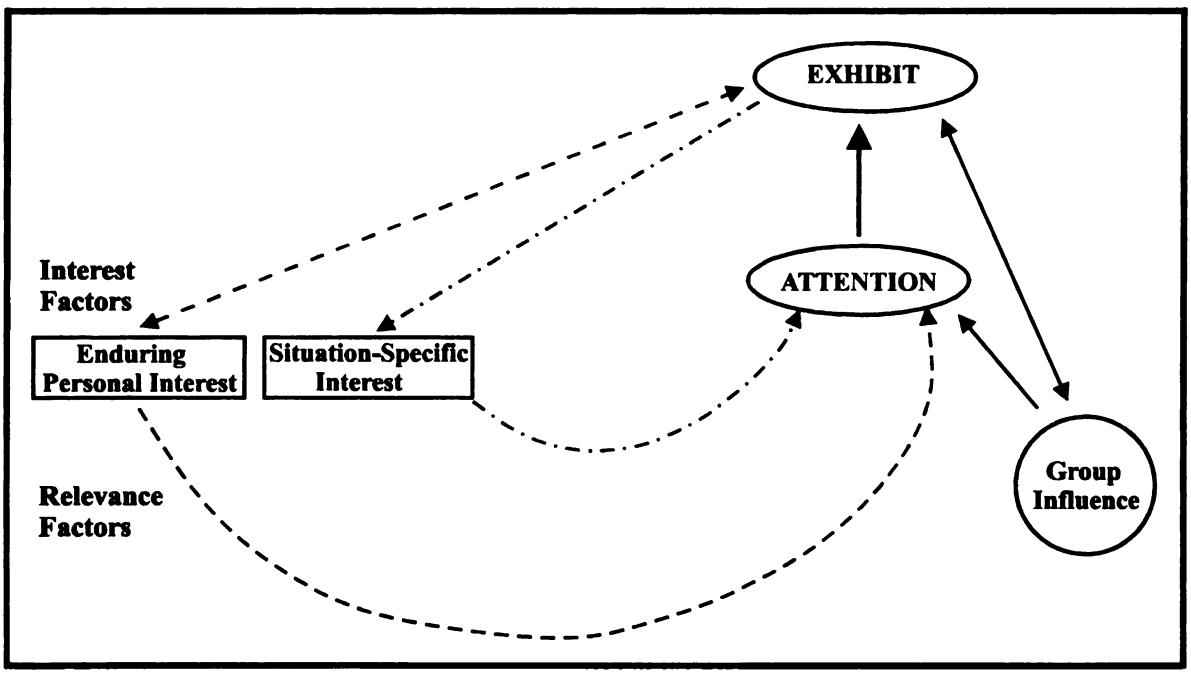


Figure 18 HFM–Locomotive, Group 7

Group 9 (no commonalities)

This father and adult son seemed to be the least affected by the factors of the Attention Model of any group that visited this exhibit. It appears that **Situation-Specific Interest** may be the only factor in operation for them ["Fuel consumption.""How fast it would go?""Where it's been?""Things like that."].

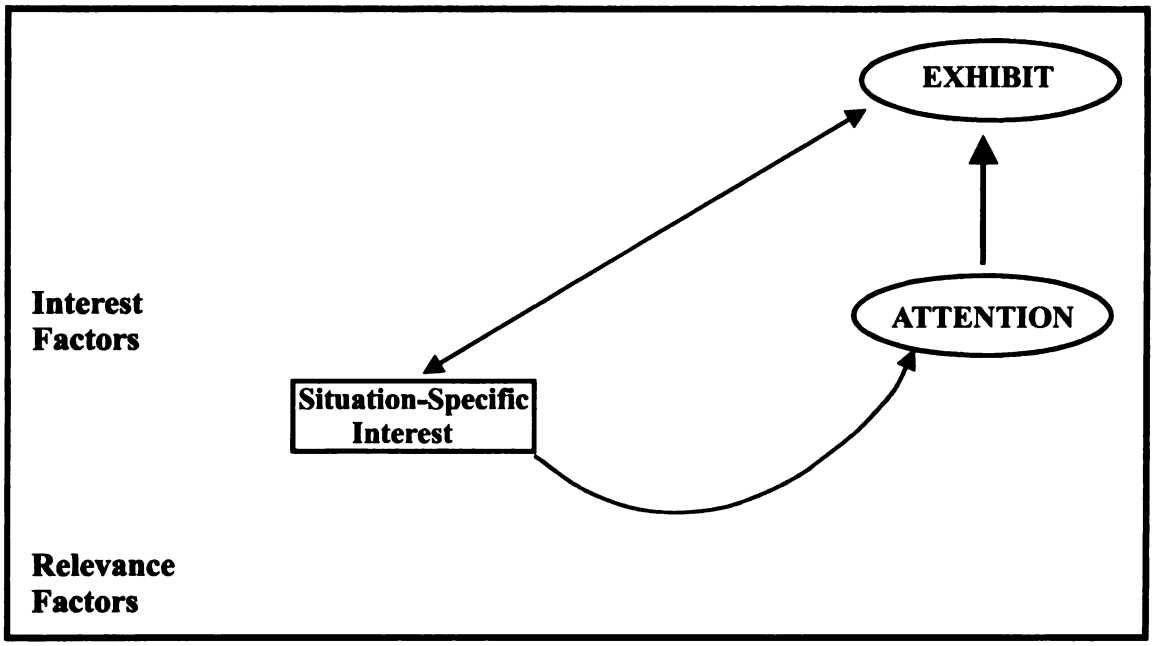


Figure 19 HFM–Locomotive, Group 9

Summary of Paths Taken Through the Model in the 1998 Study

There is evidence to show that seven of the fourteen groups spent time attending to the locomotive seemingly because of connections to personal history. Three groups were influenced by enduring personal interest. Two of the fourteen groups attended to the exhibit due to group influence. The final two were primarily influenced by Situation-Specific Interest. Therefore, the attention of nine of the groups was influenced by relevance factors and five by interest factors.

FINDINGS FROM THE 1999 STUDY

My notes from the 1999 study reveal much less variety than the groups from the 1998 study. I will discuss some of the possible reasons for this difference in Chapter V. Here, however, I will tell the single story that describes all of the groups that I observed and interviewed this summer .

Group Patterns–A Single Story - A Family/Social Visit

The groups visiting during the summer of 1999 were family or social visitors, like those in Story #4 in the 1998 study. Many of the groups I encountered this summer were on family vacations and the museum was one of many stops they had planned to make. Once inside, they opted to visit the exhibit under study. Others were entertaining out-of-town guests who they brought to the museum to show a favorite exhibit or to direct their friends to exhibits which they had mutually discussed before coming.

All of the groups in the 1999 study spent time looking at the objects in the exhibits under study. They also engaged in conversation at various points or, in some cases, conversed during the entire time they were in the exhibit area. These visitors were in no hurry to move through each of these relatively large exhibits.

Each group was idiosyncratic, but the visits were similar enough in their totality to consider them a family or social visit. These people were spending time with each other as surely as they were spending time with the exhibit.

There were thirty-two family/social groups in the 1999 study, comprising a total of eighty people. They varied in number from a husband and wife couple or a pair of friends to a family of five. On average, there were 2.5 people per group. The mode was two people per group.

Paths Through the Attention Model

Each of the groups in the 1999 study exhibited their own unique mix of similarities and differences and, as such, this detail is best captured by tracing their paths through the theoretical Attention Model. This time, the groups will not be arranged by story–as they were in my report of the results of the 1998 study–as there is only a single story. Instead, the paths will be grouped by the institution where the visiting groups were encountered: the Detroit Institute of Arts, the Henry Ford Museum, and the Michigan State University Museum. This will permit further comparison of the dynamics of the research sites later.

Detroit Institute of Arts

Groups 1 & 4 (identical)

These two groups came to the museum with an **Enduring Personal Interest** in American art in general, and American Landscape art in particular.

The family group that became my Group 1 at the DIA consisted of a young husband, wife, and daughter (approximately 8 years old). They came to the American Art section because they were looking for it ["We were looking specifically for the American artists."] since the wife had an **Enduring Personal Interest** in this art ["It was my choice."]. This interest was form of **Group Influence** which was quickly superceded by their desire to educate their daughter ["I wanted to make sure she saw the Rivera Room and, then, we started with the American section."]. So, the **Enduring Personal Interest**–of, particularly, the wife–is mediated through the **Group Influence** desire to educate.

Group 4 was a couple, a man and woman, probably in their 30s, who came to the gallery because of his **Enduring Personal Interest** ["This is probably my favorite section . . . I was looking for Church and I was looking for Thomas Cole."]. His interest also became the **Group Influence** that brought them to the gallery on that day ["I probably did lead."].

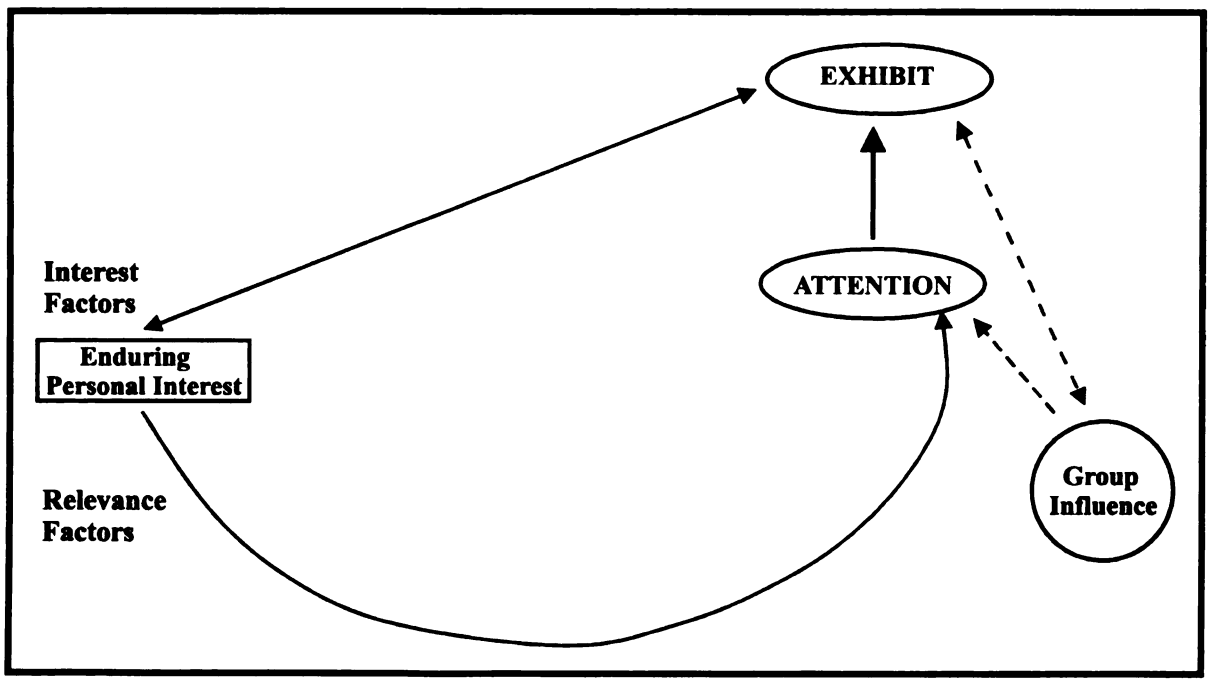


Figure 20 DIA, Groups 1 & 4

Groups 3, 7, 8, & 9 (identical)

This pattern described the path for the largest number of groups who came to the gallery. Here, we see four different instances of **Situation-Specific Interest**.

Group 3 was a young man and young woman who were actually on their way to get something to eat when they came to the gallery. Their attention was motivated by **Situation-Specific Interest** ["They look so real, just like you were there."].

Group 7 was a young husband and wife who were on their way to another gallery when they came through. It was **Situation-Specific Interest** that caused them to stop ["The landscapes, I think, attracted me.""I was looking for some places that I had been before to see if there were any, just by chance, any of the places I've personally been."].

Group 8 was a young husband and wife from out of town who were just passing through. It was **Situation-Specific Interest** that made them stop ["She though about a movie, 'What Dreams May Come.' Then we started talking about computer animation {that was used in the movie to create the scenes representing heaven}."].

Group 9 was a young husband and wife who were touring the museum, as they do on an annual basis. They stopped on the basis of **Situation-Specific Interest** ["Not terribly familiar with the artists in here, but just like the paintings, actually."]

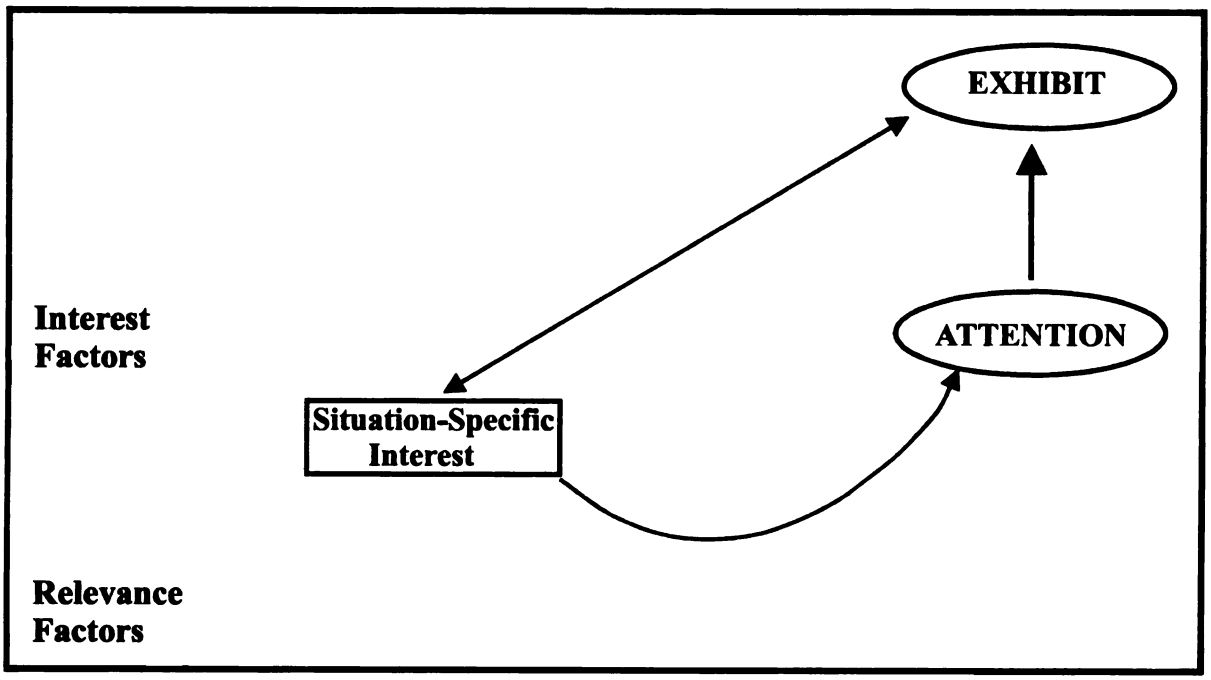


Figure 21 DIA, Groups 3, 7, 8, & 9

Groups 2 & 5 (similar)

These two groups shared the same elements of the model but did not share common priorities. The paths are labeled in Figure 22 to indicate the differences.

Group 2 consisted of two young adults–a male and female–on a social outing. She was visiting from Dayton, Ohio, and he was showing her the DIA and the American art. It was her **Enduring Personal Interest** ["She wanted to see the American art."] in American art that brought them to the gallery–this interest also became a **Group Influence**. But it was also his personally experienced past **Personal History** ["Reminds me of certain light while traveling, more in Kentucky, and those kinds of areas."] that mediated the visit. Here, the interests of both people in the group were active in their paying attention to the paintings.

Group 5 was an older husband and wife (probably in their 60s) and their two granddaughters. They came to show the girls the DIA (**Group Influence**)["We wanted to go someplace with our granddaughters."] but he also has an **Enduring Personal Interest** in American art ["I wanted to see the American art."]. There was also several general **Personal History** motivators at work ["We were members {of the DIA} for years.""We have a couple of Kindaid things {artist Thomas Kinkaid}.""We just had a trip to the Hermitage in St. Petersburg."].

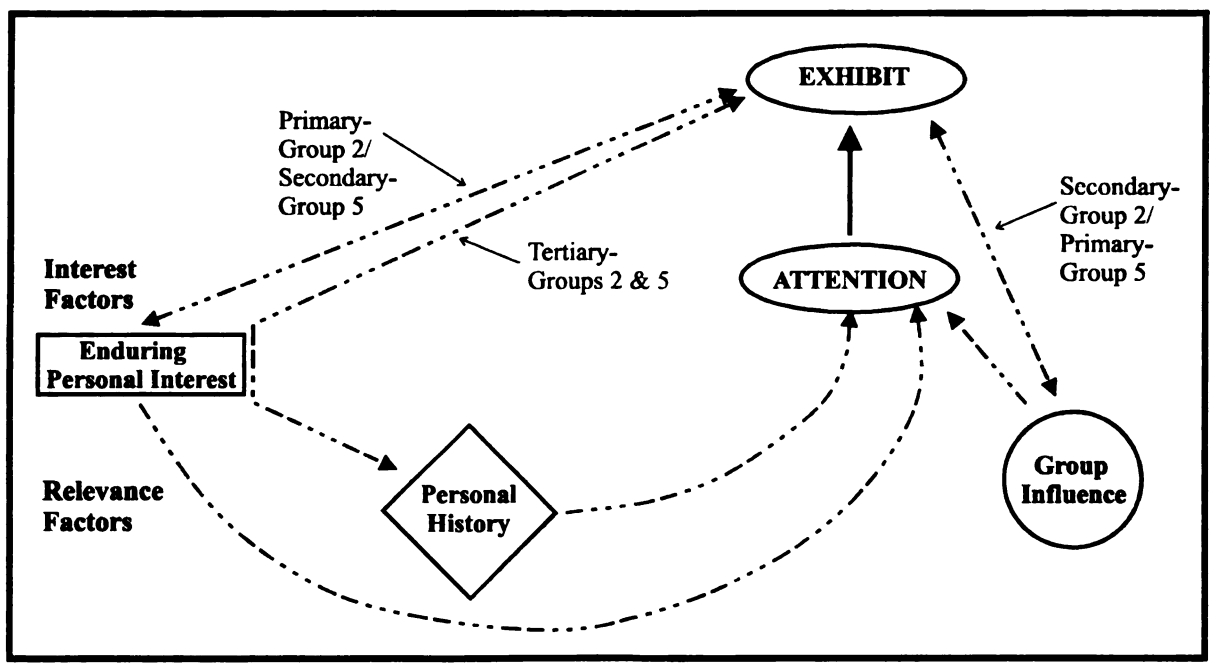


Figure 22 DIA, Groups 2 & 5

Group 6 (no commonalities)

This husband and wife spent time paying attention to the paintings solely on the basis of their personally experienced past (**Personal History**)["We just took a trip to New York state and I thought I'd seen some paintings of that area here."]. The husband did exert **Group Influence** when he wanted to show a painting to his wife ["My husband wanted to show me something."].

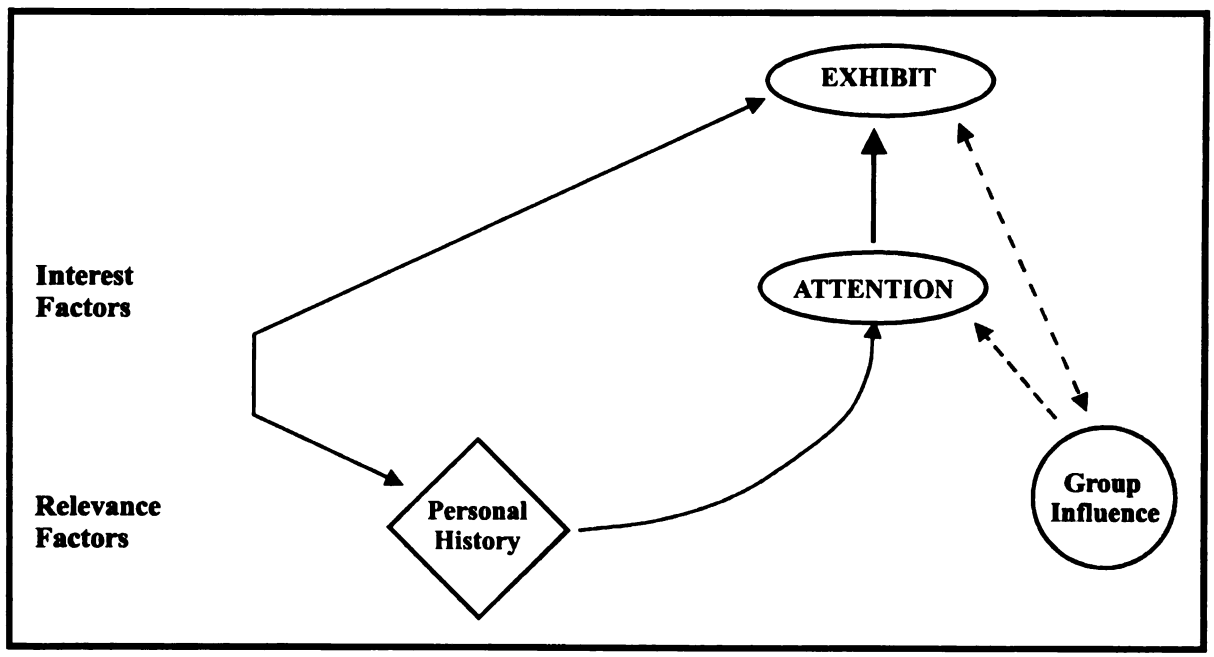


Figure 23 DIA, Group 6

Group 10 (no commonalities)

This young man and young woman are art students at the Center for Creative Studies, which is located next door to the museum. They were primarily attracted by his **Enduring Personal Interest** ["I knew there were some nice paintings in here, so that's why I came in."], and by her **Personal History** in terms of her vicariously experienced past ["My dad, with all the hills, because he grew up in West Virginia."].

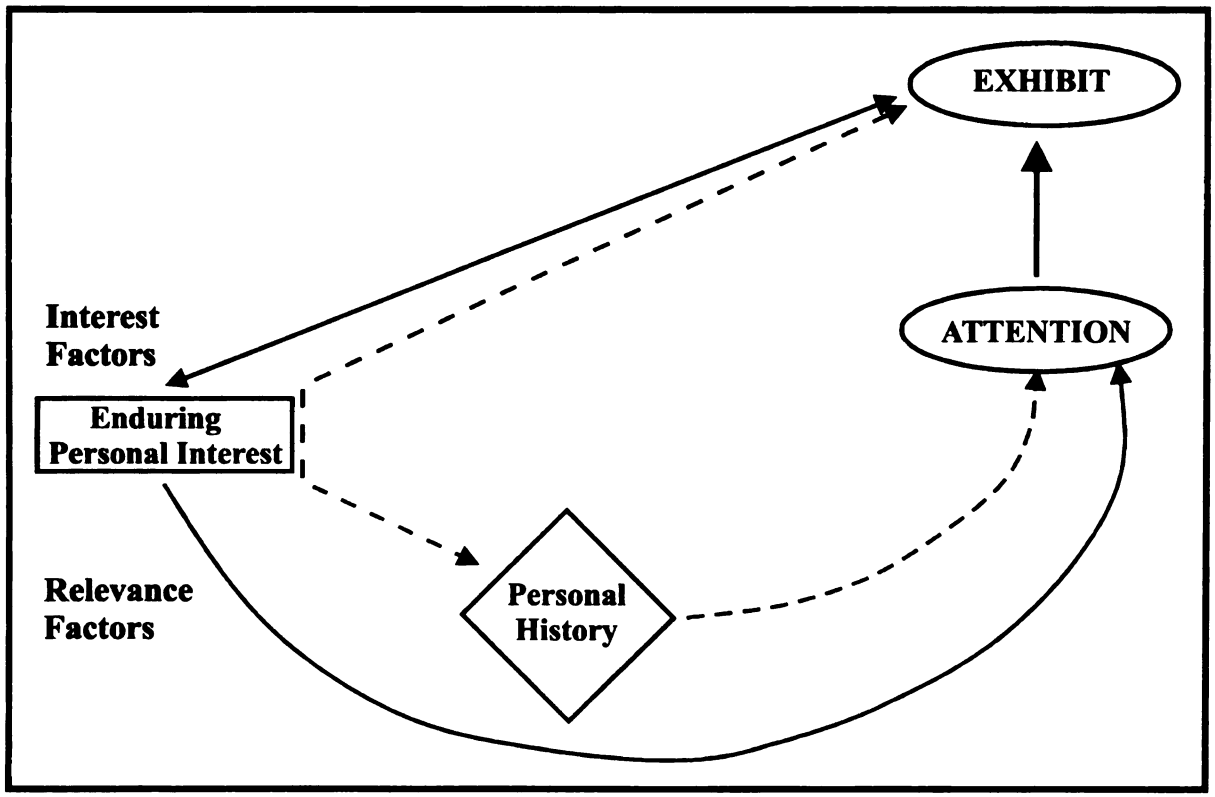


Figure 24 DIA, Group 10

Henry Ford Museum (Aviation)

Groups 4 & 6 (identical)

These two groups took identical paths through the model, using only the element of **Personal History**.

Group 4 was a family of five: Husband, wife, teenage sons and daughter. There were primarily drawn in by their shared personally experienced past (**Personal History**)["It reminded by of Carl VanIleson's airplane. We're from North Dakota and he's from Hatton and they have an airplane similar to that."].

Group 6 was a middle-aged husband and wife who were drawn by **Personal History**. One of these connections was vicariously experienced history (**Personal History**)["My dad used to fly and his dad was a tail gunner in World War II."], as well as personally experienced history (**Personal History**)["I work at a bearing company where a lot of our bearings go into aircraft."].

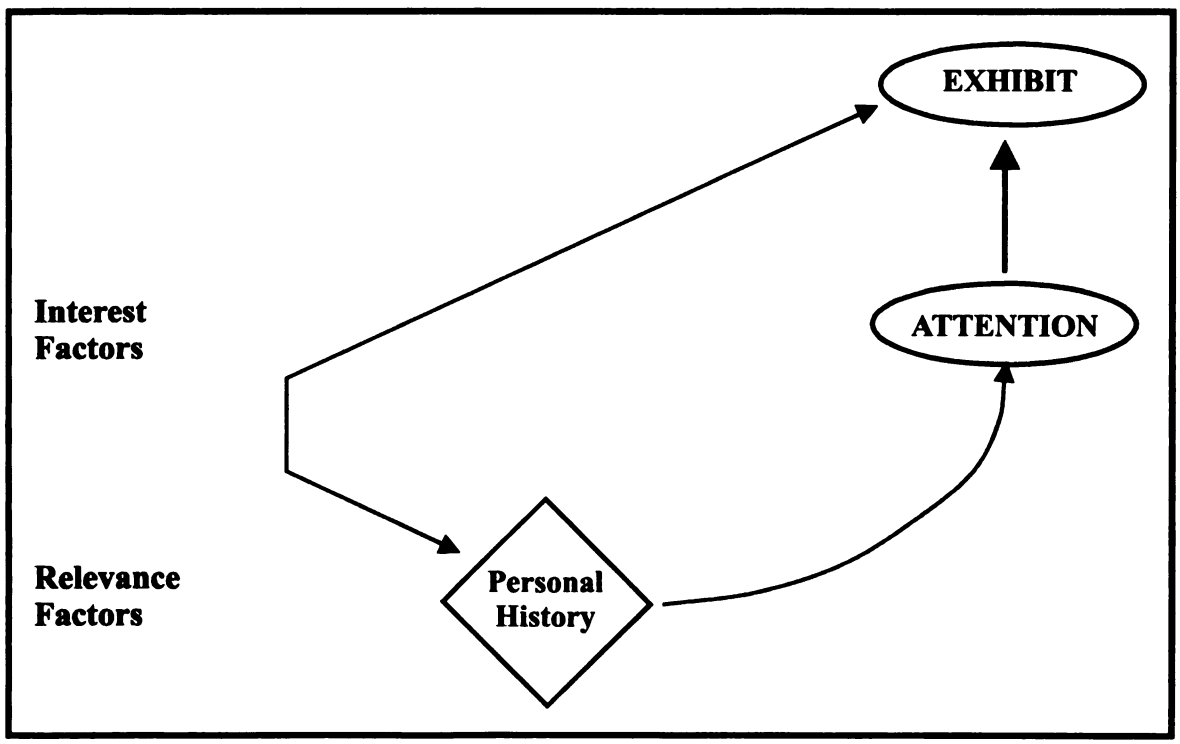


Figure 25 HFM–Aviation, Groups 4 & 6

Groups 5, 11, & 12 (identical)

These three groups also took a simple path through the model, involving only the element of **Situation-Specific Interest**.

Group 5 was a husband and wife in their late 50s or early 60s. They were motivated to attend by **Situation-Specific Interest** ["The plane, you know, the history significance."'The South Pole, that I thought was fascinating."].

Group 11 was a husband, wife, daughter (approximately 7 years old), and son (approximately 9 years old). They paid attention based on **Situation-Specific Interest** ["I remember seeing something on A & E or Discovery, or something, on that particular piece when it was new. Then, all of a sudden, there it is, right in front of you. It's a little different ball game."].

Group 12 was a couple, he in his 40s and she in her 30s, who were attracted by **Situation-Specific Interest** ["I liked the texture on the plane, that's what I was looking at."].

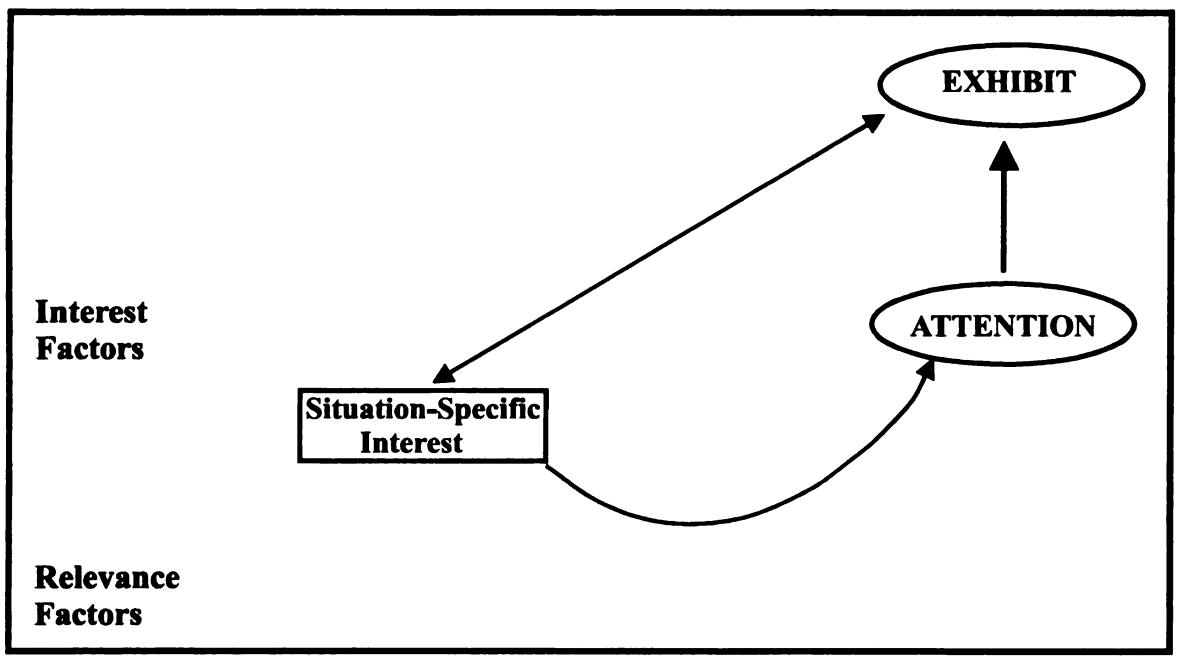


Figure 26 HFM–Aviation, Groups 5, 11, & 12

Groups 8 & 10 (identical)

These two groups attended based on a single factor, **Enduring Personal Interest.**

Group 8 was an older husband and wife who were attracted primarily through the husband's **Enduring Personal Interest** ["I'm interested in aviation. More interested that probably most people are."].

Group 10 was a young married couple who were also motivated to pay attention on the basis of the husband's **Enduring Personal Interest** ["I've been thinking about buying one, buying a helicopter or a plane."].

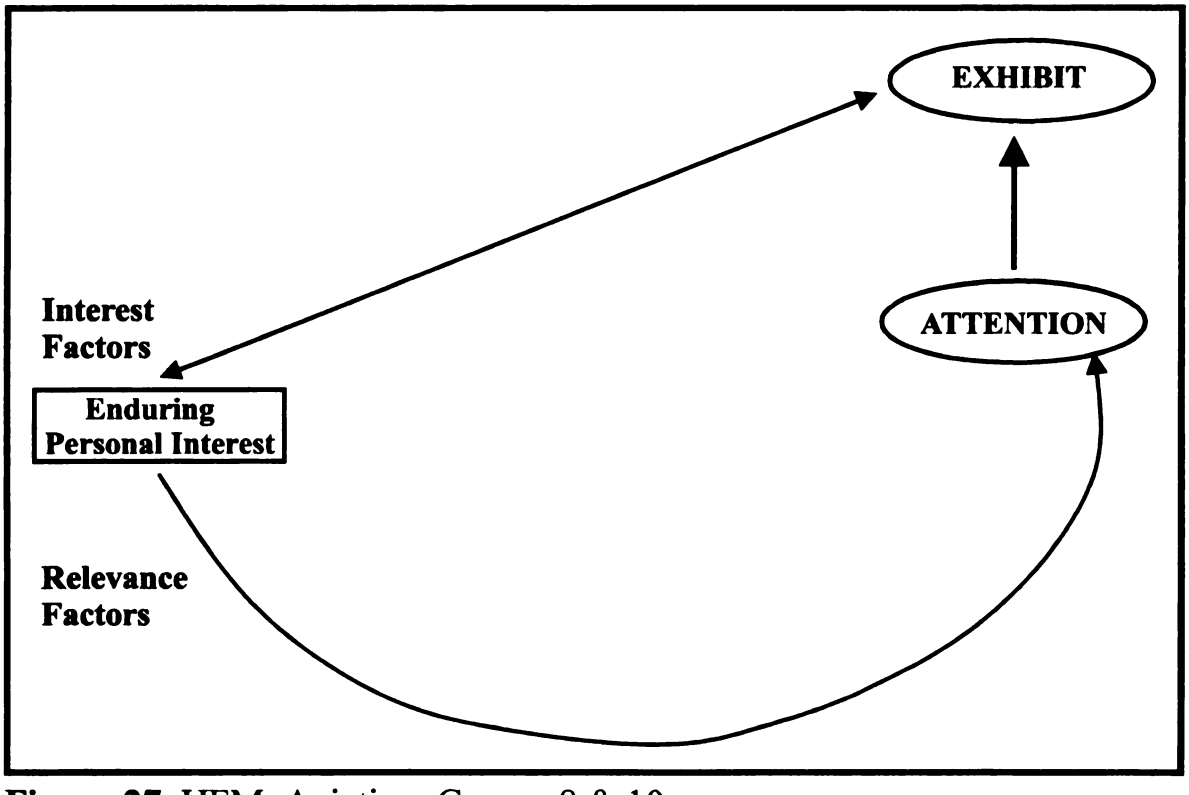


Figure 27 HFM–Aviation, Groups 8 & 10

Groups 3 & 7 (similar)

These two groups had similar paths through the model that would be classified as identical except that Group 7 added the element of **Group Influence** to **Enduring Personal Interest** and **Personal History**. The order of the paths is identical for both.

Group 3 was a middle-aged husband and wife. They stopped primarily due to his **Enduring Personal Interest** ["I've always been interested in aircraft, as far back as I can remember."] and through their vicariously experienced past (**Personal History**)["My uncle went to Antarctica, to the South Pole, with Admiral Byrd."'Your mother saw Lindbergh."].

Group 7 comprised two middle-aged women. One was a pilot and, therefore, made connections to her **Enduring Personal Interest** ["Of course, I'm an aviator and I've been one for over 40 years."] and by her personally experienced past (**Personal History**)["I did fly that {a Ford Tri-motor, but not the one on display}."]. The other woman made her connections through her personally experienced past (**Personal History**)["I have an affinity for Ford Tri-motors because I rode in one."]. They each influenced each other in choosing to visit the exhibit (**Group Influence**)["We plotted our way back here to the Aviation exhibit."].

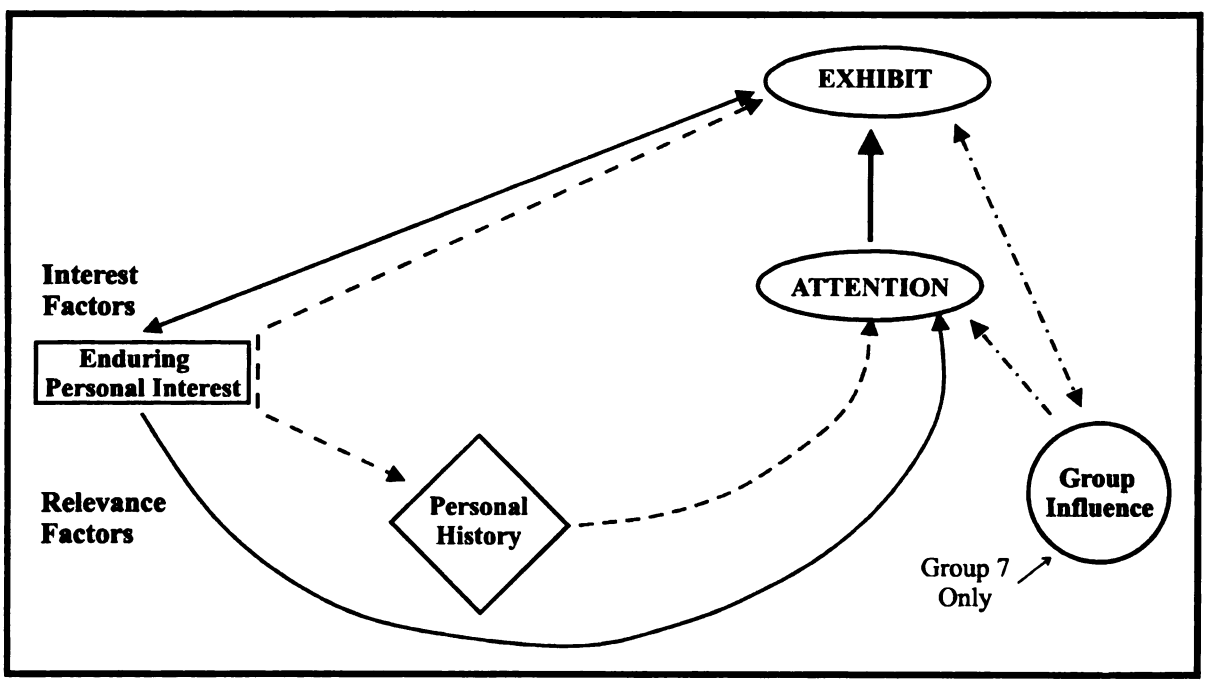


Figure 28 HFM–Aviation, Groups 3 & 7

Group 1 (no commonalities)

This group consisted of a young family: Husband, wife, and daughter (approximately 8 years old). The motivation to attend came primarily through **Enduring Personal Interest** on the part of the husband ["I'm particularly interested in aviation, so that's probably why we spent a little more time there than normal, than some of the other places."]. The connection for the wife, however, was **Situation-Specific Interest** ["Just the size, I think, caught our attention first. It's just interesting."].

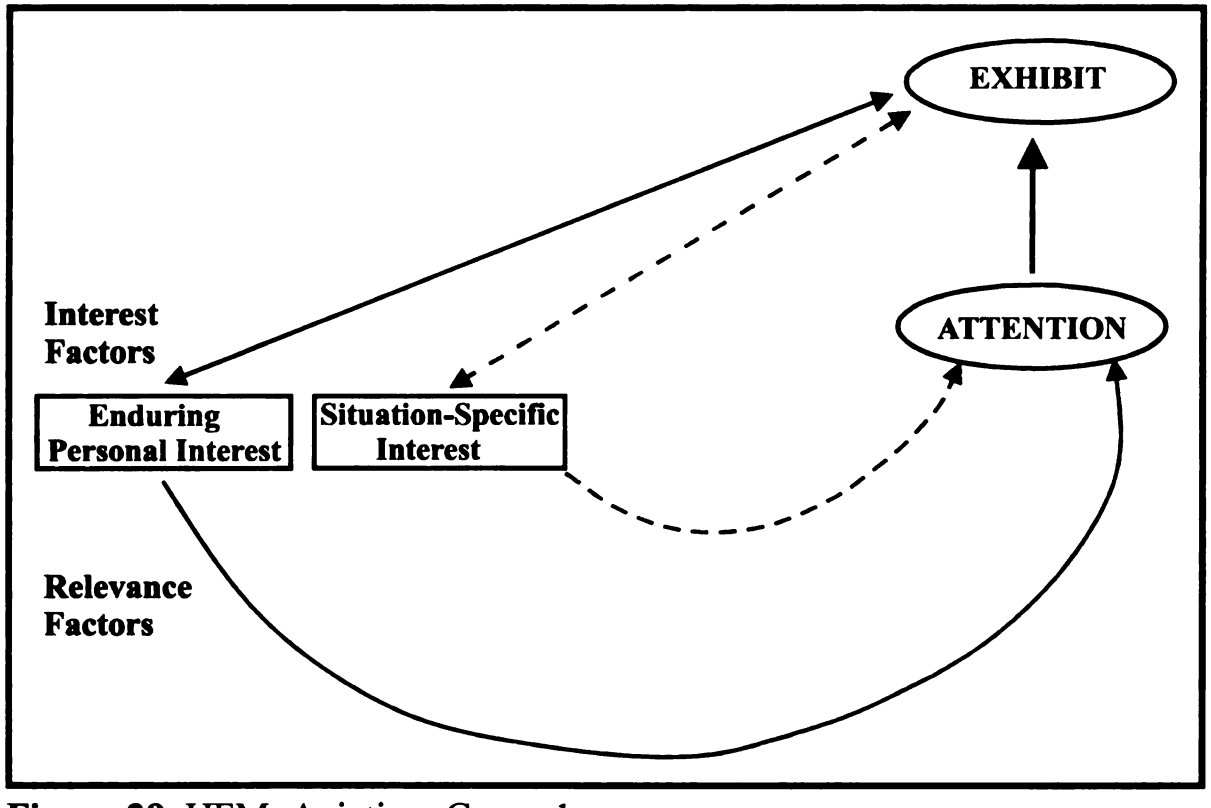


Figure 29 HFM–Aviation, Group 1

Group 2 (no commonalities)

This family was a husband, wife, daughter (approximately 7 years old), and daughter (approximately 12 years old). The element causing them to stop was primarily that of personally experienced past (**Personal History**)["Specifically, Sikorsky is from our home state. Sikorsky helicopter is the next town over."], but there was also some **Situation-Specific Interest** ["I saw too about Admiral Byrd . . . that was the plane that did it, so I though that was interesting and how he named it."]. There was also some **Group Influence** as the father pointed out things to his children ["I'm trying to point out {things} to my daughters from time to time."].

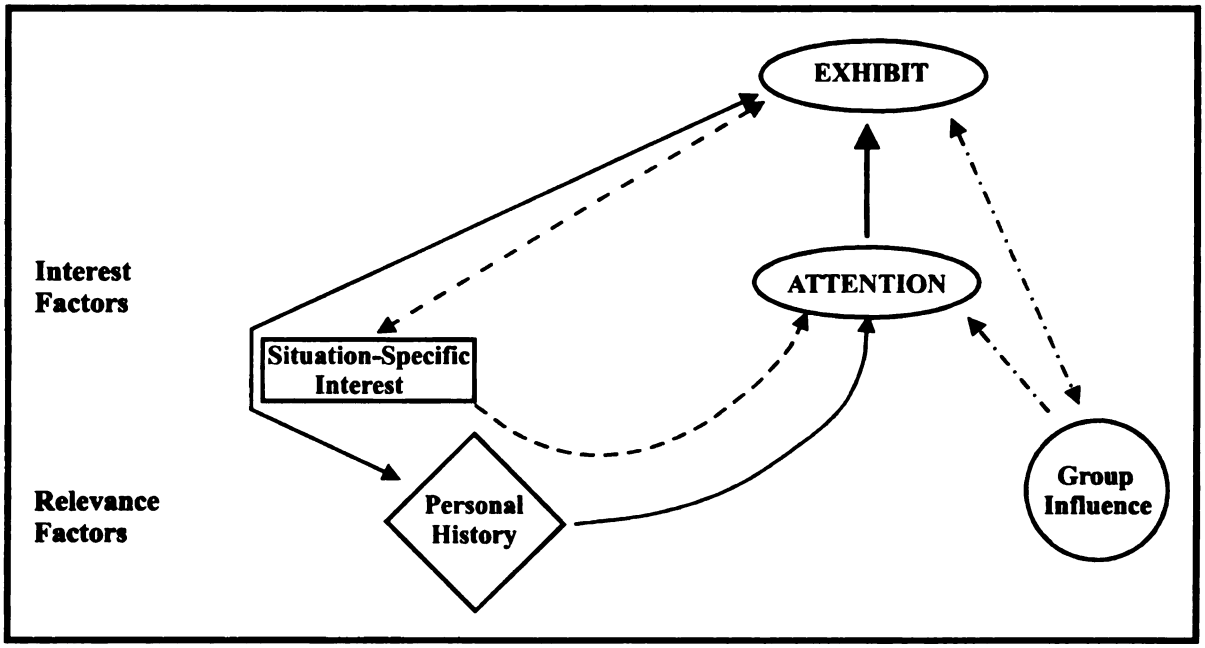


Figure 30 HFM–Aviation, Group 2

Group 9 (no commonalities)

Here we have a husband, wife, and teenage son. They were drawn to the exhibit through **Situation-Specific Interest** ["One thing I thought of, it's hard to believe, on some of this stuff, it's hard to believe that people actually flew in this and lived to tell about it."]. This group also found the Autogiro a bit unbelievable (**Curiosity**)["I looked at the Autogiro because it looked funny."].

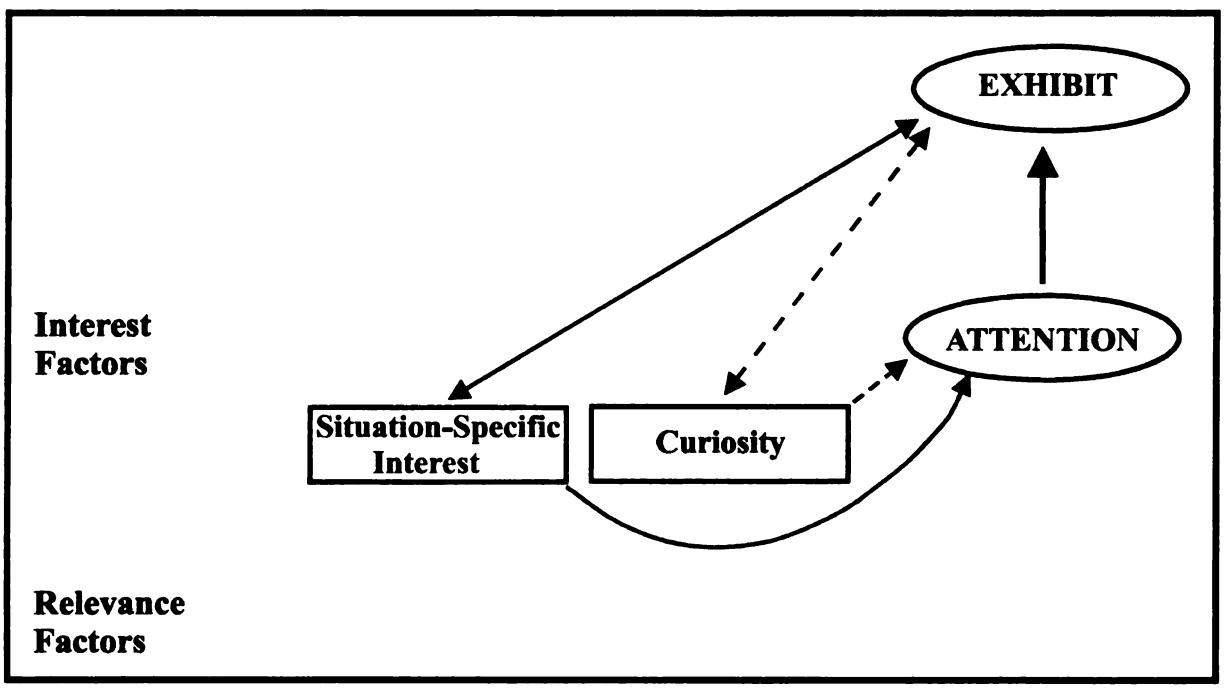


Figure 31 HFM–Aviation, Group 9

Michigan State University Museum

Groups 4 & 6 (identical)

These two groups were identical in that they both attended to the exhibit based on their **Enduring Personal Interest.**

Group 4 was a young husband and wife with a daughter who was approximately 7 years old. They paid attention as a result of the **Enduring Personal Interest** of the daughter ["We stopped because there's a lot of animals here and she likes 'em."].

Group 6 was a young husband and wife. They paid attention as a result of the **Enduring Personal Interest** of the husband ["He likes watching birds. He's got a book and binoculars."], as well as a shared **Enduring Personal Interest** in wildlife ["We wanted to see the animals and wildlife, things like that. We like to see 'em."].

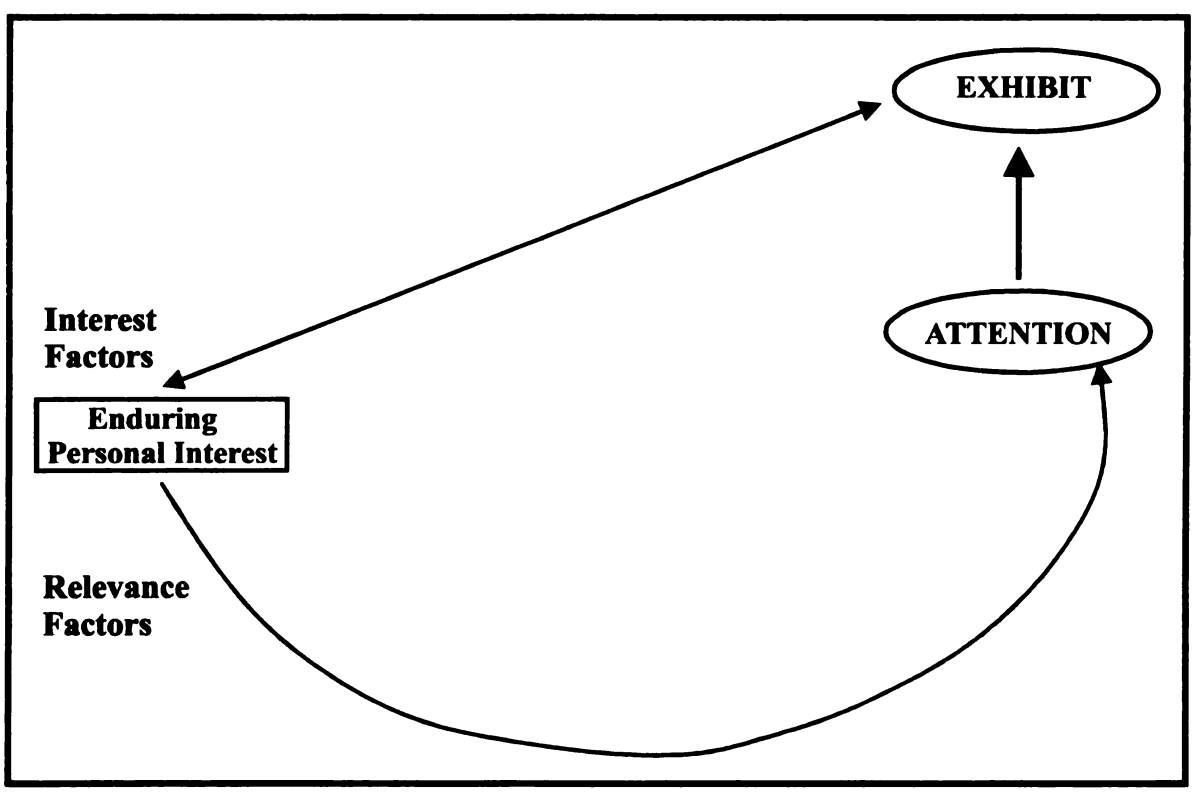


Figure 32 MSUM, Groups 4 & 6

Groups 2, 7, & 10 (identical)

These three groups all paid attention solely on the basis of their **Personal History**.

Group 2 was comprised of an older gentlemen and his adult grandson. They were connected to the exhibit through the personally experienced past or **Personal History** of the grandfather ["He was talking about going to Africa and seeing the big animals."].

Group 7 consisted of a middle-aged husband and wife. They connected through their **Personal History** ["Just interested in animals we've seen."].

Group 10 was a young husband and wife. They paid attention based on his personally experienced past (**Personal History**)["I live on 40 acres of land with forest. I do hunt and fish. I really like the outdoors myself."].

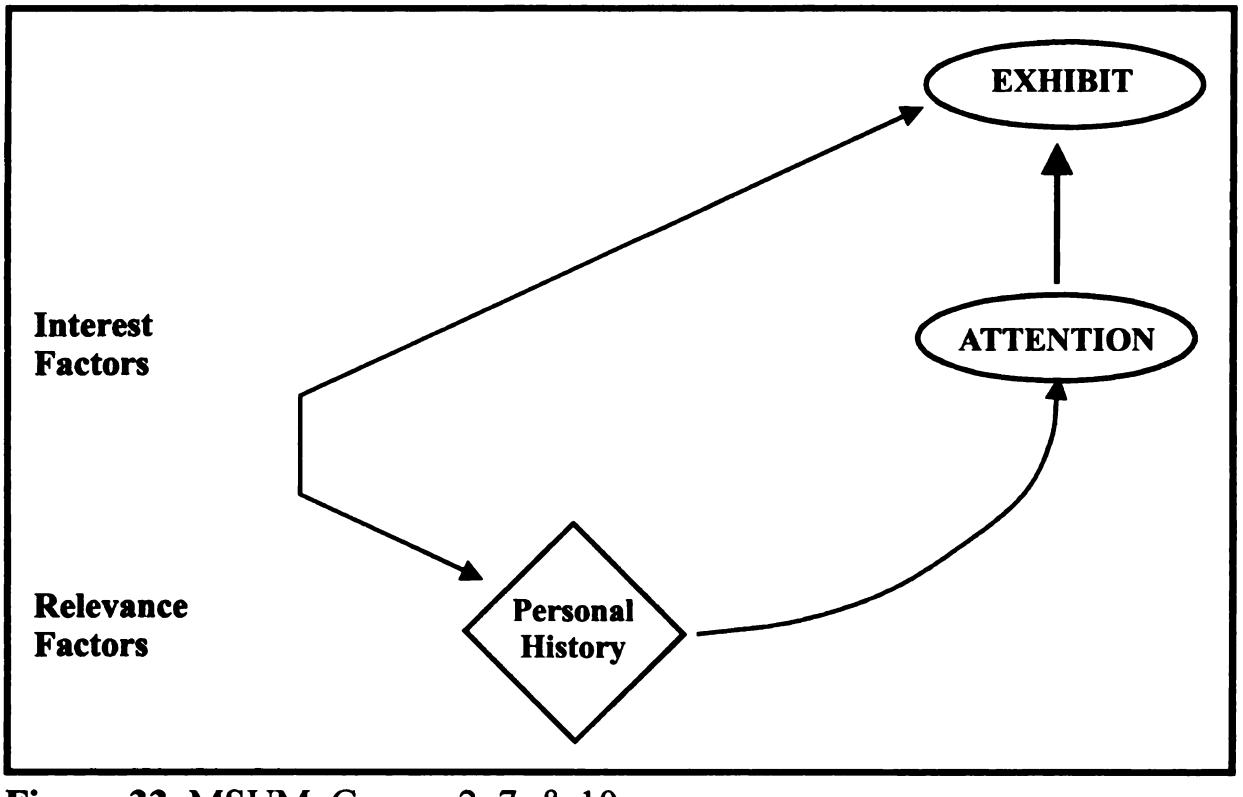


Figure 33 MSUM, Groups 2, 7, & 10

Groups 1 & 5 (similar)

These two groups took a similar path through the model. They would have been identical but Group 1 added **Curiosity** to the **Enduring Personal Interest** and **Personal History** that these groups shared.

A man and woman in their 50s made up Group 1. They were visiting the museum as a part of her trip up from Alabama. They paid attention based on a shared **Enduring Personal Interest** ["We both love animals."] and through a shared personally experienced past (**Personal History**)["We were thinking of our own personal memories of being out in Kansas and driving along {and seeing wildlife}. We drove a truck together."]. The woman also found in puzzling that there was an apparent lack of water birds (**Curiosity**)["I was wondering why there were no water birds over there . . . why they have no water birds in their display."].

Group 5 was a couple, a husband and wife in their 30s. They connected through the **Enduring Personal Interest** of the wife ["I like the animals. I like to see the animals."], as well as her personally experienced past (**Personal History**)["I was telling him we used to see those weasels on the farm."].

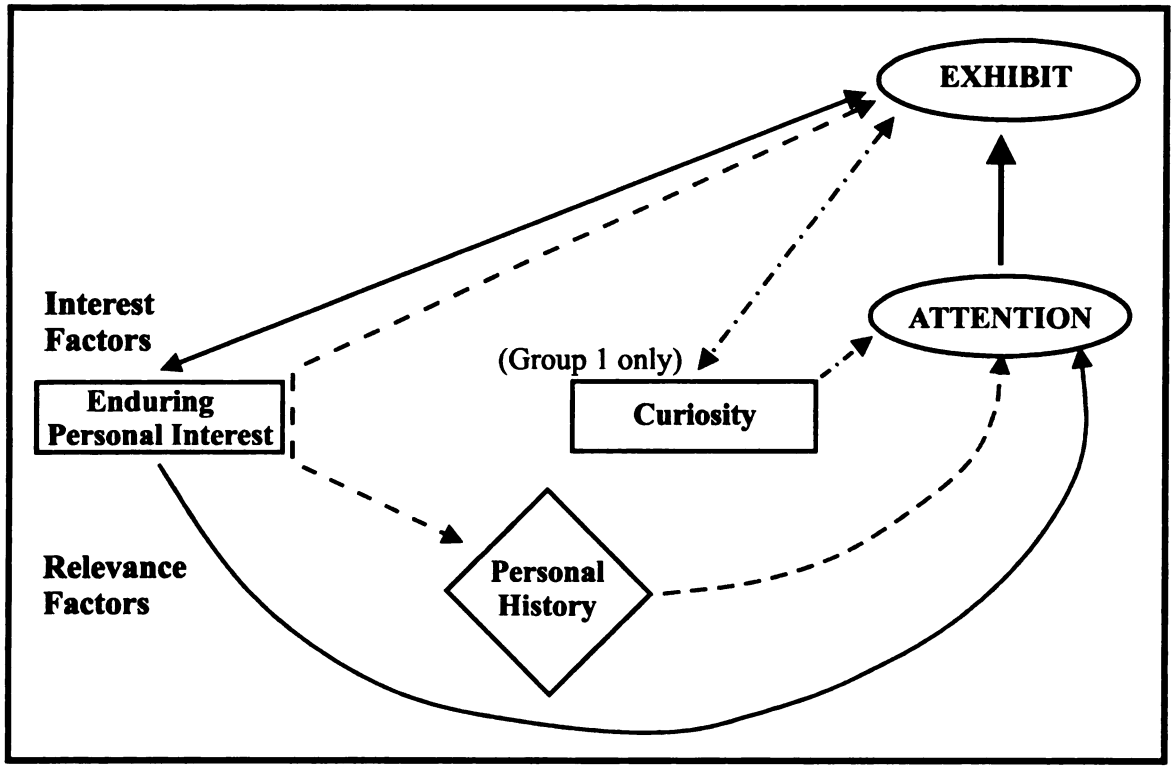


Figure 34 MSUM, Groups 1 & 5

Groups 3 & 9

These groups would have taken an identical path through the model–**Situation-Specific Interest**--but Group 9 added the component of **Personal History**.

Group 3 consisted of a husband, wife, and daughter (approximately 10 years old). They paid attention based on the **Situation-Specific Interest** of the husband ["It looked interesting; caught my eye."].

Group 9 consisted of a young husband, wife, and son (approximately 6 years old). They, too, exhibited **Situation-Specific Interest** ["That's the smallest deer I ever saw, and that's the biggest anteater I ever saw."]. They also added the element of **Personal History** ["We used to go elk shining up north."].

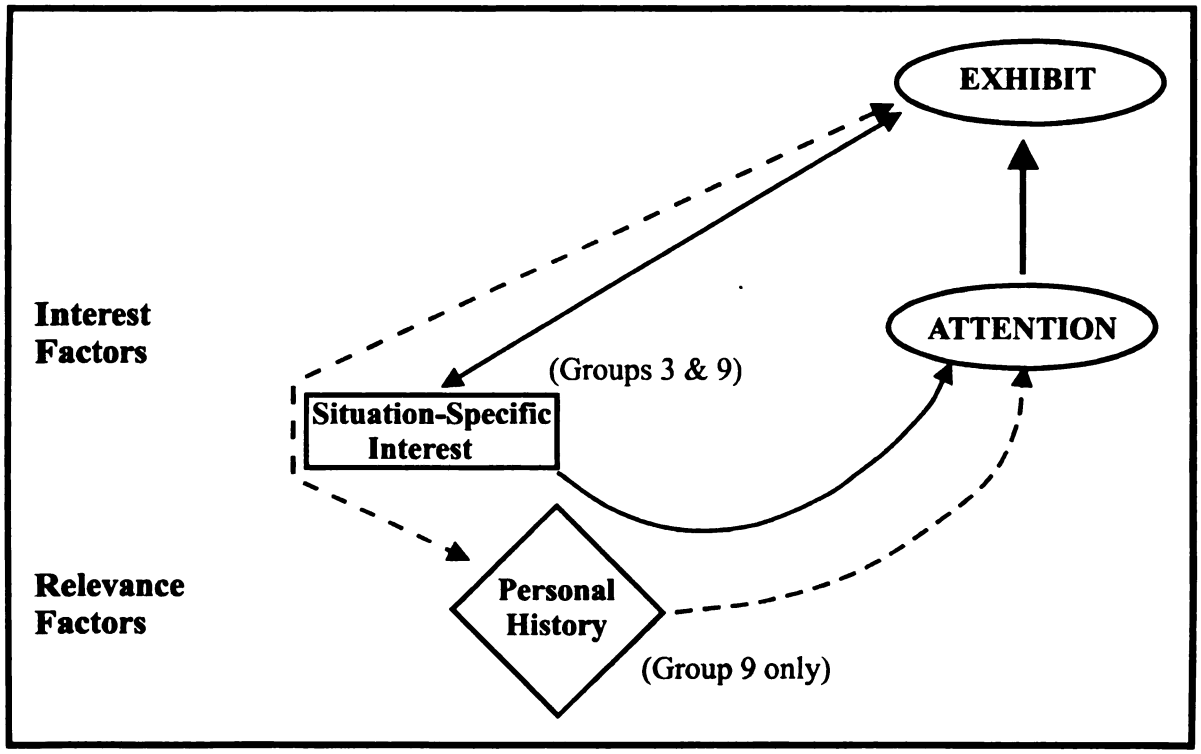


Figure 35 MSUM, Groups 3 & 9

Group 8 (no commonalities)

This group was composed of a middle-aged woman with her teenage son and daughter. The connection was made through their personally experienced past (**Personal History**)["We grew up in the woods. The kids were born in the Upper Peninsula."] The mother also influenced her children to come to the exhibit (**Group Influence**)["I think they {son and daughter} were following me."].

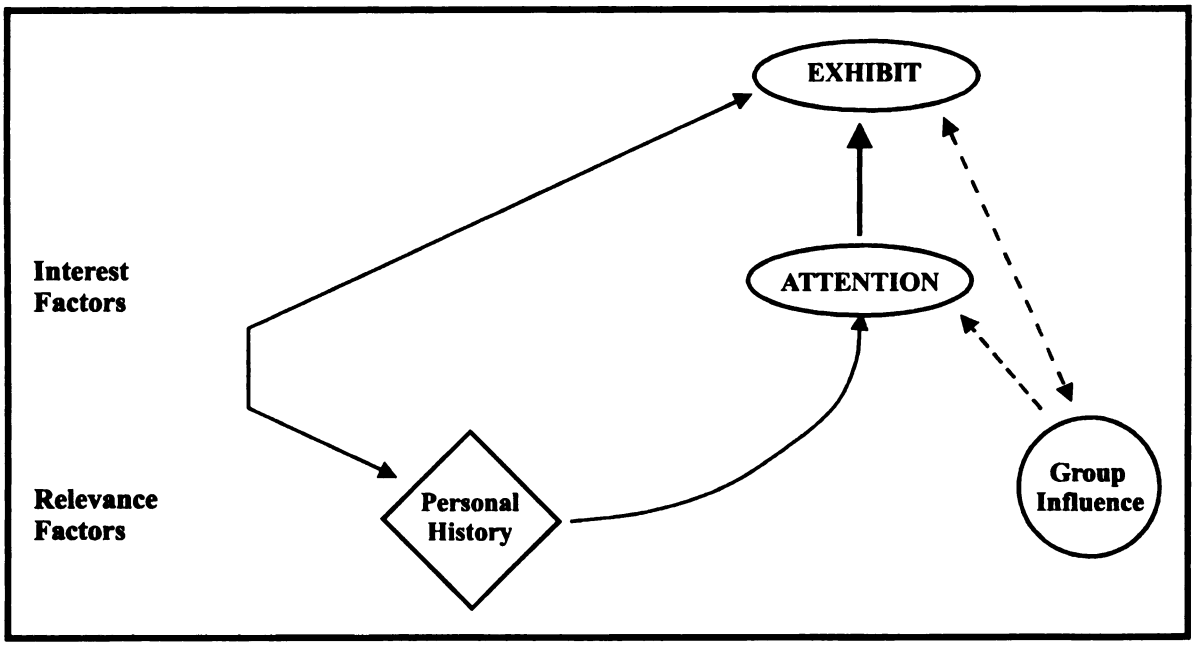


Figure 36 MSUM, Group 8

Summary of Paths Taken Through the Model in the 1999 Study

There was evidence to show that thirteen of the thirty-two groups spent time attending to the three exhibits in this study based on some level of enduring personal interest. Eleven of the groups paid attention on the basis of situation-specific interest, things they found *curious*[11] or *interesting*. Seven groups found a connection to their personal history that explained the dynamic behind their

attention. And only one group was primarily involved with the exhibits through group influence. Therefore, twenty-four (75%) of the thirty-two groups attended based on interest factors while eight (25%) of the thirty-two paid attention based on relevance factors.

SUMMARY OF THE PATHS FOR BOTH STUDIES

In this section I will summarize both the 1998 and 1999 studies before exploring the new levels of detail (sub-factors) that I've uncovered within some of the model's factors. I will first summarize in terms of patterns through the model that reveal a commonality between the studies. Then, I will summarize at the level of connections.

Patterns Through the Model

I noticed two sets of patterns in the paths that the thirty-two groups took through the attention model. The first pattern is that which describes the greatest number of groups. Figure 37 shows the simple, or single path, pattern taken most often by the groups in this study, that of Situation-Specific Interest. Nine groups, or 19%, of the groups were motivated by situation-specific interest.

This path was taken by groups in each of the four exhibits. It was observed once each in the locomotive exhibit and the evolution and diversity exhibit, three times at the aviation exhibit, and four times with the landscape paintings.

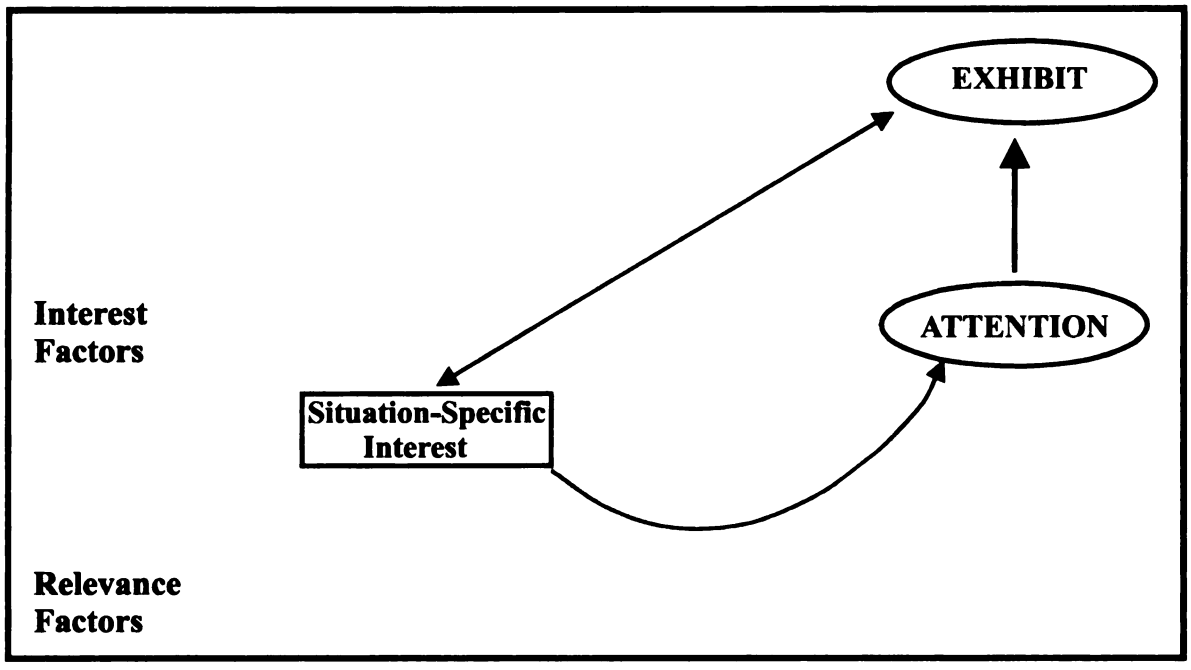


Figure 37 Largest Number of Groups for a Single Path Pattern.

The second commonality that I noticed were a series of patterns that were present in the largest number of exhibits. One pattern was common to all four exhibits, while three patterns were common to three of the four exhibits in this study. There are two pairs: the first are the simple, or single-path patterns, while the last are the complex, or multiple-path patterns. The first of these patterns common to multiple exhibits is already shown in Figure 37, in that the pattern for the largest number of groups (19%) also occurred in all of the exhibits. The additional patterns are shown in Figures 38, 39, and 40. The path in Figure 38 occurs in 75% of the exhibits and was the path for six groups (13%). Figures 39 and 40 are complex path patterns that were the case for six (13%) and three (6%) groups, respectively.

(Note: The solid lines in Figures 39 and 40 merely represent the paths, without hierarchy.)

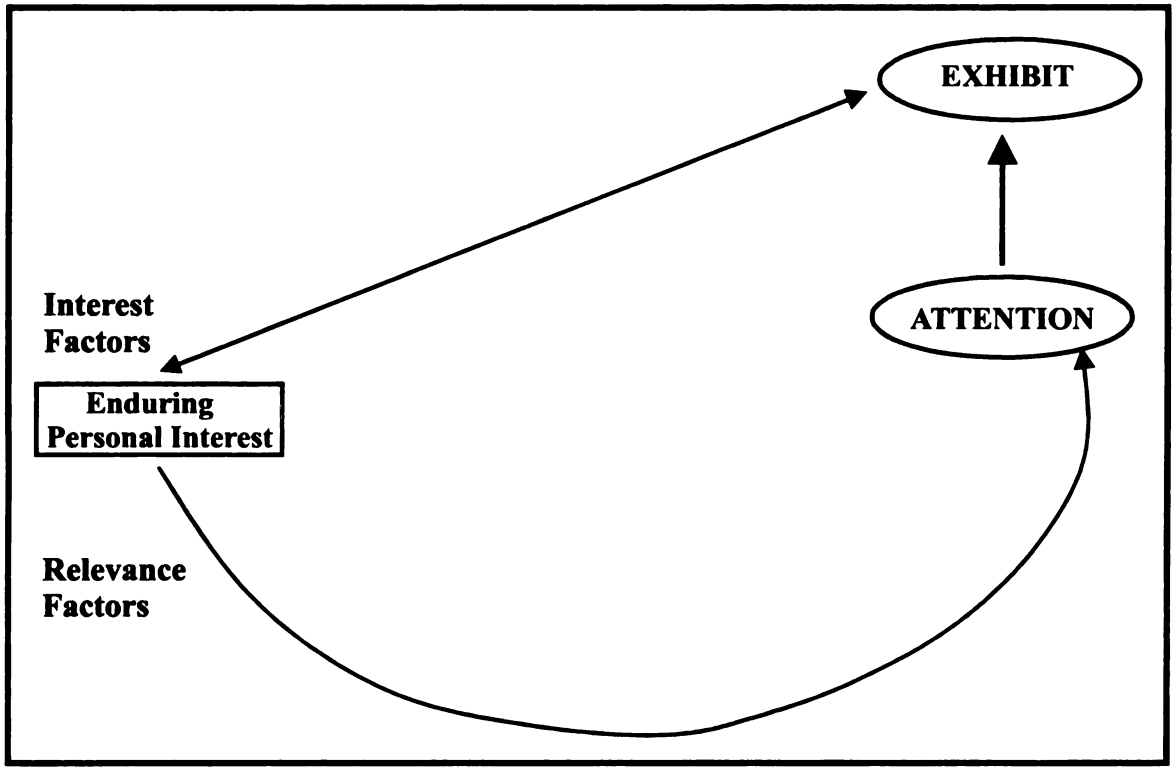


Figure 38 Pattern for 6 Groups in Three out of Four Exhibits

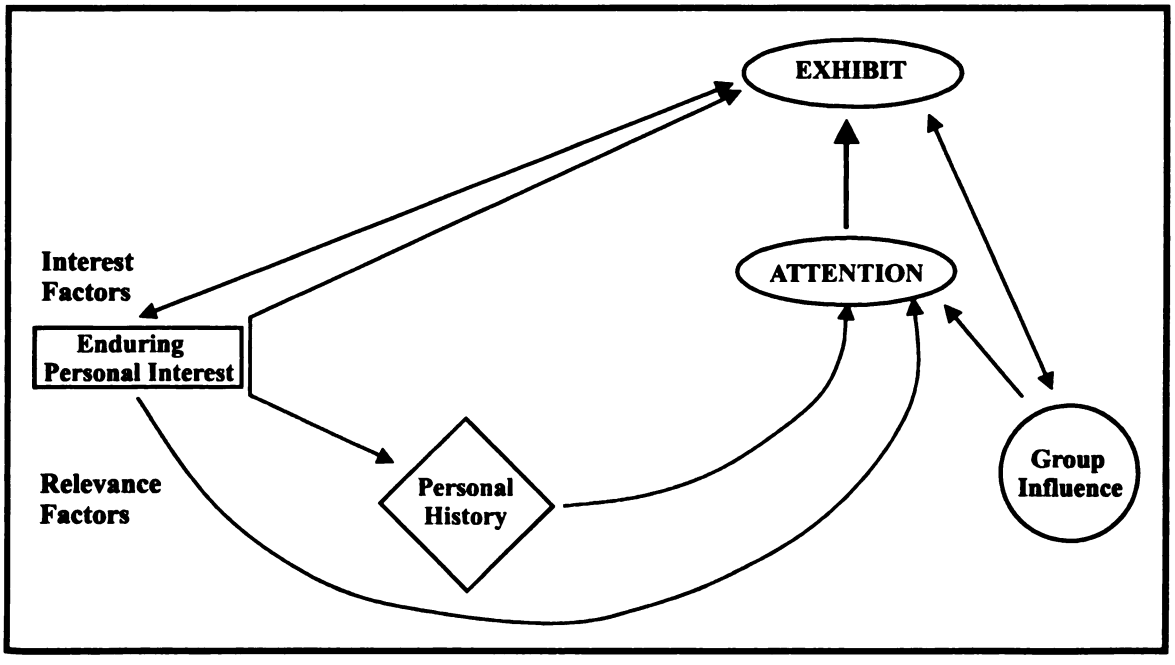


Figure 39 Pattern for 6 groups in Three out of Four Exhibits.

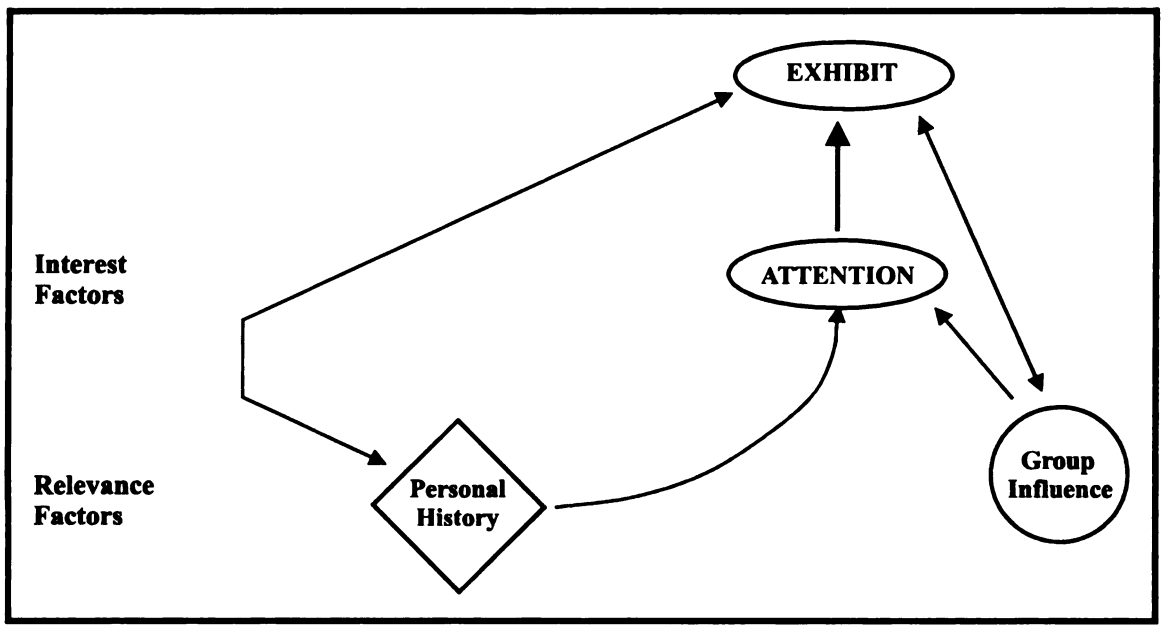


Figure 40 Pattern for 3 groups in Three out of Four Exhibits.

Connections

I now explore the data at the level of specific connections that visiting groups made with the exhibits through the factors in the model. Table 8 is a compilation of the primary connections that I documented through the two studies. The table places the three interest factors above the heavy horizontal line and the two relevance factors below the line.

	1998 Study		1999 Study			
Factor	HFM Locomotive	DIA	HFM Aviation	MSUM	Total	%
EPI	2	4	5	4	15	59
S-SI	2	4	4	2	12	
C	0	0	0	0	0	
PH	6	1	3	4	14	41
GI	4	1	0	0	5	
# Groups	14	10	12	10	46	100

Table 8–Primary Connections

Two things are very evident when the data is displayed in this manner. First, primary connections between the visitors and the exhibit were about equally made through interest (59%) and relevance (41%) factors, though interest factors dominated. Second, none of groups paid attention primarily based on curiosity. I defined curiosity very rigidly (after Berlyne), possibly undercoding curiosity in favor of situation-specific interest (I will say more about this phenomenon in Chapter V), as a result, there were no primary connections based on curiosity. Groups that paid attention based on relevance found that relevance as a connection to some aspect of their personal histories and more of these connections occurred at the locomotive exhibit than at any other exhibit.

Several of the groups detailed in the study found multiple connections within the model that further explained the dynamics of their motivation to attend. A summary of these multiple connections to the model are displayed in Table 9.

	1998 Study		1999 Study			
Factor	HFM Locomotive	DIA	HFM Aviation	MSUM	Total	%
EPI	5	6	5	4	20	52
S-SI	12	4	6	2	24	
C	1	0	1	1	3	
PH	12	4	5	7	28	48
GI	7	5	2	1	15	
# Conn.	37	19	19	15	90	100

Table 9–All Connections

Two things are immediately noticeable from this tabulation. First, groups visiting the locomotive exhibit made more of these multiple connections, averaging 2.6 connections per group. Second, the dynamics of attention are about equally explained in Interest factors (52%) and Relevance factors (48%), with interest still dominating, as it did with the primary connections. Again, however, curiosity played a minor a role in the attention of these forty-six groups (3%), but occurring in three out of four exhibits.

NEW COMPONENTS–REFINING THE THEORETICAL MODEL

This qualitative study began with a theoretical model developed from the literature. One of my primary interests was to see if this model proved plausible in the field. My second aim was to see what detail needed to be added in the case that it should prove authentic In this section I will report my field data as it applies directly to the theoretical model. I will refine the model as dictated by the dynamics of attention that were at work amongst the 46 visiting groups who participated in this study. The theoretical Attention Model for Museum Exhibits was shown in Figure 3, but is reproduced here in Figure 41, for convenience.

Each of the model's factors proved useful in describing the dynamics of attention in each of the four exhibits in the combined 1998 and 1999 studies. Often, data collected from the groups that constituted these studies provided additional levels of detail. I'm calling this additional level of detail the model's sub-factors. I will, therefore, first provide evidence for the five factors that describe the attention dynamic and then provide additional evidence for the sub-factors that developed as a result of the data collected in this study.

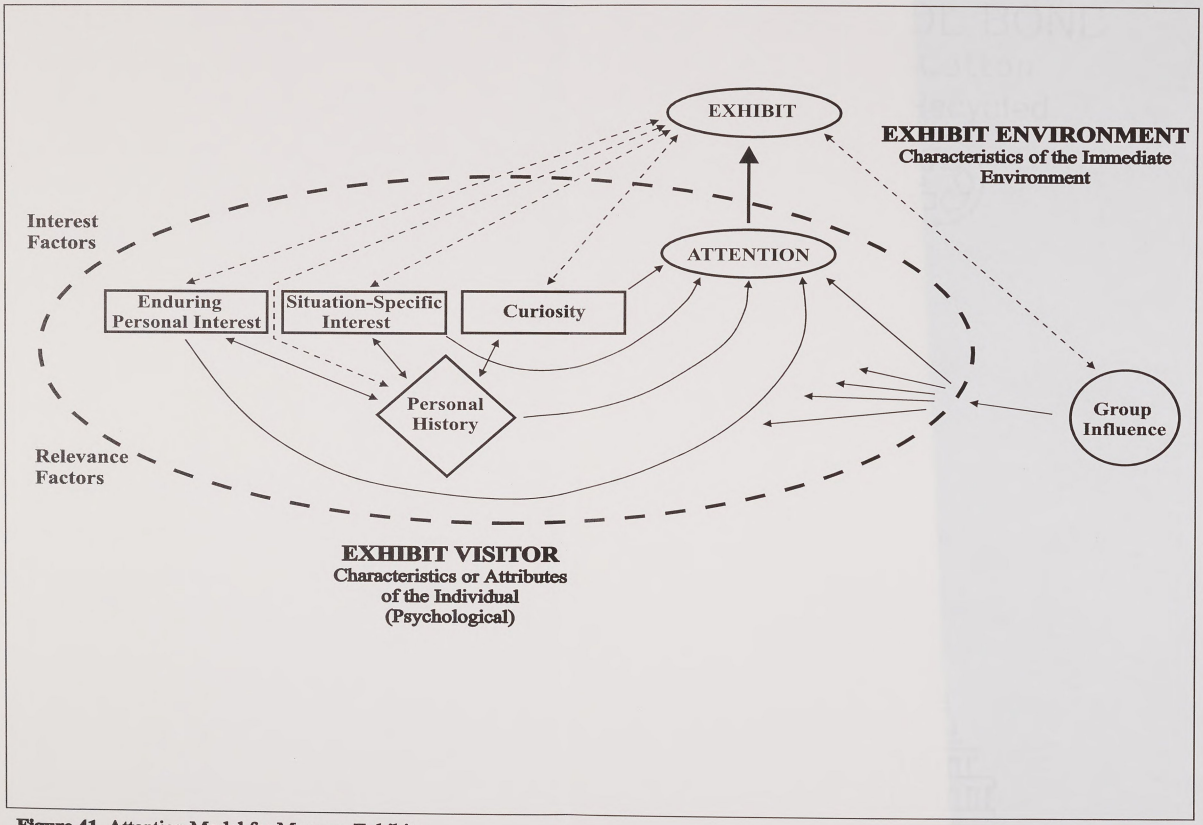


Figure 41 Attention Model for Museum Exhibits

The Model's Factors

Enduring Personal Interest

A durable characteristic of the individual to be interested in specific objects and, as a result, to pay attention to them. This factor includes the kinds of interests that friends would list if they were describing this person, i.e., clocks, painting, trains, etc. In the studies reported here I found that individuals were motivated by the objects and artifacts in each of the four exhibits.

1) HFM–Locomotive Exhibit

Visitors demonstrated that they paid attention because of their interest in some aspect of the locomotive, such as the mechanical engineering inherent in the locomotive or in locomotives taken more generally. Two of the groups were mechanical engineers who were in town for the Society of Automotive Engineers (SAE) convention that just ended prior to the first day of observations and interviews. These engineers were interested in the design, mechanism, and building of the locomotive. A group of three engineers from Italy said, "We come from Europe. We are engineers and we have never saw something big like that." A group of three engineers from the U.S. were interested in "mechanical transportation in general." Both groups expressed interest in design and were amazed to think of designing and building a locomotive like the #1601 without the aid of computers.

Other visitors, however, had long term interests that were not driven by their profession. One visitor had seen the locomotive before, developed an interest in it, and brought a friend to see it as well: "He's from out of town. I knew it was here and I wanted to see it again." Another visitor expressed a similar interest in the #1601 and said, "Actually, I've been here before and knew it was here. Wanted to see it again."

Thus, there is evidence from the groups visiting the locomotive exhibit that enduring personal interest motivated by either professional interests or from non-professional interests may describe the dynamics of attention where longstanding interests are at work.

2) DIA–Luminist Gallery

Groups visiting this gallery demonstrated that personal interest factors mediated their attention, such as a longstanding interest in American art, American landscape art, or artists who use light in the style of the Luminist painters. One visitor simply said, "I like American art," while another was more specific when he said, "I like American landscape art." The Luminist Gallery features paintings that are a very specific school of American landscape art that emphasizes the unique use of light. One visitor said he and his wife collect prints from a contemporary painter that emphasizes light. He said, "We have a couple of Kinkaid things. Thomas Kinkaid, a new artist, or relatively new. I have some of

his prints. He's called the 'Painter of Light.'"

Thus, there is evidence from the groups visiting the Luminist Gallery that enduring personal interest in the art may describe the dynamics of attention and that longstanding interests were at work.

3) HFM–Aviation Exhibit

Visiting groups who came to the aviation exhibit demonstrated that they paid attention because of personal interests, such as aviation, or aircraft, or because they are pilots themselves. One visitor said, "It really caught my eye. I like aviation stuff a lot. I don't own one, but I would like to." Another simply said, "I've always been interested in aircraft. As far back as I can remember." One of the pilots that I spoke with was a woman in her sixties. She said, "I'm an aviator and I've been one for over 40 years." She had actually flown a Ford Tri-motor aircraft. Another pilot simply said, "I'm interested in aviation. More interested in aviation than probably most people are."

Thus, there is evidence from the groups visiting the aviation exhibit that enduring personal interest motivated by their interests in the objects displayed may describe the dynamics of attention where longstanding interests are at work.

4) MSUM–Diversity and Evolution Exhibit

People who came to the Diversity and Evolution exhibit demonstrated that they paid attention because of strongly developed, or developing, personal

interests, such as the habitat of animals. The mother of a seven year old girl said, "She wants to be a veterinarian when she grows up," indicating an enduring personal interest that was becoming well developed. A woman who likes to see animals that inhabit her neighborhood said, "I like the animals. I like to see the animals, particularly the animals that are around this area." A man who had an enduring interest in birds said, "I do like birding myself and the bird feeding."

Thus, there is evidence from the groups visiting the wildlife exhibit that enduring personal interest in animals and their habitat may describe the dynamics of attention where longstanding interests are at work.

The stable, or enduring, interests of visitors provide the motivation for their attention to exhibits that connect to their enduring personal interests. This proved true across the four exhibits encompassed by this pair of studies.

Situation-Specific Interest

An opportunistic likelihood that an individual will choose to pay attention to a particular object based on his or her perception of the object's interestingness. This factor is based on the individual's desire to know more about his or her environment. This is what most people mean when they say someone is a *curious* person. Situation-specific interest is, however, more like scientific curiosity–the propensity to probe and discover.

1) HFM–Locomotive Exhibit

Visitors demonstrated that they paid attention to the locomotive because they were intrigued by it. They wanted to know how it operated, how people learned to design large machines, or they became absorbed in reflecting on how powerful it must have been. One visitor simply wanted to know, "How it works." One man thought about what a person would have to know in order to build such a machine: "I think if you think about the schooling you had to have in 1940 to be a [mechanical] engineer." Another man just found the locomotive inherently interesting, "Walked past the President's cars and just got started here. It caught our eye. The sheer size and strength of it."

Thus, there is evidence from the groups visiting the locomotive exhibit that situation-specific interest was the dynamic that may describe their attention to the exhibit.

2) DIA–Luminist Gallery

Visitors demonstrated that they paid attention to the paintings because they found some aspect of the gallery interesting. Some found art interesting, were interested in exploring the genre, or were interested in the way the artists rendered the scenes. One man who had an interest in the art itself said, "Just an interest, not real developed." This general interest sets this man and others like him apart from those who have a well developed, or Enduring Personal Interest. A woman also

expressed a general interest in the art when she said, "Just curious. Just wanted to see what they looked like."

Some people did comment on the scenes depicted in the paintings, at least in a general way. One man thought about the things of which he was reminded. He said, "It reminds me of certain light while traveling . . . so it kind of reminds me of traveling and things I've seen while traveling." The wife of another visitor was showing him "The Fisherman's Wedding Party," since they had visited Venice, Italy. He simply said, "When we were in Venice, it didn't look like that."

Thus, there is evidence from the groups visiting the gallery that situation-specific interest may describe the dynamics of their attention to the paintings.

3) HFM–Aviation Exhibit

The responses to the aviation exhibit were similar to those recorded at the locomotive in the 1998 study, the other technological exhibit in this study. That is, they demonstrated that they paid attention to the aircraft because they were intrigued by it. They wanted to know about the historical connection, how it was named, and to express their satisfaction in having the opportunity to see the famous plane. One woman found general interest through historical significance of the plane's name, "I saw in the brochure too about Admiral Byrd, about going over the North Pole, then over the South Pole. That was the plane that did it, so I thought that was interesting. And how he named it. I was interested where the

name came from, 'Floyd Bennett.'" A man responded to the same aircraft by expressing his pleasure to see it: "Just happened to be on the route through. I didn't know that they were here until we stopped. I said, 'Oh, lookie here, the Ford Tri-motor that Byrd flew over the South Pole. Wow!'"

Thus, there is evidence from the groups visiting the aircraft that situation-specific interest may describe the dynamics of their attention.

4) MSUM–Diversity and Evolution Exhibit

Visitors demonstrated a general, or Situation-Specific, interest in animals, such as wanting to see the animals close up, being drawn in because of something that caught their eye, or because they found some of the more common ones interesting . In the "Our World" exhibit, most of the visiting groups had a general, rather than a specific (or Enduring) interest. One woman said, "I thought the owls were really interesting, because I'd never seen those owls close up, the little owls." A man said, "It looked interesting, caught my eye." Another man was more specific when he said, "Just some of the common birds and things like that, are interesting."

Thus, there is evidence from the groups visiting the wildlife exhibit that situation-specific interest may describe the dynamic of their attention.

Curiosity

A characteristic of the individual to choose to pay attention to objects that are novel or incongruous. This factor is based on the individual's desire to reduce uncertainty and to resolve ambiguity. Curiosity was not really found very often in this study. It was only marginally evident in three of the four exhibits.

1) HFM–Locomotive Exhibit

The locomotive would seem to excite visitor curiosity if for no other reason than its size. It was a draw for one couple who said that it caught their eye while browsing the museum. The other thirteen groups did not seem surprised to find this large locomotive in the museum.

Thus, there is evidence from this one group that their visit might be described by the attention factor of curiosity.

2) DIA–Luminist Gallery

Curiosity wasn't encountered amongst any of the visiting groups to this exhibit.

3) HFM–Aviation Exhibit

The Autogiro is possibly the most curious object in the portion of the aviation exhibit used in this study. It looks like an airplane that can't fly while looking as if the rotor was added as a joke. One visitor found this "contraption" incongruous and said, "I looked at the Autogiro, because I thought it looked

funny. I wondered if they actually used it."

Thus, there is evidence that this visitor's attention may be described by curiosity that was based on the strangeness of the exhibit.

4) MSUM–Diversity and Evolution Exhibit

A woman thought the mural in the waterfowl area to be incongruous in that it was the only area devoid of actual wildlife. She said, "One thing, I was wondering why there were no water birds over there. They had the paintings, and all. But why they have no water birds over there in their display, because I think that would be real interesting." There were water birds, turtles, and snakes, but she apparently missed them all while dealing with her puzzlement over the mural taking up so much space without a single real animal present in the diorama.

Thus, there is evidence that this visitor's attention may be described by curiosity due to the incongruity of this area devoid of actual animals.

Personal History

I wanted to know if visiting groups made connections to exhibits based on their own personal histories. Personal history refers to the likelihood that an individual will choose to pay attention to an object based on a perceived connection between the object and his or her own past. This factor is based on the individual's awareness that the object has some degree of personal meaning. That is, would something in their past become salient while viewing the exhibit

resulting in their paying attention? If so, then the relevancy of the exhibit to their own past history would become descriptive of the dynamics of attention.

1) HFM–Locomotive Exhibit

Visitors demonstrated that they paid attention based on making connections to the locomotive and manifested this in a variety of ways: through their personal history as an engineer or because of memories of hearing trains. One man from Hamilton, Ontario, Canada said, "I came in the front door and saw this. As soon as I saw it, it caught my eye. I can remember sitting up in there and pulling the levers, like I say, this size down here [pointing to one of the smaller locomotives nearby]." A retired woman said, "Reminds me, when we lived in Ohio, every morning we would hear the whistle from the train and I always thought, 'I would like to ride a train like that someday.'"

Thus, there is evidence from these groups that personal history may describe the dynamics of their attention.

2) DIA–Luminist Gallery

Visitors demonstrated that they paid attention based on factors related to their personal histories, such as memories of ancestors, one's own history, paintings that portrayed scenes that one had seen. One man said, "My grandfather and his father, they probably saw scenes like that." A woman was commenting more on the museum sights, not the paintings, when she said, "I went to college at

Wayne State and so in between breaks, sometimes, I would buzz over. Back in '78 and '79." A man was looking for similarities with places he had been. He said, "I was looking for some places that I had been before to see if there was any, just by chance, any of the places I've personally been."

Thus, there is evidence from the groups visiting the gallery that their personal histories may describe the dynamics of attention that were at work.

3) HFM–Aviation Exhibit

Visitors demonstrated that they paid attention in the aviation exhibit based on their personal history, such as memories of their own or memories from family and friends. One man told me of his growing interest, "[My interest started] last year when I took the first plane ride. It's been building and building." Another man and his family are acquainted with Sikorsky helicopters. He said, "Sikorsky is from our home state. Sikorsky Helicopter is the next town over. So, we're interested."

Thus, there is evidence from the groups visiting the aircraft that personal history was in evidence and may describe the dynamics of their attention.

4) MSUM–Diversity and Evolution Exhibit

Visitors demonstrated that they paid attention on the basis of their personal histories, such as common animals they had seen and the more exotic animals in their foreign habitat. One woman spoke of her family and said, "We've seen, not

exotic animals, but animals walk through the backyard: deer, beaver, and like that." While a man who had visited Africa said he had "Seen the anthills about 10 feet high that the anteater would be around."

Thus, there is evidence from the groups visiting the wildlife exhibit that personal history was at work and may describe the dynamics of their attention to the exhibit.

Group Influence

Group influence can take many forms, but in this model it is construed to refer to the likelihood that an individual will choose to pay attention to an object based on a perceived association between the object and his or her group. This factor is based on the individual's awareness that the object has some degree of shared meaning amongst group members

1) HFM–Locomotive Exhibit

Visitors demonstrated that their own connections to the exhibit resulted in their attempts to influence other group mates to pay attention, such as professionals instructing non-professionals, enthusiasts, and even interested children . One gentleman who was a current locomotive engineer said, "Some of the running gear on it–I was pointing out to her the sand pipes on there, the reverse gear, and brake rigging on the engine." Two brothers from Canada were both knowledgeable about steam (especially Great Lakes ships) and shifted the

influencing role back and forth as their expertise pertained to the component they were viewing at the time. Nor does this role of "influencer" only include adults. In one case a gentleman told me, "The grandson brought us over here."

Thus, there is evidence from the groups visiting the locomotive exhibit that some group members influenced others and that this might describe the dynamics of attention in these cases.

2) DIA–Luminist Gallery

Visitors demonstrated that the influenced their group mates when visiting the gallery such as, one person bringing others because of an interest or the existence of a more burning desire to show another something. One woman brought her group in so she could see something, "It was my choice because I wanted to see something." A man said, "I was looking for Church and I was looking for Thomas Cole, a couple of the ones that I know and recognize." Another woman simply said, "My husband wanted to show me something."

Thus, there is evidence from the groups visiting the gallery that group influence was at work and may describe the attention of others influenced by other group mates.

3) HFM–Aviation Exhibit

Visitors demonstrated the they influenced others in their group to pay attention to the aircraft such as, a pre-trip influence or making a discrete decision

after arriving. Many times this influence occurred prior to visiting, such as the aeronautical engineer who said, "We heard about the Ford museum; that's the reason we came." Or, the influence often occurs after the group has arrived at the museum. One young man who had visited the museum before said, "We plotted our way back here to the aviation exhibit this time."

Thus, there is evidence from the groups visiting the aircraft that group influence may describe the dynamics of the attention of group members.

4) MSUM–Diversity and Evolution Exhibit

Visitors demonstrated they paid attention in the wildlife exhibit on the basis of group influence, such as one interested person leading others or using the various displays to exert influence. One woman spoke of her interest in the animals and then, referring to her group, said, "I think they were following me." Another woman spoke of her group interactions in terms of the "Conversation that came up when we happened to see a particular animal."

Thus, there is evidence that groups visiting the diversity and evolution exhibit paid attention based on the influences of others in their group and group influence may, therefore, describe the dynamics of attention in these cases.

Summary of the Model's Factors

I have pulled representative samples from the data set to illustrate various aspects of the model's factors in the above discussion. The factors seem to be

plausible explanations of the dynamics of attention for the groups that participated in the 1998 and 1999 studies. I will further exemplify the plausibility of the model in the next section where additional detail is added to several of the factors by identifying sub-factors. The one element that is not strongly represented is curiosity. I will discuss this in Chapter V.

The Model's Sub-Factors

In this section I will discuss some of the sub-factors that have emerged from the two studies and which add detail to the Factors discussed above. These sub-factors are attached to the major factors: Enduring Personal Interest, Situation-Specific Interest, Personal history, and Group Influence. They vary in nature from instances where one group or person expressed something that clearly adds detail to the major factor, to instances where a number of groups or individuals expressed similar dynamics. I coded the data according to the factor when none of the specifics presented themselves and according to the sub-factors when the detail was clearly in evidence.

Enduring Personal Interest–New Interest

This sub-factor is an example of the initial step in the development of a new Enduring Personal Interest. It was reported only by the European mechanical engineers who visited the locomotive exhibit in the 1998 study. Their attention

was due to their established interest in their profession and things mechanical but it began to develop to an interest in locomotives for their own sake. They simply said, "We are hooked!"

Situation-Specific Interest

Situation-specific interest is the more general interest that people have in the world around them. The data from the 1998 and 1999 studies indicate the need for additional detail. There are three new levels of detail behind this general interest: Emotions, Imaginings, and Transitions.

Emotions

The emotional responses that I encountered dealt with a range of General Emotions (fear, wonder, etc.) as well as Aesthetic Responses. I will report these two sub-divisions in turn.

General emotions.

Visitors to the four exhibits being reported here expressed a variety of emotions. A young boy between 8 and 10 years old soberly said of the locomotive, "It could kill me!" A man expressed a wonder at the power when he said, "Yeah, there's an emotional thing about their size. That's an awful lot of power." A woman who visited the Luminist gallery was both calmed and confused. She said, "The one over there, with the water, felt calming. For me,

they're calming. I mean, they're not like the more abstract seems to evoke, um, confusion." A man spoke of "uncertainty" and "unpredictability" as he looked at the Church painting of *Cotopaxi*. A woman visiting the aviation exhibit spoke of disbelief when she said, "Actually, the first helicopter, I think, doesn't look like the helicopter I rode in. And, it just looks like, ooh, I don't know that I would want to ride in that, it looks kind of scary." An older man expressed his pride, "Well, I guess I felt proud that we had so many innovative people that brought these developments to the forefront." A woman visiting the "Diversity and Evolution" exhibit was scared, "Scared of the snake." A man was surprised, "And how big some of them are. I was surprised."

Aesthetic responses.

Attention for some visiting groups resulted as they responded to the aesthetics of the exhibits. Something is considered aesthetically pleasing by one who experiences an emotional response to the beauty of the object. This inexorably leads us to the concept of the *sublime*. The English writer Shaftsbury argues that the sublime is the highest form of beauty. Something is considered sublime if it represents something higher, such as deity. In fact, Sweeney (1991) contends that there was a "Belief in the divinity of the natural world" (p. 158) during the time of the Civil War. This relates to a category of emotions that I especially observed at the DIA which I call the Natural Sublime, or the reverential

feeling that visitors experienced while viewing the Luminist landscape art. It also manifested itself at the MSUM.

There is another manifestation of the sublime, however, in the technological objects at the HFM, which I, like Perry Miller, Leo Marx, and David Nye, call the Technological Sublime. David Nye (1994) says the sublime "Is about repeated experiences of awe and wonder, often tinged with an element of terror, which people have had when confronted with particular natural sites, architectural forms, and technological achievements" (p. xvi). And the Technological Sublime is, according to Marx (1964), the nineteenth century Americans process where "The awe and reverence once reserved for the Deity and later bestowed upon the visible landscape is directed toward technology or, rather, the technological conquest of matter" (p. 197). The technological objects at the HFM are definitely representative of the grand achievements of a heroic people and of the conquest of space and time.

Natural Sublime

The Luminist Gallery at the DIA and the Evolution and Diversity exhibit at the MSUM are both representative of the natural world. A young man who was visiting the DIA spoke of the spectacular nature of the light and how the painting seemed detached from the temporal: "We were discussing the amazing light in these paintings. The skies, the colors in the skies, the movement, or lack of it.

The timelessness in some of the work." His female companion responded to the beauty, saying, "Beauty's beauty. This is beautiful stuff." Another woman, there with her husband, stopped solely on the basis of the beauty, "Because of the beauty of it."

The response to the natural sublime was also in evidence at the MSUM. A woman who was visiting with her family responded to the size of many of the animals, saying, "And how big some of them are. I was surprised." Another woman who was visiting with her male friend was quite taken by the spectacle of the butterflies that were just outside the Diversity and Evolution exhibit. She said, "The butterflies are absolutely fascinating. I could stand there all day and look at the butterflies." A woman who visited with her husband and daughter expressed amazement: "I didn't realize that there was that many, really, different species. You think about different animals and you don't realize the diversity and the different appearances."

Technological Sublime

Many of the visitors to the locomotive in the 1998 study expressed amazement at the shear size of the machine: "Very big." "Huge." "I've never seen anything quite that big." "The size of it." "It's HUGE!!!" "Awesome." This emotion was perhaps best described by a boy about eight years old who said, "It could kill me!" Nye (1994) says that people often have difficulty describing

sublime objects. Visitors said, "Beyond description, see it!" "Go and see it." "Encourage everyone in general to come and see it. It's amazing." Visitors also responded to the power in the machine: "It's such a big engine. I mean, I know there's a lot of power in them by the size of the boiler and stuff like that." "I mean, you see, I mean look at the enormity of all the things on the outside." "I thought how huge it was–massive. And how complicated it must have been back at that time to design and build something like that. I've been around, but this thing's huge!"

Visitors to the aviation exhibit at the HFM tended to express admiration for the inventors, the people who had a vision for the conquest of distance by powered flight. One woman, there with her husband, expressed her pride in American technology in general as she said, "And American technology is just so impressive. It makes me proud." An older man, attending with his wife commented about the courage of Byrd's expedition to the South Pole, "Oh, wonder, admiration, probably for these guys who did this. That airplane. Fly over the South Pole in that sucker? That takes some guts!" One woman also spoke about her surprise at the size of, particularly, Byrd's plane, "Just the size, I think, caught our attention first thing." Her daughter related her surprise to what she had seen on television: "I'm kinda' just surprised at how big they are. Because on TV and in pictures you can't quite capture how big they are."

Imaginings

How wonderful it was to find people projecting themselves into a painting, watching a locomotive barrel down the track, taking to the sky, or interacting with animals. This higher level of affective involvement is what Raphling and Serrell (1993) call *imaginings*. Imaginings involves the visitor stepping outside their own experience, trying to imagine the object in use, the painter's vision, or the animal in its habitat.

A woman visiting town was attempting to see the landscapes through the artist's eyes as she looked at the paintings. She said, "I think, I would say I was trying to envision what they were looking at when they painted it, more so." To which her male companion agreed, "Yeah, I would say I was trying to enter into their vision." Another young woman and her male companion projected themselves into the scene itself. She said, "We just talked about how they were kind of peaceful and how it would feel to go there." A man at the aviation exhibit thought about what it would be like to be an early aviation pioneer. He said, "The only thing I can think of is about the inventors, the people who first tried them. They came up with the idea and needed somebody to test them, so they ended up testing them themselves. Some people, it worked successfully the first time and some lived through several crashes in order to perfect their inventions." A woman thought of herself going to Antarctica in the Ford Tri-motor and how cold it

would be: "We said the metal one looked heavy and cold to go to Antarctica." A man at the MSUM thought about seeing the animals in their habitat, "I think one of us made a comment about what it would be like to see that in the wild or out in the backyard." A visitor to the locomotive exhibit thought about mining the coal needed to power the locomotive, "Trying to imagine the number of people it took to go down into the mines and things to do the coal to make one of those things run. And the number of lives that were lost in those coal mines." One woman thought about the skill required to operate the locomotive: "Where they went to school to learn how to run it?" Others thought about how difficult the work was. One man said, "The poor guys that built it [and] those poor guys who had to feed that sucker going down the road."

Transitions

The sub-factor of transitions refers to an expression of a visitor being in the process of transitioning from one factor, the one that engaged their attention, toward a newly developing interest. For example, a man who visited the aviation exhibit was in the process of developing his own interest in flying after going on a flight: "Started last year when I took the first plane ride. It's been building and building." The European mechanical engineers who visited the locomotive were making the shift from attention due to enduring personal interest and personal history in mechanical engineering to developing an interest in locomotives for

their own sake: "We are hooked!"

Personal History

Data from the two studies led me to code personal history data into three sub-factors. These sub-factors are: Personally Experienced Past, Vicariously Experienced Past, and Idealized (or romanticized) Past.

Personally Experienced Past

One's personally experienced past refers to memories of actual events in the visitors' personal pasts. These may be real or imagined, as the past often is, but the critical determining factor is that the visitor represents these events as coming from their own pasts. For example, a young adult student at the Center for Creative Studies experienced a field trip to the DIA. On that basis, he returned for a weekend visit with one of his classmates. He said, "I'm a student at the Center for Creative Studies, next door, and we came in here for a tour one afternoon." But his personal past, as well as that of his female companion, goes further back– to middle school: 'We both, like, took art in middle school together. We both went to the same high school and we both ended up here in Detroit." Another man thought about his personal experiences in terms of seeing pictures of the paintings: "More memories of seeing. Seeing some of the paintings in books that I had seen before." A man who visited the aviation exhibit remembered

seeing programs on television about aviation: "Yeah, because I can remember seeing something on A&E or Discovery, or something, on that particular piece when it was new." A woman thought about the airplane owned by a neighbor: "It reminds me of Carl VanIleson's airplane. We're from North Dakota and he's from Hatton and they have an airplane similar to that." A man at the MSUM thought about animals he had personally seen: "Thinking just about the animals I've seen in my own backyard." Another man had worked at a natural history museum and thought about that: "I used to work at a museum. Just reminded me of my experience working at another museum." A man visiting the locomotive exhibit thought about his boyhood: "I remember when I was a kid seeing them. And I rode on them. A lot of nostalgia there." Two brothers from Canada thought about an accident: "Oh, him and I were hit by a train in 1949. Up in Northern Canada. Like this thing would drive right over the thing that hit us. And the one that hit us pretty near drove over us."

Vicariously Experienced Past

A person's vicariously experienced past involves memories of family or friends. This is the kind of "experience" that is lived through another person. A man visiting the Luminist Gallery thought about his grandfather and great grandfather: "My grandfather and his father, they probably saw scenes like this." Another man lived the experience through the lives of the people of the time: "I

try to think back to that point that they're discussing and try to see if it's relevant or, see if I can understand something they might be saying in the paragraphs." This man's wife thought through her father's experiences: "My dad, with all the hills, because he grew up in West Virginia. It looks familiar, reminds me of it." A woman visiting the aviation exhibit thought of her father's experiences in the service: "My father was in World War II. I don't know if he'd be interested in seeing some of the war ones too." A couple also thought about her uncle's and mother's experiences. The wife's uncle flew with Byrd: "My uncle went to Antarctica, to the South Pole, with Admiral Byrd." He said, "Your mother saw Lindbergh." A woman at the MSUM thought about her father's experiences and influence: "Probably from my father. He was very interested in animals and in birds. He kind of peaked my interest when I was younger. I guess that's just carried on." A man visiting the locomotive thought about the railroad experiences of his brother: "My younger brother was a fireman on steam powered railroad locomotives and he progressed from the steam fired ones to the diesel ones." Another man thought through the experiences of several relatives: "My dad worked for the old Nickel Plate. My grandfather worked before him, and he had two uncles who worked on the Illinois Central, down South. My brother works for the NS." Another man thought of his father's experiences: "My grandfather worked for the Grand Trunk, he was a fireman. It does bring back some

memories of what he used to do." And a woman thought of an unfortunate incident her mother had: "My mom got a cinder in her eye from a steam engine."

Idealized (romanticized) Past

A romantic or idealized vision of the past is a sub-factor that I found in evidence only in the Luminist Gallery at the DIA. Here, a person thinks of the purer, simpler times with a wistful sentiment. A woman expressed the "greener grass" syndrome as she looked at the landscapes: "Times were better, skies were cleaner, grass was greener." A gentleman with another group thought about the great age of discovery: "I guess it brought to mind the discoveries on this continent at that period of time." He also thought about how some of the paintings purposively romanticized the scenes: "How these were romanticized by the painters for the people who hadn't seen these places themselves yet."

Group Influence

Group mates influenced each other in a variety of ways. Four sub-factors that I observed were: Pre-Exhibit Influence, Socialize/Educate, Lead/Follow, and Discussion.

Pre-Exhibit Influence

Group members can influence each other prior to arriving at the exhibit. This might be a conscious choice to visit the exhibit or a more spontaneous

decision when it was seen from a distance. A woman at the DIA admitted to influencing her family: "It was my choice because I wanted to see something else too." A man brought his friend based on his interest: "I was looking for Church and I was looking for Thomas Cole, a couple of the ones that I know and recognize." A husband and wife visited the room and returned. The wife said it was at her husband's urging: "My husband wanted to show me something." A social group, two women, came to the aviation exhibit because of a mutual choice: "We plotted our way back here to the aviation exhibit this time." A woman visiting the MSUM said she and her husband came to the exhibit due to his urging: "He likes watching birds. It was his idea." A man brought his friend to the locomotive exhibit based on his desire to show him something: "I knew it was here. He's never been here before." A family made their decision based on the brochure: "Looked at the brochure and thought we'd take a look at trains."

Socialize/Educate

I have placed these two sub-factors together for convenience. There was only one instance that I coded as *socialize*, but this instance could also be construed as a desire to educate. A family visiting the DIA came because the mother wanted to socialize and educate her daughter: "This is her first time here and our last name is Knight and she wanted to see the Knights and the armor. And I wanted to make sure she saw the Rivera Room and, then, we started with

the American section. I was explaining to her that when these artists were painting these pictures, it was when the country was raw."

The visitors in the remaining exhibits were seeking solely to educate fellow group members. At the aviation exhibit it was the men who felt obligated to enlighten females on mechanical issues. One man, for example, was explaining the mechanism to his wife: "Tried to enlighten her on a few things, mechanically." Another man was teaching his daughters: "I'm trying to point out things to my daughters from time to time as we go through." I observed one man talking to his children at the locomotive exhibit with gesturing and pointing, obviously involved in a teaching interlude. He would not, however, share any of the details when asked what he might have been saying. Others were playing the role of docents as their expertise pertained. One man explained the mechanism to his wife: "Some of the running gear on it. I was pointing out to her the sand pipes on there, the reverse gear, and the brake rigging on the engine." Two brothers shifted the teaching role back and forth as their expertise pertained.

Lead/Follow

Another sub-factor that became evident concerned the role of group leadership. I will say more about this in Chapter 5, but, suffice it to say, that some people were clear on who within the group was filling the leadership role within the exhibit under study. In the aviation exhibit, for example, a wife clearly

admitted that her husband was the leader at the moment: "I'm being led by the male factor here." At the MSUM a woman said that her family came into the exhibit because of her leadership: "I think they were following me." An older gentleman visiting the locomotive exhibit said his grandson was in charge of the group at the moment: "The grandson brought us over here."

Discussion

All of the groups in these studies entered into discussion. Three examples from the MSUM are typical. A man and his grandson were discussing the evolution topic of the exhibit: "We started talking about evolution." A woman and her husband talked about animals when looking at the reptiles: "When we were looking at the snakes we were talking about different animals." A middle-aged husband and wife talked opportunistically, as the animal or label led them: "Just conversation that came up when we happened to see a particular animal."

Summary of the Sub-Factors

The sub-factors just discussed add a new level of detail to the basic Attention Model that was not evident in the original theoretical model. Data used to exemplify the sub-factors is also applicable to the factors themselves, giving additional support for the operation of the factors as the dynamics whereby attention is paid. I have pulled representative samples from the data set to illustrate

various aspects of the model's sub-factors in the above discussion. The sub-factors seem to be plausible explanations of the dynamics of attention for the groups that participated in the 1998 and 1999 studies. They further exemplify the plausibility of the model as explanatory of the dynamics of motivating attention.

SUMMARY

This chapter summarized the findings relating to the factors within the Attention Model and their plausibility as descriptors of the dynamics at work as free-choice learners are motivated to pay attention in a free-choice learning environment, a museum exhibit. I have provided stories that summarize the nature of the visit for groups within both the 1998 and 1999 studies, included individual paths through the model as taken by each of the forty-six groups who participated in the studies; exemplified the model's factors; compared the various sites along the factors of the model; and added sub-factors to several of the model's original factors.

The following items highlight the findings of this study:

- ✔ The forty-six groups included in this study had one of four different kinds of visits, called 'stories.' There were three stories for the winter visitors in the 1998 study and one story for the combined three sites in the 1999 study. This single story is equivalent to story #4 in the 1998 study.

- ✔ Stories #1, #2, and #3 from the 1998 study represent more specialized visits: engineers, steam afficionados, locomotive engineers.

- ✔ The fourth story in the 1998 study and the single story for the 1999 study represent the more generalized family/social visitor.

- ✔ There were specialized visitors in the 1999 study, pilots, museum workers, artists, but their presence didn't affect the groups like the specialists in the 1998 study did.

- ✔ There were variations in paths through the attention model even within stories.

- ✔ The major categories within the attention model–interest and relevance–were plausible predictors of attention.

- ✔ The elements within these categories–enduring personal interest, situation-specific interest, curiosity, personal history, and group influence–were powerful enough to describe the attention fo the forty-six groups included in this study.

- ✔ All factors except curiosity was strongly represented and generated sub-factors that added new detail to the model.

- ✔ The primary dynamics of motivation fall within the interest category: enduring personal interest and situation-specific interest.

- ✔ Personal history was the dominant dynamic factor describing attention within the relevance category.

CHAPTER V

CONCLUSIONS AND DISCUSSION

INTRODUCTION

The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention. These factors comprise an Attention Model for Museum Exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits. In this chapter I will revisit the scope and limitations of this study from Chapter I, draw conclusions from the findings reported in Chapter IV, offer hypotheses about the various paths through the model that can serve as provisional theory for future studies, discuss the use of the model, and give suggestions for future research.

SCOPE AND LIMITATIONS

The scope and limitations of this study result from the design and choice of method, setting, and participants. There are at least five limitations, one from design, three from choice of method, and one based on setting and participants: 1) The study was designed to explore the visitors' motivation to pay attention in a global sense: Integrating what drew them to the exhibit with what kept them at the exhibit. These motivators are likely quite different for most visitors. For the

purposes at hand, therefore, I chose to look at the total picture. 2) The sample was not randomly chosen. Instead, groups exhibiting attention-like behaviors were asked to consent to a conversation about their visit The results of the study cannot be generalized to a population. 3) I relied on one contact with the participants. I did not ask them to provide me with their names and contact information, negating my opportunity for follow-up on areas that might benefit from clarification after the fact. 4) I spent a very short period of time talking with each group of people. These participants had paid admission to the museum (in all but the MSUM) and were there to get their money's worth. I spent from 5 to 10 minutes with each group, on average. 5) The interviews were conducted while the visitors were still in the exhibit or gallery. There was the temptation for them to want to continue with their visit and there were the distractions of other visitors moving past during the interview. Each of these limitations–method, setting, and participants–was discussed in Chapter I.

CONCLUSIONS

The findings from this pair of studies support the choice of interest and relevance as categories for the factors that describe the dynamics of attention on the part of free-choice learners. These factors of enduring personal interest, situation-specific interest, curiosity, personal history, and group influence were able to describe the dynamics of the motivation to attend for the visitors who

participated in this study. Further, the findings show that the attention model applied to visiting groups across the four exhibits and three institutions that were included in this study.

The results of these studies provides evidence, therefore, that the attention model provides a more detailed analysis of the "hook" in Csikszentmihalyi and Hermanson's original diagram (see Figure 1), which depicted the "hook" as curiosity leading to interest. The attention model explains the ways by which a visitor may be motivated to pay attention. The museum visitor who pays attention then has the potential to move into Csikszentmihalyi's flow state. The move to a flow state would depend on opportunities for involvement and skill challenges of the environment that don't greatly exceed those of the visitor (Csidszentmihalyi, 1975, 1990; Csikszentmihaly & Hermanson, 1995).

Conclusions from the Stories

The experience of the forty-six groups of museum visitors who participated in this study were categorized into one of four stories. These stories (see Chapter IV) describe the overall nature of the visits for these groups and were based on the similarities in their patterns of interaction while in the exhibit, which was corroborated by the interviews. These stories could describe the visits of most groups visiting a museum. I add sub-factors taken from data collected from the participants in my two studies described in Chapter IV. I am confident that the

model has the power to accommodate new stories, ones not encountered in the course of these studies, as well.

I found it useful to divide the stories into two groups that were based on the level of visitor expertise: professional/hobbyist and family/social. The professional/hobbyist stories include the mechanical engineers, steam afficionados, and locomotive engineers encountered in the 1998 study. The social/family stories include the social/family visits from both the 1998 and 1999 studies.

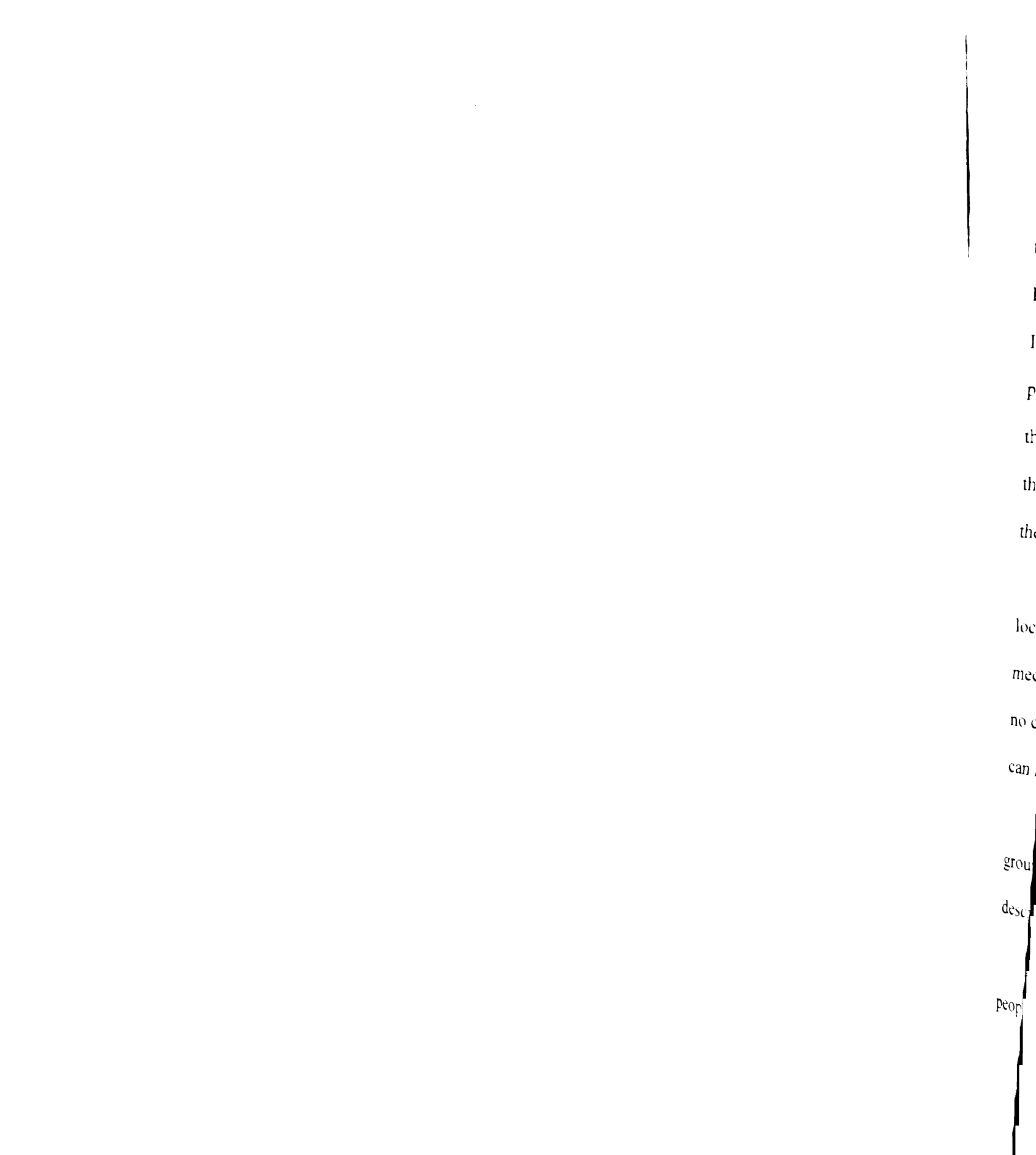
The two groups of mechanical engineers in the 1998 study that were included in story #1 are remarkably similar. Their enduring personal interests in mechanisms and mechanical transportation formed their motivation to attend. These interests in machines were professional interests that must characterize others of their profession who visit the locomotive. But there were not corresponding professionals who visited the exhibits in the 1999 study. There were, for example, no aeronautical engineers who visited the aviation exhibit as a group of professionals, nor painters who visited the Luminist Gallery en masse, nor biologists who visited the Evolution and Diversity exhibit on a group field trip.

I speculate that any visiting group of professionals would act in similar ways to an exhibit that would be obviously related to their vocation. A group of biologists who might visit the Evolution and Diversity exhibit after attending a conference at the university might discuss the various displays from professional

perspectives, and debate the pros and cons of topics such as wildlife ecology. They might also shift from their enduring personal interest in biology to a situation-specific interest in an animal such as Arctic Fox because they became interested in some aspect of the animal's habitat. Their attention could be generated by their professional interest but could likely be switched based on some of the ideas or information that they gained from the display.

Only one visiting group from the 1998 study is described by story #2 . They were two brothers who are best characterized as steam afficionados. They were primarily interested in Great Lakes freighters and they shared an enduring personal interest in this technology along with a shared personal history (each had sons on freighters). Based on these forces, they paid close attention to the large steam locomotive. Their overall enthusiasm and intensity set them apart from all the other visitors who participated in the two studies. Each of the three exhibits in the 1999 study were visited by individuals having a strong knowledge of the objects, but no one else exhibited the degree of intensity nor did any of the other visitors have a companion who was as knowledgeable as they. These two brothers were indeed a specialized group on the basis of their interests. Thus, I place this story withing the professional/hobbyist category.

Story #3 in the 1998 study included two groups of visitors. Both of these couples included a gentleman who had been a locomotive engineer or who



currently is a locomotive engineer. The attraction to the locomotive, based on profession, could be considered similar to the groups of mechanical engineers. Unlike the groups of engineers, however, there was only one expert in each of these groups. These experts took on a teaching role, explaining details of the locomotives to the less informed member of their group–their wives in both cases. I titled the stories "A Docent in the Group" as a result of this dynamic. There were pilots in the groups visiting the aviation exhibit and painters in the groups visiting the landscape gallery, but none of them assumed the formal teaching role to extent that these gentlemen did. I consider this a special group and place the story within the professional/hobbyist category.

I believe that the dynamics of a group with only one professional, like these locomotive engineers, differs from a group with multiple experts, like the mechanical engineers, based on the opportunity for discussion. A single expert has no choice but to share his or her experience in the "docent" role. Multiple experts can interact based on common training and language.

The model was quite able to describe the dynamics of these three special groups of visitors, even though my goal was to develop a model that would describe the dynamics of a more general family/social group.

The vast majority of the groups (89%) were the kind of groups that most people and most museum professionals (Hooper-Greenhill, 1994) would consider

typical of today's museum visitors–the family/social group. Hood (1991), in her study of visitors to the Henry Ford Museum and Greenfield Village, identifies 58% of the winter visitors (as in my1998 study) to be family visitors and 21% to be groups of friends. The Hood report also indicates that 64% of the summer visitors (as in my 1999 study) to be family groups and 12% to be groups of friends. I do not have equivalent audience characteristics for the other two institutions[12], but I believe the numbers to be similar. Hence, the family/social group of visitors is the more typical profile of the visiting groups in this study and, given the audience characteristics from the Hood study, the kinds of groups that one might expect to be characteristic of museum visitors.

Conclusions from the Paths

The majority of all 46 groups followed paths through the attention model that involved the interest factors. Groups expressed either an enduring personal interest or a situation-specific interest. The relevance factor of personal history explained the attention of the majority of the groups that paid attention based on relevance. Thus, both interest and relevance were at work among these forty-six groups as they were motivated to pay attention to the exhibits.

Hypotheses about the Varied Paths

I posit two major constructs as motivators for attention: interest and relevance. I have discovered nine paths within the attention model that connect

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interest and relevance to the dynamics of attention. The following 12 hypotheses are my interpretation of the data from this study in a form that can become the basis for future research and discussion. See Table 10 for a listing of the 12 hypotheses. I will describe the paths by providing conclusion, meaning for the museum, an example, and a suggested research question for each of the 12 hypotheses.

Hypothesis No.	Concept/Factor	Hypothesis
1	Interest (Concept Level)	A visitor's propensity to pay attention to an exhibit is influenced by the degree to which the exhibit appeals to the visitor's interest in the kinds of stimuli present. This predisposition is of three kinds: enduring personal interest, situation-specific interest, or curiosity.
2	Relevance (Concept Level)	A visitor's propensity to pay attention to an exhibit is influenced by the degree to which the exhibit is perceived to be relevant to the visitor. This perceived relevance is of two kinds: personal history (psychological) or group influence (social/psychological).
3	Enduring Personal Interest	Visitors may pay attention to the exhibit if they have a previously developed interest in the subject of the exhibit or one of the exhibit components. Enduring personal interest is subordinate to the factor of interest.
4	Situation-Specific Interest	Visitors may pay attention to the exhibit if they find some aspect of the exhibit interesting. This interest is a function of the perceived interestingness of the exhibit itself and is a function of personal traits and social conditioning. Situation-specific interest is subordinate to the factor of interest.

5	Curiosity	Visitors may pay attention to the exhibit if there is some element of surprise or incongruity inherent in the exhibit that elicits the visitor's natural tendency to be curious. This factor is subordinate to the factor of interest.
6	Personal History	Visitors may pay attention to the exhibit if they can see relationships between the exhibit and their own personal history. This factor is subordinate to the factor of relevance.
7	Connections to Another Group Member	A particular exhibit may not connect directly to an individual visitor but may make one of the connections described in hypotheses #3 through #6 to another individual in the visitor's group. This attending individual may then assist the non-attending group member to pay attention by mediating between the exhibit and the non-attender. This leads to the connections described by hypotheses #8 through #12.
8	Group Influence via Enduring Personal Interest	Visitors within a group may become interested in an exhibit if someone in their group has an enduring personal interest in the exhibit or one of its elements. Such an attending group member may mediate the attention of non-attending group mates. This interaction might lead to an emerging interest that is subordinate to the category of interest.
9	Group Influence via Situation-Specific Interest	Visitors within a group may become interested in an exhibit if someone in their group first becomes interested due to situation-specific interest. Such an attending group member may mediate the attention of non-attending group mates. This interaction might lead to an emerging interest that is subordinate to the category of interest.

10	Group Influence via Curiosity	Visitors within a group may become curious, not about the exhibit, but to know why others in their group find the exhibit interesting. This may lead to an interaction between the non-attending group member and his or her group mates. This interaction might lead to an emerging interest that is subordinate to the category of interest.
11	Group Influence via Personal History	Visitors within a group may become interested in an exhibit if someone in their group makes a connection to their own personal history. Such an attending group member may mediate the attention of non-attending group mates. This interaction might lead to a connection to personal history on the part of the non-attender that is subordinate to relevance.
12	Group Influence via Direct Appeal	Visitors within a group may become interested in an exhibit if someone in their group makes a direct appeal to the non-attended to look at something specific. This interaction might lead to a connection that is subordinate to the category of relevance in that it was mediated through the group.

Table 10 Listing of Hypotheses

The first two hypotheses are about interest and relevance–the conceptual level of the model. I will defer to the hypotheses concerning the specific paths for specific examples and suggestions for research. The following ten hypotheses concern the actual paths through the model. I use an example from only one of the four exhibits with each of these hypotheses and consider this representative of the remaining sites. The reader should refer to Figure 42 where the hypothesis

numbers are attached to the relevant connection within the model shown in the figure.

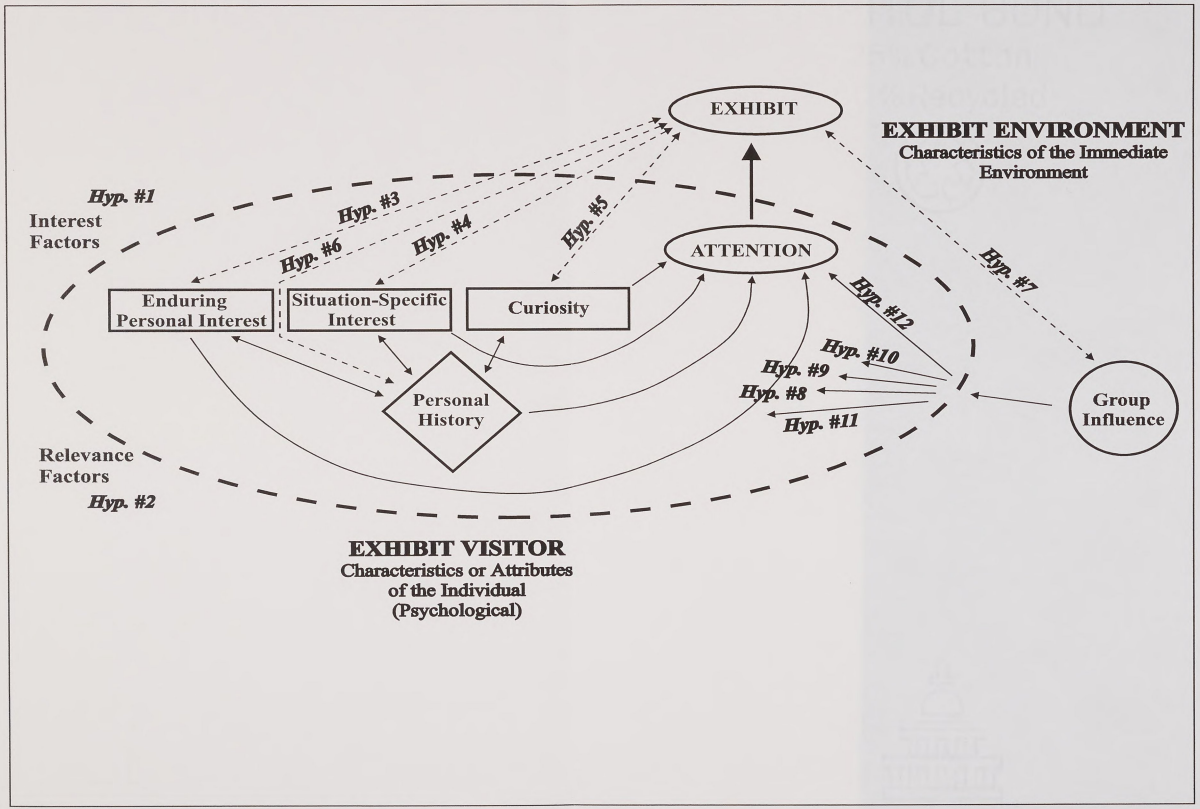

Figure 42 Attention Model for Museum Exhibits with References to Hypotheses

Hypothesis #1 - **INTEREST** [Concept Level - Psychological]

A visitor's propensity to pay attention to an exhibit is influenced by the degree to which the exhibit appeals to the visitor's interest in the kinds of stimuli present. This interest is of three kinds: enduring personal interest, situation-specific interest, or curiosity.

Conclusion: Visitors who have an enduring personal interest in some aspect of the exhibit, simply find the exhibit to be interesting through situation-specific interest, or have their curiosity aroused by the exhibit. They are more likely to pay attention to the exhibit than those visitors who are unable to make any of these connections.

Meaning for Museum: Many visitors need assistance in understanding how their interests may apply to an exhibit. For example, younger visitors may find it difficult to relate to a technological exhibit such at the #1601 since they were not part of the railroad era. Museum practitioners should employ techniques appealing to visitors' enduring personal interests, developing situation-specific interests, or creating curiosity.

Example: Specific examples are given below for the factors within this category (enduring personal interest, situation-specific interest, and curiosity, see hypotheses #3, #4, & #5).

Research Question: See hypotheses #3, #4, & #5 for the specific questions.

Hypothesis #2 - **RELEVANCE** [Concept Level - Psychological and Group Mediated]

A visitor's propensity to pay attention to an exhibit is influenced by the degree to which the visitor perceives the exhibit to be relevant. This perceived relevance is of two kinds: personal history (psychological) or group influence (social/psychological).

Conclusion: Visitors who can make connections between the exhibit and their personal history or who are assisted in making either interest or relevance connections by other members of their group are more likely to pay attention than visitors who do not see any personal or group relevance in the exhibit.

Meaning for Museum: Many visitors need assistance in making connections based on relevance to an exhibit. For example, a visitor looking at the Sikorsky helicopter may not think it workable until reminded of having seen the "Autocopter" in the movie "Annie." Museum practitioners should employ techniques appealing to visitors' sense of their personal history or that make it easy for groups to engage in conversation over exhibits.

Example: Specific examples are given below for the factors within this category (personal history and group influence, see hypotheses #6 and #8 though #12).

Research Question: See hypotheses #6 and #8 through #12 for the specific questions.

Hypothesis #3 - **ENDURING PERSONAL INTEREST**

Visitors may pay attention to the exhibit if they have a previously developed interest in the subject of the exhibit or one of the exhibit components. Enduring personal interest is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits representing topics in which they have already developed an ongoing or enduring personal interest.

Meaning for Museum: Even visitors who have enduring personal interests that are relevant to the exhibit might not be able to recognize how the exhibit connects to these interests unassisted. For example, a person might not realize how their interest in the American Civil War might relate to landscape painting. A painting that does relate may need a label in order to make that connection clear.

Example: The museum should interpret their objects so that as many connections to visitors' enduring personal interests as possible can be made explicit. The DIA did include a label with the Church painting "Cotopaxi" to explain how the landscape might be a metaphor for events in history. Such connections should be made clear whenever possible.

Research Question: How do people develop Csikszentmihalyi's emerging motivation (leading to EPI) within museum exhibits?

Hypothesis #4 - **SITUATION-SPECIFIC INTEREST**

Visitors may pay attention to the exhibit if they find some aspect of the exhibit interesting. This interest is a function of the visitors' perception of the interestingness of the exhibit itself and is a function of personal traits and social conditioning. Situation-specific interest is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits that are generally perceived by most visitors as being interesting.

Meaning for Museum: Museums need to make the best use of their most interesting exhibits. It is sometimes necessary to highlight the interesting features of exhibits. For example, a visitor might not find the painting "Ellen's Isle" interesting until they know that it was painted from the artist's imagination, based on the classic poem "Lady of the Lake."

Example: The museum should find "interesting" features of their objects or interesting relationships with other objects and/or historical figures and places. The DIA did make it know than "Ellen's Isle" was based on the poem "Lady of the Lake."

Research Question: What makes certain objects more inherently interesting to visitors than others?

Hypothesis #5 - **CURIOSITY**

Visitors may pay attention to the exhibit if there is some element of surprise or incongruity inherent in the exhibit that elicits the visitor's natural tendency to be curious. This factor is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits that stimulate their need to satiate curiosity.

Meaning for Museum: It is sometimes helpful to arrange exhibits so that visitors are surprised to find two seemingly dissimilar exhibits next to each other. For example, placing a Hummingbird next to a dinosaur might strike a visitor as being incongruous, even silly, until it is made known that some scientists believe that birds are the direct descendants of dinosaurs.

Example: The museum should make an effort to provide as much variety as possible in the design of exhibits and galleries. The MSUM didn't juxtapose the Hummingbird and a dinosaur but did mention that relationship in a label.

Research Question: What does it take to elicit individual curiosity in a museum that is filled with novel and ambiguous objects?

Hypothesis #6 - **PERSONAL HISTORY**

Visitors may pay attention to the exhibit if they can see relationships between the exhibit and their own personal history. This factor is subordinate to the category of relevance.

Conclusion: Visitors are more likely to pay attention to exhibits representing topics that have some connection to their own personal history.

Meaning for Museum: Visitors often need assistance in finding the connections between exhibits and their own personal history. For example, a visitor to the locomotive might not make the immediate connection between the locomotive and the coal mine where a grandfather worked.

Example: The museum should make an effort to connect their objects to historical contexts and the everyday experiences of real people as well as to geographical and culture. The HFM did mention the #1601's role in the haulage of coal in West Virginia.

Research Question: How do visitors establish connections between exhibits and their personal history?

Hypothesis #7 - **CONNECTIONS TO ANOTHER GROUP MEMBER**

A visitor in a particular exhibit may not choose initially to pay attention. He or she may, however, subsequently choose to pay attention under the influence of another member of the group who is paying attention. This leads to the connections between the visitor and the exhibit described by hypotheses #8 through #12, those where an attending group member assists the non-attender.

Conclusion: Visitors are more likely to pay attention to exhibits where their group mates make connections to the exhibit and then assist the non-attending

group member to pay attention.

Meaning for Museum: Visitors are well served by exhibits that provoke conversation. For example, getting visitors to talk about Admiral Byrd's flight over the South Pole in the Ford Tri-motor may help individuals within the group to make a multitude of connections. One group member might realize that a relative was involved in some way in the series of flights that Byrd took to the South Pole while another might think about the contribution made by the aircraft to the development of the modern aircraft in which he or she takes such a strong interest.

Example: The general applications of connections to another group member are addressed by hypotheses #8 through #12. In general, however, the museum should seek to add ways of generating conversation among groups of visitors. Then, those who have made connections as discussed in hypotheses #3 through #6 have additional opportunity to share with other group members

Research Question: What are the dynamics of group discussions in museums? (See hypotheses #8 through #12 for additional questions.)

Hypothesis #8 - **Group Influence via Enduring Personal Interest**

Visitors within a group may become interested in an exhibit if someone in their group has an enduring personal interest in the exhibit or one of its elements. Such an attending group member may assist their non-attending group mates to pay attention. This interaction might lead to an emerging interest that the non-attender

was unable to see on his or her own.

Conclusion: Visitors are more likely to pay attention to exhibits if they are in a group where other group members have made a connection through enduring personal interest and then assist non-attending group members to pay attention.

Meaning for Museum: A group member who makes a connection to his or her own enduring personal interests (see hypothesis #3) is more likely to share information with other group members. For example, a visitor who collects paintings that use light expressively is more likely to speak enthusiastically with other group members when they encounter the paintings in the Luminist gallery.

Example: A scavenger hunt game could be designed to help members of groups find important and interesting things within an exhibit. It could ask each person to share with the others what they found that matched their own enduring personal interest.

Research Question: In what ways do individuals share their personal interests with others?

Hypothesis #9 - **Group Influence via Situation-Specific Interest**

Visitors within a group may become interested in an exhibit if someone in their group first becomes interested due to situation-specific interest. Such an attending group member may assist their non-attending group mates to pay attention. This interaction might lead to an emerging interest in some aspect of the

object on the part of the non-attender.

Conclusion: Visitors are more likely to pay attention to exhibits if they are in a group where other group members have made a connection through situation-specific interest and then assist the non-attending group member to pay attention to some interesting aspects of the exhibit.

Meaning for Museum: A group member who makes a connection to his or her own general interests in interesting things (see hypothesis #4) is more likely to share information with other group members. For example, a visitor who finds that different ducks have feet with different shape is more likely to share that information with a group mate.

Example: The scavenger hunt game, introduced in hypothesis #8, could also be designed to that it asks each person to share with the others what they found so interesting about the exhibit and why they found it so?

Research Question: How do people share information about things they find interesting with others? Do they share their own responses or do they share on the basis of what they think the other person will find interesting?

Hypothesis #10 - **Group Influence via Curiosity**

Visitors within a group may become curious, not about the exhibit, but to know why others in their group find the exhibit interesting. This may lead to an interaction between the non-attending group member and his or her group mates.

This interaction might lead to attending behavior due to interest or relevance.

Conclusion: Visitors are more likely to pay attention to exhibits if they are in a group where other members have made a connection and the non-attender seeks to find out why others find the exhibit interesting.

Meaning for Museum: A group member who has not made a connection may wonder why his group mates have been able to do so. This aroused curiosity may result in him or her looking at the exhibit to detect clues as to the attention of others.

Example: No example. There is really no way that museum professionals can attempt to control this factor. It requires that some of the group members find reasons to pay attention (see hypotheses #3 through #6). The initiative lies with the non-attender to discern the reasons for others' attention and is dependent upon group dynamics.

Research Question: Why do people not always share their motivation for engagement with others who are in their group?

Hypothesis #11 - **Group Influence via Personal History**

Visitors within a group may become interested in an exhibit if someone else in their group makes a connection to personal history. Such an attending group member may assist the non-attending group member to discover his or her own connection.

Conclusion: Visitors are more likely to pay attention to exhibits if they are in a group where other members have made a connection through personal history and then mediate between the exhibit and the non-attending group member.

Meaning for Museum: A group member who makes a connection to his or her own personal history (see hypothesis #6 for that connection) is more likely to share information with other group members. For example, a visitor who sees a scene in a painting and realizes that the scene is of a locale that he or she has visited is likely to share that information with a group mate. This might lead to the non-attending person making a connection to their own personal history.

Example: The scavenger hunt game could also be designed so that it asks each person to share with the others what they found that related to their personal history and why.

Research Question: Under what conditions do people share glimpses of their own personal history?

Hypothesis #12 - **Group Influence via Direct Appeal**

Visitors may become interested in an exhibit if someone in their group makes a direct appeal to the non-attender to look at something specific. This interaction might lead to a connection on the part of the non-attending person.

Conclusion: Visitors are more likely to pay attention to exhibits if they are in a group where other group members have made a connection and are asked by

the attending group member to look at something specific.

Meaning for Museum: A group member who makes a connection of his or her own may just point to something and request that a group mate do likewise. For example, a visitor who has made a connection with the Pitcarin Autogiro may point to the rotor and say to a group mate, "Look at that!"

Example: No example. The initiative in this case is up to the attending group member who has made his or her own associations (see hypotheses #3 through #6). The only intervention that museum professionals can initiate is to foster conversation among the members of groups.

Research Question: Under what conditions are people likely to point out specifics of a museum to others in their group?

FOUR QUESTIONS

I will now discuss and draw conclusions concerning four questions that I thought about while analyzing the data collected in the combined 1998 and 1999 studies. These are the questions: 1) Why was there a greater variety of stories in the 1998 study? 2)Why wasn't the factor of curiosity well represented in either of these studies? 3) What role does group influence really play in a museum visit? 4) How might age affect attention?

Why was there a greater variety of stories in the 1998 study?

The 1998 study included a variety of groups that made it possible to categorize the visits according to four "stories." These four stories chronicled the visits of five professional/hobbyist groups and nine family/social group visits. The 1999 study did not chronicle this same variety of visit types. The thirty-two groups that visited the three exhibits studied adhered to the more typical family/social group story that the majority of the groups from the 1998 study did. My personal theory is that visiting season had much to do with this result.

Hood and Associates collected psychographic audience data for the HFM and Greenfield Village (GV) during the five program seasons (winter, spring, summer, autumn, and December) for the 1990 year. However, I do not have similar documents from the Detroit Institute of Arts and Michigan State University Museum[13] to provide the basis for a comprehensive comparison. Therefore, I will support my theory based on HFM/GV data.

The 1998 study was conducted at the locomotive exhibit during the winter program season at the HFM. According to Hood, only twenty-three percent of the visitors attending during the winter are first time visitors. We may infer, therefore, that over three-quarters of the visitors are repeat visitors. Also, less than half (43%) are from outside the Detroit metro area. The visitor profile becomes: Better than a 50% chance that the visitors are from the Detroit metro area, or, if not, close

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Although I did not collect demographic data from my participants, several of the visiting groups in the 1998 study revealed that they fit this profile, i.e., repeat visitors who had seen the locomotive before and local residences entertaining out-of-town guests. Thus, I conclude that the 1998 visiting groups probably fit the profile provided by the Hood study for winter visitors.

The 1999 study was conducted using three aircraft from the aviation exhibit, which was during the summer program season at the HFM. According to Hood forty-seven percent of the visitors during the summer are first time visitors and 76% of visitors are from outside the Detroit area. A majority of the groups in the 1999 study freely told me that they were from out of town and that they were first time visitors. I conclude, therefore, that the 1999 visiting groups were probably also in harmony with the profile provided by the Hood study for summer visitors.

First time visitors from outside the local area where a museum is located would seem most likely to be family visitors who are attending as part of a family summer vacation. By extension, they would seem to be less likely to be specialized groups who have come to the museum as a part of a professional excursion or to revisit favorite objects. The data would also suggest that the visitors to the DIA and the MSUM are very similar in this regard. I would conclude, therefore, that this lack of diversity in the stories characterizing the 1999 study is to be expected,

if we account for visiting season.

Why wasn't the factor of curiosity well represented in either of these studies?

Very few visitors said or did anything that I classified as curiosity. Perhaps this is because I took great care in this pair of studies to differentiate between situation-specific interest and curiosity. I coded as situation-specific interest when a group was paying attention due to their perception of the inherent interestingness of the object in the exhibit. This is the kind of interest that people are experiencing when they report that the exhibit was *interesting* or even that they were *curious*, but really meaning the scientific kind of curiosity.

I took Berlyne's (1963) more strict interpretation when defining curiosity. A group needed to respond to objects as novel, incongruous, or unique in order for their attention to be considered a result of true curiosity. The findings suggest that the gentleman who found the Allegheny striking in comparison with the automobiles, the young man who thought that the Autogiro looked "funny," and the woman who found it incongruous that the mural at the MSUM Diversity and Evolution exhibit contained no actual animals seemed to be the only instances of curiosity from among the forty-six groups and 119 people included in this pair of studies.

I wonder if curiosity, as strictly defined, is a factor that describes attentional dynamics in museums? People come to museum to see things they do not see

everyday. They expect exotic and novel objects to be displayed. They would certainly consider finding a 1949 Ford car in the middle of a display of animals found on the tundra to be novel, incongruous, unique, even bizarre. But what purpose would such a juxtaposition of tundra animals and transportation technology serve? They would not, however, find it novel to see a landscape painted out of the artist's fantasy inside a gallery featuring other landscape paintings, unless it would more appropriately reside with the modern art pieces. My conclusion, therefore, is that visitors are less likely to be surprised to find unique objects in the museum since they probably came to see just how novel and unique the objects are at a specific institution.

What role does group influence really play in a museum visit?

In both of the studies reported here I focused on visitors who came in groups. It was not my purpose to study group dynamics but, rather, to choose participants who had the additional relevance component–group influence–at work during their visit. My personal theory is that the group provides an influence on non-attenders. Many museum researchers focus on groups of various kinds. Minda Bourn and her colleagues focus on family groups (Bourn, Cleghorn, & Garfield, 1995; Borun, Chambers, & Cleghorn, 1996; Borun, & Dritsas, 1997; Borun, Chambers, Dritsas, & Johnson, 1997; Dritsas, Borun, & Johnson, 1998). Rosenfeld (1980) studies family groups, Draper (1984) looks at social ties, and

Silverman (1990) studies adult visitor pairs. There appears to be a growing conviction that being a member of a group has a strong influence on attention and learning in museums.

In my two studies I found instances of group influence. Groups conferred about their itinerary both before and after arriving at the museum. Group members with strong desires to see particular objects led their groups to the exhibits under study. People with interest and knowledge assumed the teaching role. But these studies were not designed to focus on group dynamics. I did not, for example, make a concerted attempt to find out who was leading the group while at the four exhibits that I studied or how that leadership changed when a particular group moved to the next exhibit. I continue to believe, however, that future work will reveal exciting information about the dynamics of groups with regard to attention and learning in museums.

How might age affect attention?

There are many ways in which a person's age might affect his or her attention. Firstly, a person's age affects whether he or she will choose to visit a museum at all. Hooper-Greenhill (1994) has made an exhaustive study of museum visitors. She cites age as a restrictive factor, "Museum and gallery visiting is less likely among older people" (p. 63), but she also notes that this phenomenon doesn't occur until several years after a person's retirement. We are also now

seeing a big resurgence in heritage tourism, with retired people being actively approached by tour promoters. The bigger question, however, is whether age will affect the usefulness of the attention model.

The groups included in these studies varied greatly in age from young children to adults nearing eighty (possibly past eighty, in some cases). It would seem to me that the older generation is more likely to make connections through personal history than the younger people who haven't been around objects like those in the two HFM exhibits. This age disparity is less likely to be the case in either the DIA or the MSUM, due to the differences in the objects exhibited. However, even young children were as interested in the trains and planes at HFM, as they were in the animals at the MSUM. The only exhibit that didn't have many children even coming in the door was the landscape gallery at the DIA; there were only three children out of the twenty-three people who were a part of this study at the DIA, about 8%. My conclusion, therefore, is that age plays a very minor role in the working of the attention model and that the effect of a person's age can only be understood by conducting research with this question in mind.

THE DYNAMICS OF ATTENTION IN A MUSEUM SETTING

The attention model appears to be a valuable tool for both research and practice in informal learning environments. Perhaps the model may eventually be applied to formal learning settings as well, especially to on-line courses where

learners' attention must be gained without the aid of a teacher. In this section I will discuss the uses of the model in museum and offer suggestions for future research in this area.

Museum exhibit researchers will be likely to make the most use of the attention model. The model provides a theoretical basis for additional research on museum attention. I have already posed 10 possible general research questions that are of interest to museum educators and educational psychologists alike.

Museum practitioners can also benefit from the attention model. The model provides a firm basis for design of new exhibits that will engage attention. Museum educators can directly incorporate elements of the model into developing exhibits to ensure that there is great potential for visitors to pay attention to the objects in the exhibit. For example, a museum educator could design a new exhibit on meteorites to draw visitors' attention to the geographic areas in which particular meteorites were collected with an intention to make a connection through the factors of enduring personal interest or personal history.

Museum educators can examine current exhibits in the light of the factors and sub-factors of the attention model and, perhaps, they can make small adjustments to enhance the possibility of visitors paying attention where they might not have done so previously. For example, the Henry Ford Museum installed a video enhancement to the locomotive exhibit following the 1998 study[14]. This

video runs on a programmed loop and shows an Allegheny locomotive under steam, pulling a train, and provides additional information about the locomotive as well. Visitors do stop to watch the video to see what the locomotive was like in the days of regular service. The psychological value of this intervention with respect to attention and subsequent learning should be the focus of a future study. But, in the meantime, it is reasonable to expect that visitors now view the locomotive differently than did the visitors that I observed and interviewed in 1997 and reported in 1998. The practitioners at the Henry Ford Museum used the results of my study to apply theory (the attention model) to practice and, as a result, they have increased the situation-specific interest potential of the exhibit by potentially peaking visitors' interest in components of the locomotive, such as the side rods and boiler.

DIRECTIONS FOR FUTURE RESEARCH

The attention model was purposefully developed as a first step to explain the dynamics of attention paid by free-choice learners in informal learning environments. The initial studies reported here show the model to be a plausible explanation of the dynamics of attention, but more research is needed in this area. I would like to briefly address four areas where additional research would be beneficial: The area of group influence; subsequent learning, or learning that occurs after the museum visit, visitor agendas, and exhibit labels. I then add a brief

discussion of the next "big" step–from museum attention to museum learning.

I am eager to learn more about how group influence operates in museums to focus attention. My view is that attention on the part of museum visitors is both qualitatively and quantitatively different for the visitor who interacts with a group than for the solo visitor. I am interested in learning more about the dynamics of group leadership, how the leader functions within the exhibit, the effect on other group members, and the effect that the leadership role has on the leader himself or herself. An initial study that focuses on groups paying attention and groups not paying attention could answer the question: What effect does group leadership, or lack of same, have on the attending behaviors of group members?

Another study of group influence could follow a group through several exhibits. This way, it would be possible to see if there is a shifting of group leadership based on the nature of the various exhibits. This kind of study could answer questions such as: Does the group have a single leader throughout a visit to a museum that has a variety of exhibits that appeal to a variety of interests and expertise? Do several members of a group share the leadership role? What role(s) is(are) played by the members who never seem to assume leadership? Which factors, if any, set museum groups apart from groups that form around other activities?

Another explanatory factor for attention in museum exhibits is the role of visitors' agendas. Many visitors come with agendas. These pre-visit plans might include the desire for self-education and the visitors are using the museum as an open-entry/open-exit curriculum. Other visitors might be interested in sharing their pleasure in the objects and artifacts and their knowledge about these items with the others in their group. Either way, there is an agenda that influences visitors' attention to the exhibit and a future study could provide much valuable insight into this aspect of museum attention.

Possibly the most influential factor that can engage visitor attention is the exhibit label. Labels have become the object of much discussion lately in the museum community as a communication tool (cf: Serrell, 1996 & Roberts, 1997). In fact, Roberts (1997) has written an important book on the rise to prominence of the museum educator and the implications of appealing to visitors' on a more personal level. She says, "Visitors' interest and attention is determined not by an object's inherent appeal but its *relevance* to their own framework of knowledge and experience [emphasis added]"(p. 69). Museum labels must, she posits, have visitor-centered content if visitors' interest and attention is to be gained. Beverly Serrell is another proponent of making visitor-centered labels the norm within museums. She says, "There are still lots of ways to improve the museum's role of providing interpretation through better labels. We still need to work harder to

write labels for visitors" (1996, p. *xii*). The attention model presented in this study provides the factors that museum professionals might weave into their label text in order to provide visitors' with a sense of relevance and make appeal to visitors' interests. Additional study of the role the attention model could play in the development of interpretative museum labels would be an important extension of this present work.

These four areas (group influence, subsequent learning, visitor agendas, and exhibit labels) are but a few of the many directions that future research can take to develop the model and use it as a theoretical tool in future studies.

Museum learning is a logical next step after museum attention. Two researchers, John Falk and Lyn Dierking, submitted a grant proposal to the National Science Foundation in 1994 seeking funding for a longitudinal study of learning in museums. Falk and Dierking felt that more learning occurred after visitors left the museum than occurred while visitors were still at the exhibit or even within the building. Their proposed study would track visitors for an extended period of time, fifteen years, to determine what effect the museum visit played in the kinds of things that people learned on topics related to their visit to a particular museum exhibit. The fifteen year figure was unfortunate in that the NSF choose not to fund such an ambitious study. Instead, a planning grant was provided which resulted in Mike Csikszentmihalyi coming to Anapolis, Maryland

to participate in the sessions and, ultimately, to write a chapter with Kim Hermanson (1995) that became the impetus for the pair of studies that I conducted. Nevertheless, I also hold the view that much is learned subsequent to visiting museums and it is the attention paid and some degree of affective learning in the museum that results in greater cognitive, affective, and, in some cases, psychomotor learning at a later time. I am anxious to learn what researchers like Falk and Dierking find about learning after the visit and how the visit was the catalyst for that learning. It is even conceivable that the attention model will play some role in such research.

The reader is also advised to look at the various hypotheses enumerated earlier in this chapter in my section on conclusions where there are numerous specific suggestions for research. In addition, each of the hypotheses themselves could easily become topics for future research. I cannot stress strongly enough that although this study was extremely rewarding, it represents but a small step in a direction for educational research that will ultimately require the efforts of numerous researchers to fully study: the possibilities for additional research abound.

SUMMARY

These studies have provided a model that can become the basis to advance our knowledge of museum learning. The purpose of this study was to identify those factors that motivate free-choice learners acting in an informal learning environment to pay attention. These factors comprise an Attention Model for Museum Exhibits. A further purpose was to substantiate that the attention model was applicable to visitors across multiple exhibits. Attention is a prerequisite for learning, and learning is a common goal for museum exhibits.

This research was born out of a desire to add detail to Csikszentmihalyi and Hermanson's (1995) "hook." Their hook was limited in its ability to describe the complex dynamics of human attention as found in the kinds of informal learning environments exemplified by museums. The attention model was developed out of the desire to provide a systematic investigation into the dynamics of attention on the part of museum visitors. In the final analysis the model does appear to be a plausible representation of the phenomenon under study–the dynamics of motivation to attend.

There are a multitude of ways that will persuade a person to pay attention. All of them come at a cost of scarce attentional resources on the part of visitors. We, as educational professionals, both in museums and in the research community, must be thoughtful about asking visitors to expend their scarce psychic resources.

We must set clear goals for exhibit interpretation and be willing to assist our visitors in making meaningful connections to the objects that we display and interpret. The results of these efforts can be precious–human learning.

The attention model for museum exhibits appears to be a good tool for use in future museum studies on learning in exhibits. Future research, as suggested above, will result in assuring the model's role in theory building as well as in the practice of exhibit design. We will better understand how attention is gained as we advance our research agenda based on the attention model. We may then move forward with research on learning in museums.

NOTES

1. QSR is Qualitative Solutions and Research of Victoria, Australia. NUD*IST® stands for **N**on-numerical **U**nstructured **D**ata **I**ndexing, **S**earching, and **T**heorizing.

2. I will be very strict in my adherence to this definition throughout the study. For example, when coding visitors' statements I will not code as "curiosity" just because they use that word. If their behaviors and subsequent conversation lead me to believe that they experienced more of a "scientific curiosity," I will code their path as Situation-Specific Interest. If, on the other hand, their behaviors and subsequent conversation lead me to believe that they experienced true surprise, uncertainty, or any of the other collative variables, I will code as Curiosity.

3. See also Root (1970) for a more current interpretation of Maslow (1954).

4. Within the visitor relevance is Personal History. From the environment, relevance is a function of the Group. As discussed on p. 39, the individuals in the group act like components of a single visitor, thus making this connection a strong one.

5. This is represented by the work of Suzanne Hidi and her colleagues. Hidi's work is also used extensively in the field of Artificial Intelligence.

6. Named for the Allegheny Subdivision of the Chesapeake & Ohio Railroad.

7. This is the Whyte system of locomotive classification. In 2-6-6-6, the first number indicates the number of wheels on the pilot truck that guide the locomotive around curves; the middle numbers refer to the number of powered wheels (the Allegheny was a 'simple articulated' in that it had two sets of engines under the one boiler, thus it had two groups of six driving wheels); the last number indicates the number of wheels in the trailing truck; the Allegheny required so many because of the large grate area (135.2 square feet).

8. The Alleghenies also saw regular service in moving heavy coal trains and, later, heavy passenger trains over the mountain routes.

9. Attending behaviors included looking at the locomotive, pointing at the locomotive, groups stopping to talk amongst themselves, looking at the label, looking at the picture of the cab interior, and similar behaviors that had the potential to indicate a focusing of psychic energies (attention) on the artifact.

10. The Universal Resource Locator (URL) for the QSR web page is: http://www.qsr.com.au/

11. Here, I strictly coded visitor self-reports based on the theoretical model and if a visitor indicated that he/she found something "curious," I coded it as Curiosity only

if it met Berlyne's strict definition of being novel, surprising, or incongruous. If not, I coded it as Situation-Specific Interest, as if the visitor had said that he/she found it "interesting."

12. The MSUM does have some basic information, indicating that 90% of their visitors visit as part of a group and 60-70% of the groups include children. They do not, however, break down their statistics by season nor differentiate between family groups and social groups.

13. I did receive some basic statistics from the Michigan State University Museum, but their data was not as exhaustive as the comprehensive Hood study for the Henry Ford Museum/Greenfield Village. Two items are of note, however. Ninety percent of visitors to the MSUM are with others (in groups) and 50-70% of the visiting groups include children.

14. See Appendix G, Photo 2, for a view of visitors engaged with the video label added after the conclusion of my 1998 study.

APPENDICES

APPENDIX A

APPENDIX A

Original Interview Questions

Questions

1. Why did you choose to stop and look at this locomotive?

   FU1. Why did what you saw/heard draw you here?

   FU2a. What is it about locomotives (or trains or railroads) that has always interested you?

   FU2b. Could you describe those memories?

   FU2c. In what way was your curiosity piqued?

2. Tell me what you looked at?

   FU1. Why did you look at those things?

   FU2a. Does that relate in any way to your longstanding interest in locomotives?

   FU2b. Does that relate in any way to the memories that you mentioned?

   FU2c. How did that arouse your curiosity?

3. I noticed that you stopped near the ... [name spot]. Why did you stop there?

   FU1. What were you thinking (or talking) about?

4. What emotions did you experience when you looked at this locomotive? That is, how did it make you feel?

For groups, also ask:

5. Would any of you have stopped at this exhibit if you weren't in this group? Why (not)?

6. Who directed the group over to this exhibit? Why did you direct them here? Why did everyone come?

7. For those who wouldn't have normally stopped, why would you have gone to another exhibit? Did this exhibit prove satisfying after you got here?

General/Miscellaneous:

8. If you had to describe this locomotive to a friend, what would you tell them?

9. If there was an expert present here today, what would you want to ask about this locomotive?

10. What do you feel the museum could do to help people better understand this exhibit?

Note: All questions will be followed-up with an eye for the major constructs driving this research. The plan is to go from the general to the specific without giving the visitor any tips on how I might want particular questions answered. Much of the questioning will be spontaneous, based on the responses from visitors.

APPENDIX B

APPENDIX B

Revised Interview Guide

Why did you choose to stop at this exhibit today?
Did you see, smell, or hear anything that attracted you?
Did any one individual in the group steer the group over here?

What were you thinking about as you looked at the locomotive?
Did any particular memories occur to you?
How did you feel as you looked? Did looking at the locomotive evoke any emotions?

Please tell me what you looked at?
Why did you look at those things?
Were those thing meaningful in any way (evoke memories, associations, etc.)?

I noticed that you stopped [named a few places where I saw them stop]**. What were you thinking/talking about?**

Do you have any railroad memories from friends, relatives, or personal experience?

Do you consider yourself to have any longstanding interest in locomotives?
How did that come about?
What is something else that you're very interested in?
How did that interest come about?

Do you have a friend or acquaintance who would be interested in this locomotive? Why do you think they would be interested?

If you were to tell a friend about your visit to this locomotive, what would you tell them?

If there were an expert present here today, what would you like to ask about this locomotive?

What do you feel the museum could do to help people better understand this exhibit?

NOTE: On March 1, visitors were also asked if they were in town for the railroad memorabilia sale at St. Martha's that would be taking place the following day. If so, this would predispose them to be interested in locomotives, biasing the results.

Also on March 1, visitors were asked if they were in town for the SAE Convention, just concluding. Two groups were found to be in this category. It was assumed, however, that this would not bias the results since they were not particularly interested in locomotives in a direct way.

This guide was also modified for use in the various exhibits by substituting exhibit-specific terms for references to "locomotive," e.g., "gallery," "wildlife," "aircraft," etc.

APPENDIX C

APPENDIX C

Informed Consent Information

Introduction

Hello, I noticed that you spent some time looking at this locomotive. My name is John Lightner and I'm a graduate student at Michigan State University and I'm talking with visitors today in order to gather data for a study on learning in museums.

I will try to take no more of your time than necessary. The information that you share with me will be of assistance to both my own work and to the museum.

My study is concerned with what attracts visitors to a particular exhibit and what the dynamics of that motivation are. Your information about your encounter with the locomotive will help me develop an attention model for museum exhibits. This work will be written up in partial fulfillment of my program requirements at the university. In addition, I will be submitting articles to one or two journals that print articles on this subject. I am also planning to make a presentation at the Visitor Studies Conference in Atlanta later this year.

The museum staff will also receive a report that will help them as they plan for the improvement of their exhibit.

DO YOU HAVE ANY QUESTIONS CONCERNING THE PURPOSE FOR THE INTERVIEW?

You need not answer any question that you choose not to and you may terminate the interview at any time you choose.

I would ask your permission to audio tape our conversation for note taking purposes and to save some time. Would that be acceptable?

The recordings will be transcribed and I may use a direct quote when writing the results of this study. I will not have any way of identifying you by name since I have not asked your name. Such quotes will be attributed to an exhibit visitor and possibly given a pseudonym, a made-up name.

You are indicating your **voluntary agreement to participate** by continuing with the interview.

[If a group has no minor children present]

Any individual may answer any specific question or several of you may choose to respond. I am seeking the best group consensus we can get in the time we have, so please add anything you feel should be said.

Do you have any questions before we start? Let's begin.

[If there is a question of whether any members are minors]

Is anyone in the group under 18-years of age?

[If a group clearly has minors present]

Who is the parent or guardian of the children in the group? Do you give your voluntary consent for the children to participate in the interview? [Directed to the children] Are you willing to participate?

As I ask questions I will ask the younger members of the group to respond first, others may answer next. Any individual may answer any specific question or several of you may choose to respond. I am seeking the best consensus we can get in the time we have, so please add anything you feel should be said.

Do you have any questions before we start? Let's begin.

APPENDIX D

APPENDIX D

Informed Consent Letter

MICHIGAN STATE UNIVERSITY

College of Education • Department of Counseling, Educational Psychology and Special Education

East Lansing • Michigan • 48824-1034

1 October 1996

Dear Museum Visitor:

This study is concerned with what attracts visitors to a particular exhibit and what the dynamics of that motivation are. My work is concerned with the development of an attention model for museum exhibits. This work will be written up in partial fulfillment of my program requirements at the university. In addition, I will be submitting articles to one or two journals that print articles on this subject as well as making a presentation at the Visitor Studies Conference in Atlanta, next year. The museum staff will also receive a report that will help them as they plan for the improvement of their exhibit.

Our conversation was audio taped for note taking purposes, per your consent. The recordings will be transcribed and I reserve the right to use a direct quote when writing the results of this study; quotes will be attributed generically to an "exhibit visitor." These tapes will be kept in a locked file cabinet in my office.

Your anonymity is guaranteed in that I have not asked you to reveal your name. Likewise the information you shared will be kept in confidence and only shared in the ways I have described in the previous paragraphs, attributing the statements used to an exhibit visitor.

As we agreed at the beginning of the interview, your willingness to continue constitutes your informed consent, that is, that you are willing to continue in light of your understanding of the use to which the information would be put.

Should you wish to contact me, you may do so at Michigan State University. A phone number in the Educational Psychology Department is: 517/355-6684.

Thank you for your assistance in this project.

Very truly yours,

John W. Lightner

APPENDIX E

APPENDIX E

Complementary Bookmark

CHESAPEAKE & OHIO

locomotive #1601

Type: H-8 (Allegheny), Built: December, 1941
Builder: Lima Locomotive Works, Lima, Ohio

Located At: **Henry Ford Museum**, Dearborn, MI

Front side of complementary bookmark.

Boiler Pressure: 260 psi	Wheel Arrangement: 2-6-6-6
Cylinders (dia. x stroke): (4) 22 ½" x 33"	Tender: 25 tons, coal
Piston Valve (max. travel x dia.): 8" x 12"	25,000 gal., water
Driver Diameter: 67"	426,100#
Weight (loco. + tender): 1,215,600#	Cost: $230,663 (in 1941)
Length: 125' 8"	Tractive Force: 110,200#
Width: 11'1"	Tubes (# & dia.): 48 - 2 1/4"
Height (top of stack): 16' 5 ½"	Flues (# & dia.): 278 - 3 ½"

Back side of complementary bookmark.

Note: The bookmark is shown actual size. It was printed on a medium blue card stock. The information is from Huddleston & Dixon, Jr. (1996).

APPENDIX F

APPENDIX F

Node Names

NODE IDENTIFIER	NODE NAME	VISITOR EXAMPLE
F1	Enduring Personal Interest	"He likes watching birds. He's got a book and binoculars. So, it was his idea."–Visitor to the MSUM
F2	Curiosity	"Yeah, I liked the texture on the plane. That's what I was looking at. Why would you do like a corrugated texture instead of a smooth texture?"–Visitor to the Aviation Exhibit at the HFM
F3	Personal History	"I went to college at Wayne State and so in between breaks, sometimes, I would buzz over."–Visitor to the DIA
F5	Group Influence	"We decided to start on the end. Looked at the brochure and thought we'd take a look at trains."–Visitor to the Locomotive Exhibit at the HFM
F14	Imaginings	"We just talked about how they were kind of peaceful and how it would feel to go there."–Visitor to the DIA
F16	Socialize	"I wanted to make sure she [her daughter] saw the Rivera Room and, then, we started with the American section."–Visitor to the DIA
F17	Idealized (romanticized) Past	"Times were better. Skies were cleaner. Grass was greener."–Visitor to the DIA

F18	Pre-exhibit Influence	"He's from out of town. I knew this was here and I wanted to see it again."–Visitor to the Locomotive Exhibit at the HFM
F21	Technological Sublime	"Yeah, there's an emotional thing, it's their size. That's an awful lot of power."–Visitor to the Locomotive Exhibit at the HFM
F22	Natural Sublime	"It has that timeless quality to it, almost the timeless quality of the sun and the light."–Visitor to the DIA
F25	General Emotions	" I can see some emotions in the one the volcano and the one with the big waves here, but basically, just uncertainty. An emotion like that or things that are unpredictable waiting for change. I think that, that setting means that there's a change coming, or there's change happening, or just happened, or something like that."–Visitor to the DIA
F26	Educate	"Tried to enlighten her [his wife] on a few things, mechanically."–Visitor to the Aviation Exhibit at the HFM
F28	Personally Experienced Past	"I was thinking about my own yard whenever I was thinking about that."–Visitor to the MSUM
F29	Vicariously Experienced Past	"My grandfather worked for the Grand Trunk, he was a fireman. It does bring back some memories of what he used to do."–Visitor to the Locomotive Exhibit at the HFM
F30	Situation-Specific Interest	"I would think anybody would be interested in this. I have a little girl who is interested in it."–Visitor to the Aviation Exhibit at the HFM

F31	Transitioning	"(H) [His interest started] last year when I took the first plane ride. It's been building and building."–Visitor to the Aviation Exhibit at the HFM
F32	Discussion	"When we were looking at the snakes we were talking about different animals. We were both in Adack, Alaska, and that's just a small island and most of the animals that were there were brought by the Navy."–Visitor to the MSUM
F33	Lead-Follow	"The grandson brought us over here."–Visitor to the Locomotive Exhibit at the HFM

Note: Node numbers are not sequential in that preliminary nodes were deleted as the factors and sub-factors developed through the data analysis.

APPENDIX G

APPENDIX G

C&O #1601 Images

Photo 1 Visitors with C & O #1601 (From: *Henry Ford Museum & Greenfield Village: A Pictorial Souvenir*, 1993).

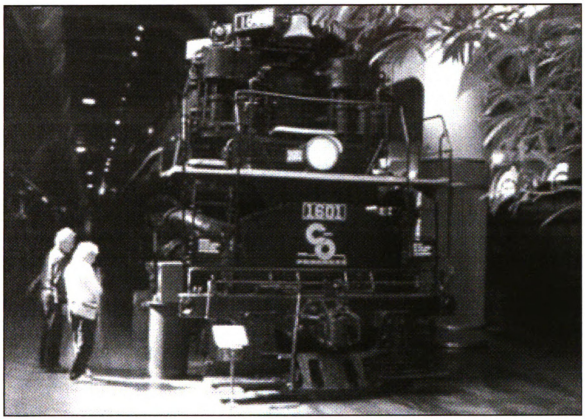
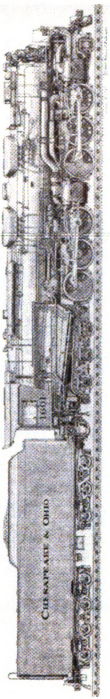


Photo 2 Visitors Viewing the New Video Label at the C & O #1601 (From: http://www.hfmgv.org/museum/allegh.html, 3/27/00)



Drawing 1 Profile of C & O #1601 (Bill Berkompass, artist. Used with permission of Technical Press, Ltd.)

Photo 2 Brass Model of C & O #1601

LIST OF REFERENCES

REFERENCES

Berlyne, D.E. (1963). Motivational problems raised by exploratory and epistemic behavior. In Kock, S (Ed.) *Psychology: A study of a science, Volume 5.* New York: McGraw-Hill. pp. 284-364.

Borun, M., Chambers, M., & Cleghorn, A. (1996). Families are learning in science museums. *Curator, (39)*, 2, 123-138.

Borun, M., Chambers, M., Dritsas, J., & Johnson, J. (1997). Enhancing family learning through exhibits. *Curator, (40)*, 4, 279-295.

Borun, M., Cleghorn, A., & Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator, (38)*, 4, 262-270.

Borun, M. & Dritsas, J. (1997). Developing family-friendly exhibits. *Curator, (40)*, 3, 178-196.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety.* San Francisco: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York: HarperCollins.

Csikszentmihalyi, M. & Hermanson, K. (1995). Intrinsic motivation in museums: Why does one want to learn? In, Flak, J.H. & Dierking, L. (Eds.), *Public institutions for personal learning: Establishing a research agenda.* Washington, DC: American Association of Museums. pp. 67-77.

Diamond, J. (1986). The behavior of family groups in science museums. *Curator, 29*(2), 139-235.

Dierking, L. & Falk, J. (1994). Family behavior and learning in informal science settings: A review of the research. *Science Education, 78*(2), 57-72.

Diers, D. (1979). *Research in nursing practice.* Philadelphia: J.B. Lippincott Co.

Draper, L. (1984). *Friendship and the museum experience: The interrelationship of social ties and learning.* Unpublished doctoral dissertation, University of California, Berkeley.

Dritsas, J., Borun, M., & Johnson, J. (1998). *Family learning in museums: The PISEC perspective.* Philadelphia: PISEC.

Falk, J. H. (1983). Time and behavior as predictors of learning. *Science Education, 67*(2), 267-276.

Falk, J.H. & Dierking, L.D. (1995). *Public institutions for personal learning: Establishing a research agenda.* Washington, DC: American Association of Museums.

Gagné, R.M. (1985). *The conditions of learning and theory of instruction* (4th Ed.). Chicago: Holt, Rinehart and Winston, Inc.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60*(4), 26-34.

Hood, M.D. (1991). *Henry Ford Museum & Greenfield Village Audience Assessment.* Columbus, OH: Hood Associates.

Hooper-Greenhill, E. (1994). *Museums and their visitors.* London: Routledge.

Huddleston, E.L. & Dixon, Jr., T.W. (1996). *The Allegheny: Lima's finest on the Chesapeake & Ohio and the Virginian.* Mukilteo, WA: Hundman Publishing.

James, W. (1890/1950). *The principles of psychology, Volume I.* New York: Dover Publications, Inc.

Keele, S. (1973). *Attention and human performance.* Pacific Palisades: Goodyear Publishing Company.

Keller, J. M. (1979). Motivation and instructional design: A theoretical perspective. *Journal of Instructional Development, 2*(4), 26-34.

Keller, J.M. (1983). Motivational design of instruction. In Reigeluth, C. (Ed.), *Instructional theories*. Hillsdale, NJ: Lawrence Erlbaum Associates. pp. 386-434.

Keller, J.M. (October, 1987a). Strategies for stimulating the motivation to learn. *Performance & Instruction*, 1-7.

Keller, John M. (November/December, 1987b). The systematic process of motivational design. *Performance & Instruction*, 1-8.

Koran, Jr., J.J. & Koran, M.L. (1983). The roles of attention and curiosity in museum learning. In, Nichols, S.K., Alexander, M., & Yellis, K. (Eds.), *Museum education anthology: 1973-1983*. Washington, DC: Museum Education Roundtable, pp. 205-213.

Krapp, A., Hidi, S., & Renninger, K.A. (1992). Interest, learning, and development. In Renninger, K.A., Hidi, S., & Krapp, A. (Eds.), *The role of interest in learning and development*. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 3-25.

Laetsch, W.M., et al (1980). Children and family groups in science centers. *Science Child, 71*(6), 14-17.

Lightner, J.W. (1998). *An attention model for museum exhibits*. A Practicum Report, Michigan State University, East Lansing. [ERIC Document Reproduction Service No. ED 415 362).

Lincoln, Y.S. & Guba, E.G. (1984). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Marx, L. (1964). *The machine in the garden: Technology and the pastoral ideal in America*. New York: Oxford University Press.

Maslow, A.H. (1954). *Motivation and personality*. New York: Harper and Row.

Maw, W.H. & Maw, E.W. (1968). Self-appraisal of curiosity. *The Journal of Educational Research 61*(3), 462-465.

Miles, M.B. & Huberman, A.M. (1994). *Qualitative data analysis* (2nd Ed.). Thousand Oaks, CA: Sage Publications.

Morse, J.M.. (1986). Quantitative and qualitative research: Issues in sampling. In Peggy L. Chinn (Ed.), *Nursing research methodology: Issues and implementation.* Rockville, MD: Aspen Publishers.

Morse, J.M. (1994). Designing funded qualitative research. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research.* Thousand Oaks, CA: Sage. pp. 230-235.

Nye, D.E. (1990). *Electrifying America: Social meanings of a new technology.* Cambridge, MA: MIT Press.

Nye, D.E. (1994). *American technological sublime.* Cambridge, MA: MIT Press.

Raphling, B. & Serrell, B. (1993). Capturing affective learning. *Current trends in audience research and evaluation.* Washington DC: American Association of Museums: Committee on audience research and evaluation. pp. 57-62.

Roberts, L.C. (1997). *From knowledge to narrative: Educators and the changing museum.* Washington: Smithsonian Institution Press.

Robinson, E. S. (1928). *The behavior of the museum visitor* (AAM New Series, No. 5). Washington DC: The American Association of Museums.

Root, A.A. (1970). What instructors say to the students makes a difference. *Engineering Education, 61*, 722-725.

Rosenfeld, S.B. (1980). *Informal learning in zoos: Naturalistic studies of family groups.* Unpublished doctoral dissertation, University of California, Berkeley.

Schunk, D.H. (1996). *Learning theories: An educational perspective* (2nd Ed.). Englewood Cliffs, NJ: Merrill.

Serrell, B. (1996). *Exhibit labels: An interpretive approach.* Walnut Creek, CA: AltaMira Press.

Serrell, B. (1997). Paying attention: The duration and allocation of visitors' time in museum exhibitions. *Curator, 40*(2), 108-113, 116-125.

Silverman, L.H. (1990). *Of us and other "things": The content and functions of talk by adult visitor pairs in an art and a natural history museum.* Unpublished doctoral dissertation, University of Pennsylvania, Philadelphia.

Sterry, P. (1994). Social interaction of family visitors at heritage tourism sites: Establishing a research program. In, Wells, M. & Loomis, R. (Eds.), *Visitor Studies: Theory, Research and Practice, Vol. 9* (pp. 127-133). Jacksonville, AL: Visitor Studies Association.

Sweeney, J.G. (1991). *Masterpieces of Western American Art.* New York: Crescent Books.

Yin, R.K. (1993). *Applications of case study research.* Newbury Park, CA: Sage.