REMEMBERING EXHIBITS AT MUSEUMS OF ART, SPORT AND SCIENCE: A LONGITUDINAL STUDY
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Abstract

The present study examined adults' memories of exhibits in museums that they had visited. Exhibit memories were assessed at three sites: the Ontario Science Centre, the Hockey Hall of Fame and the Art Gallery of Ontario. Participants were asked to choose two exhibits they found interesting, and they received similar semi-structured interviews about them, at the time of the initial visit and then one month later (Science Centre) or five months later (other sites).

Participants retained stable episodic memories of the exhibits they chose, regardless of exhibit type, and independently of whether or not they had discussed the exhibit in detail with the interviewer at the first interview. As to change in semantic memory (broadly defined), for some visitors the memories were enhanced between the initial and follow-up interview, for some they remained stable, and for others they deteriorated. Autobiographical memories were reported by about half of the visitors at the Hockey Hall and Art Gallery both on-site and at follow-up (not tested at the Science Centre). Enjoyment was the most common affective response reported at all sites at both interview times. Visitors from all sites described engaging in post-visit exploration activities, for instance talking to someone else about an exhibit. Visitor characteristics of personal interest and domain knowledge of the topic were not robustly associated with memory measures.

Differences in the findings across museums were interpreted in terms either of self-orientation which emphasizes affective responses, or stimulus-orientation which emphasizes cognitive responses. Visits to the Hockey Hall tended to evoke self-oriented memories, visits to the Art Gallery tended to evoke stimulus-oriented memories, and visits to the Science Centre tended to evoke both self- and stimulus-oriented memories. These patterns of memory suggest that museum exhibits have
varied influences on visitors, including helping them to define their personal identities.
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for

Gertrude Arnold &

Angela Benedict
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Chapter One

Introduction

Preface

Museums — the very mention of the word evokes one's memories about past experiences in these places. Often, upon learning the topic of this dissertation, individuals spontaneously shared their memories of museum and gallery exhibits. What seems apparent is that these places, also considered “attics of civilization” are special to many people. What remains unclear, beyond anecdotal stories, is exactly what, and how adults remember the “curiosities” of museums. This will be the primary focus of this dissertation.

The main function of this chapter is to introduce some concepts and research that are relevant to the study of memories of museum exhibits. In order to provide a context for understanding museums and museum visitors, the history of museums, along with current educational perspectives on museums will be reviewed. This historical review will demonstrate that museums have become increasingly focussed on visitor experience with a greater emphasis being placed on visitor education. Afterwards, some literature outlining museum education concepts will be presented. Next, two episodic memory studies conducted on memories of cultural events will be reviewed. Then the museum literature specifically concerned with visitor memories of exhibits will be covered. A select number of studies conducted within museums will be examined, followed by a comprehensive examination of the research exploring the long-term impact of museum visit focusing on adults but occasionally looking at children. This review of the museum literature will reveal that the research is at an exploratory stage. Finally, the rationale and overview of this dissertation will be explained.
Museum History

In this section, I trace the emergence of the modern museum from Greek and Roman times. The two main trends throughout history are, first, the increasing democratization of museum attendance from places for the learned and the wealthy to places for the general public, and second, the increasing focus on visitor experience and education.

The Latin word museum is derived from the Greek word *muoseion* meaning "seat of Muses." The *muoseion* was a temple dedicated to the nine muses, or goddesses, who were responsible for the welfare of astronomy, comedy, dance, history, poetry, music, love, tragedy, and the epic. In both Greek and Roman times, *muoseions* were mainly places of contemplation which were reserved for philosophical discussions. The greatest *muoseion* of the ancient era was founded by Ptolemy Stotor in the third century B.C., although rather than being a museum as we know today, it was more of a university prototype. It housed statues of thinkers, surgical and astronomical instruments, animal parts and hides, and a botanical and zoological park.

The Greek and Roman empires kept hoards of votive offerings, selected for their historic, aesthetic, or magical importance, housed in temples, that could be used in case of a public emergency. A similar situation occurred in Medieval Europe, where royal or church collections could be used to finance wars and other state expenses.

By the 15th-century, the rise in new merchant and banking families in Europe led to the development of many private collections, particularly in Italy. One of the most outstanding collections was owned by the Medici family in Florence. Their private collection was opened to visitors in 1582, and was listed in tourist guides of that period. The term "museum" was used to describe the Medici collection, and denoted the idea of comprehensiveness, rather than a place or building. This concept was reflected in work published by Samuel van Quicheberg who in 1565 advocated that collections should represent a systematic classification of all materials in the universe representing the
encyclopaedic, rational approach to knowledge.

Collections were known by two terms. One type of collection was identified as a cabinet, usually a square room filled with taxidermic animals, botanical rarities, some works of art, and historical objects. The second type of collection was identified as a gallery, usually a long hall, side lit, filled with paintings and sculptures.

One of the first institutions to receive government funding to construct a museum specifically designed for public visits was the University of Oxford — the Ashmolean Museum opened in 1683.

In the 18th-century, the focus on classification was coupled with increased world exploration. These two factors led to a keen desire for acquiring the exotic. In this period, the British Museum opened, with its focus on the historical and scientific, and the Louvre opened, with its focus on the aesthetic. By the end of the century, the idea of museums had spread to North America.

The first museum boom occurred in the mid-19th century when museums were built to provide entertainment to a population that was becoming increasingly urbanised due to the Industrial Revolution. Certain museums started to be viewed as places to promote scientific and technical achievements, and they became the precursors of modern interactive science museums.

Around the turn of the century, the function of museums underwent a fundamental philosophical shift: from a storage and exhibition space benefitting scholars, to an educational facility benefitting the general public. In the United States in 1888, George Brown Goode developed the concept of the instructive label, and described an educational museum as a collection of labels for each specimen (as opposed to a collection of specimens, each one with a label). Actually, the focus on labelling describes the educational emphasis of many museums for most of the 20th century.

As a consequence of the developing educational focus, the present century has
witnessed the establishment of museum education departments within museums, and a more systematic approach to museum studies. The focus on the visitor continues to increase, and is reflected in contemporary policies as promoted by the American Association of Museums.

Current Museum Policy

In the early 1990's, a major report on the educational role of museums was issued, and is regarded as a landmark document. Entitled Excellence and Equity (AAM, 1992), this document urges that education be at the centre of museums' public service role. This document was built upon the assumption that, "If collections are the heart of museums, what we have come to call education — the commitment to presenting objects in an informative and stimulating way — is the spirit" (AAM, 1992 p. 10, as quoted from AAM 1984 report). Some of the characteristics which capture the essence of museums' educational agenda include:

- encourage lifelong learning among people of all ages and backgrounds, at all levels of capability, mastery, and interest,
- provide enriching experiences offered through interaction with objects and ideas,
- supply a context in which to trace the continuity of human experience and the natural world and to examine change critically,
- serve as appropriate places to confirm and validate accepted ideas and can be forums for presenting and testing alternative ideas and addressing controversy,
- provide places for reflection and contemplation as well as avenues for exploration and discovery,
- offer the opportunity for experiential, emotional, and intellectual learning that is self-directed and voluntary.
The document states that the “learning experience is a moment of reflection or a chance discovery that moves the visitor in a lasting way ... no matter what the visitor’s level of capability” (AAM, 1992, p. 16), and “[a]dults, in particular, are seeking opportunities to learn both individually and with their families” (AAM, 1992, p. 16).

The conceptual and methodological development of this dissertation flowed out of the desire to research whether some of the core recommendations contained within the Excellence and Equity document are, in fact, being experienced by the museum public. This dissertation serves to operationalize some aspects of the above policy statements so that information about the current state of museum education can be gathered. The specific research objective was to determine whether visitors are being moved “in a lasting way” via exhibit memories.

Museum Education

It is helpful to see how museum education is defined in the museum field in order to develop an operationalized definition for the present research. First, however, it is worth noting that there is some debate about whether museums even have any long-term educational impact at all.

There have been suggestions that museums are merely a form of “edutainment” (Wolf & Tymitz, 1978) that encourages a mindless, unquestioning acceptance of information (Pearce & Moscardo, 1985), rather than promoting learning or understanding. This concern is not new. In 1956, it was coined the “pinball effect”; when visitors treat museums as an amusement arcade or playground (Brooks & Vernon, 1956). As Tulley and Lucas (1991) note, people do have fun, but there is not much research to indicate whether they retain anything from their experience.

One difficulty with assessing educational outcomes is that the definition varies. Indeed, the term “museum education,” is rarely used, and the terminology that has replaced it has broadened (Roberts, 1997) to include terms which place more focus on...
the visitor, such as “learning”, “experience” (which emphasizes open outcomes), or “meaning-making” (which emphasizes interpretation).

The diverse terminology reflects the diverse goals of museum education. Rice (1987) argues that museum education should “encourage people to rediscover the delight, curiosity, and wonder they lose in becoming adults” (p. 19). Her definition emphasizes the affective domain of museum education. Williams (1984) states that the primary goal involves “teaching visitors how to have personally significant experiences with objects” (p. 22). Sometimes the term museum literacy is used which is defined as competence (knowledge, skills, attitudes) in reading objects (Strapp, 1984). Most museum educators hope that learning occurs within the museum, and that this learning will provide the motivation to continue learning outside the museum (Duensing, 1987).

One of the basic functions of a museum is to create an environment where a meaningful interaction between the visitor and the exhibits can occur (Worts, 1990). The principles involved in this interaction can be considered as those of experiential learning. There is a core of elements which various theorists define as central to its meaning, although often different terminology is used for similar concepts. The model reviewed here will be Boud and Pascoe’s (1978).

Boud and Pascoe (1978) propose that a high degree of involvement, high learning control and a close correspondence of the learning task to activities outside the learning environment are fundamental. Indeed, if museum learning is examined for these features, it serves to typify the defining principles of experiential learning. A high degree of involvement and control may be dependent on what the visitor brings to the experience in terms of personal interest, and the freedom to choose which exhibits he or she will interact with or view. The correspondence between the museum experience and the connection with other activities might be reflected in the interweaving of the museum experience into the visitor’s everyday existence.

In summary, we see that there may be some visitor characteristics (domain
knowledge, personal interest) that are important to consider when exploring experiential learning in relation to visitor education. In addition, we see that museum education includes not only formal knowledge and details, but is rather broadly defined, thus it is important to assess a wide variety of exhibit memories to capture the diversity of learning. Although there are many goals, information about the typical visitor’s encounter with exhibits remains sketchy as will become evident in the museum research review.

Episodic Memory

Another framework to consider in relation to exhibit learning and memories is to think of it in terms of episodic memory. Almost everyone has memories of attending a museum, gallery, or zoo, and attendance records at these various institutions reveal that visiting them is a very popular leisure activity. In situations where people may not closely attend to learning outcomes or be motivated to rehearse or recode the information, the episodic memory literature looking at memories of cultural visits might highlight a few principles which might be applicable to the development of exhibit memories. Sometimes this type of memory is referred to as incidental memory, which can include everyday memory which does not involve effortful processing.

Wagenaar (1986) conducted a study of episodic memory over a 6 year period, by recording various events in his life. One of the sample events recorded was a trip to see a picture “The Last Supper.” At the end of the 6 year period, the author tried to recall the events cued by who was involved, and where and when the event happened. Wagenaar (1986) found that only 20% of his memories were irretrievable, even though there was some evidence that none of the events were completely forgotten. This study indicates that everyday life events are forgotten very slowly. By relating this to memories of museum exhibits, one would theorize that episodic memories of exhibits would not be forgotten, and given a cue for recall, say from one’s everyday
environment, the memory would be more likely to be recalled. In other words, the recall of an exhibit is not a disconnected isolated event, but can be connected or cued by events, places, or people.

Sehulster (1989) conducted a descriptive investigation of the content and temporal structure of operas he had attended over the span of 25 seasons using a free recall paradigm. In the pattern of recall, he found that memories about the content of opera performances were more likely to be maintained if he engaged in activities such as rehearsal, retelling, listening and reading about the performance afterwards. In other words, recall was not totally dependent on the opera itself, but also on the discourse and thoughts that occurred after the opera which had an important impact on its memorability. This pattern could very well apply to the memorability of museum exhibits; if they are discussed or thought about afterwards, they may be more likely to be remembered, and potentially altered and re-constructed by the very act of engaging in the above activities.

In conclusion, the episodic or incidental memory literature regarding museum or cultural experiences would lead one to expect that episodic memories of museum exhibits should be remembered, particularly if a cue is available to elicit the memory. The literature also suggests that memorability of exhibits might be influenced if visitors engage in some form of post-visit rehearsal.

Studies of Memories of Museum Exhibits and Visits

Now that I have reviewed the definitions of museum education and some of the episodic memory literature (on cultural events), I will move onto the museum research literature. This literature review will be divided into two sections. The first section will review research conducted during museum visits, and the second section will review research conducted after the museum visit. This first section is offered as a broad overview that is representative of some of the approaches to the study of exhibit
learning and memory. Looking at this research can highlight how learning and memories can be measured, whilst the second section, which covers research after visitors leave the museum, will be comprehensively covered since this is the focus of this dissertation. The emphasis will be on research conducted with adults, but with some review of research conducted with children because it tends to be more theoretically-based and can inform research with adults.

Memories and Learning During the Museum Visit

One common method of studying visitor behavior is by observing visitor movements in museums. Using this method, researchers collect person-centred data by mapping visitors’ movements, or collect place-centred data by counting the number of patrons who frequent a particular exhibit. Person-centered mapping has a long history. Galton in 1884 was one of the first to employ this method in a museum, collecting data on 9,337 people. Such results are used to inform the museum staff about which exhibits are situationally interesting to the public.

As to what is happening within the visitor, one measure of this is time on task, or the holding power of an exhibit (Donald, 1991) — the amount of time a person spends at an exhibit divided by the time it takes to observe and read about an exhibit. The assumption is that the more time spent on a particular task, the greater the likelihood that learning will take place. This assumption is based on Craik and Lockhart's (1972) argument that the deeper the level of processing that takes place, the better the long term memory of an event will be. Thus, visitors who spend longer times on a task, may build more suitable schemas to receive and process information, ultimately facilitating long-term memory; however, longer time on task does not necessarily result in a deeper level of processing. The main advantages of the time measurement to measure learning is that it is both unobtrusive and economical. There is some evidence to suggest that time on task is associated with learning (Screven, 1965; Shettel, 1973) and situational
interest, but time on task leaves much to speculation and does not provide precise information about the quality or quantity of memory. When one considers the fact that visitors, on average, spend about forty seconds at each exhibit and five minutes on puzzles (Linn, 1976), it seems unlikely that much cognitive processing takes place.

There has been some research conducted within museums for exhibit memories. One such study assessed individual differences in patrons’ memories of a film exhibit (Loftus, Levidow, & Duensing, 1992). At the San Francisco Exploratorium, an assault from the movie "Z" was shown on a large TV screen as people entered. Later during their visit, a sign invited visitors to interact with a computer program that recorded their memories of the film clip. Responses were obtained from 1,989 people. The results showed that adults between the ages of 26 and 65 years were more accurate in their memory of the events in the film clip than children and elderly visitors. While age appeared to be a factor in one's ability to recall events, occupation was not; police officers were no more accurate in remembering details than other members of the general public.

In contrast to the details of the film exhibit studied in the above research, Tulley and Lucas (1991) explored conceptual understanding after direct experience with an exhibit at a science centre. Visitors were observed assembling an interactive lock and key exhibit. After interacting with the exhibit 96% of the participants said that they were now clear about how this kind of lock worked. They were then asked to provide a full description of the lock's workings. The participant's understandings were sorted into three categories. In the best category people had a complete understanding of the lock and key mechanism which included technical comments — 11% of the participants were in this category. In the second category, 59% of the participants had a full understanding of how the lock worked, but did not provide technical comments. In the third category partial understanding in which only one part of the essential feature was mentioned, was given by 28% of the participants.
The main aspects of exhibit memory from the above two studies, conceptual understanding of exhibits, and memory about the details of exhibits, will be incorporated into the present study.

Memories after the Museum Visit

In this section, the research conducted after visitors have left the museum will be reviewed with a focus both on methodological design and the conclusions. What will become apparent is that much of this research is at an exploratory stage. In general, the methods consist of asking visitors what they remember or if they did anything after their visit.

In one of the first studies to explore the long-term impact of a museum visit, family members were interviewed by telephone two to three months after visiting a learning centre in a zoo (White & Barry, 1984). Parents were asked what they remembered and did after the visit. The researchers found that the majority of families did do something afterwards such as talk about their visit or read an animal book. Although the majority of the responses were affirmative in indicating some long-term impact, the results typically consisted of parents reporting on the general activities of their children, usually organized by the parents to promote learning.

Falk (1988), using a semi-structured interview, examined learning and memory by asking people, some of whom worked in museums, to recall their early museum experiences. In addition to recalling details about exhibits, learning and memory was defined as a recollection of social, temporal and mental states (episodic memory). The study found that people had no difficulty recalling their mental state — if they were bored or hassled — and could recall the temporal sequences and geography of the museum. These results suggest that episodic memory remains stable over a long-term period. However, there were some methodological problems with the study. First, the participants interviewed were a select group, people who work in a museum, so one
could argue that their memories may not be representative of the average visitor's memories because people who work in museums may be primed to remember museum experiences. In addition, these early museum experiences may not be typical experiences because they may have led people to select a career in museums. It also would have been interesting to know whether participants' recall was accurate, and if not, how the memory was transformed.

Also, by exploring memories of childhood visits, Falk and Dierking (1990) asked children and adults what they remembered about a school trip taken in the primary grades. The bulk of the recalled experiences consisted of the exhibit subject matter. Moreover, nearly three-quarters of the participants stated that they frequently thought about the field trip afterwards.

Using a different methodology, McManus (1993) used an uncued mail-back memory comment sheet to assess recall of visitor memories of Gallery 33, at the Birmingham Museum and Art Gallery, an exhibition on the beliefs, values and customs regarding art around the world. The time between the visit and mail-back averaged about seven months, and ranged from two to ten months. On average, visitors supplied five memories. The exhibits most frequently mentioned were interactive videos and masks that visitors could try on. The recollections were classified into four types: just over half of the recollections consisted of descriptions of the exhibits, 23% consisted of episodic memories, 15% were recollections about affect, and 10% were summary memories. Many of the recollections were of a very personal nature, both in terms of the exhibits recalled and the content of the recollection. McManus concluded by suggesting that memories about museum exhibits were highly salient and individualized.

The above study is more methodologically specific than the previously reviewed research because visitors were asked to respond to one gallery area, allowing the researcher to know which exhibits visitors were discussing. However, the
generalizability of the findings is questionable. First, only visitors who left their names and addresses in a comment book could be included in the study, and the response rate to the mailing was only 22%. One could argue that these two selection factors—writing one's address in a comment book and completing the questionnaire—would ensure that the visitors most primed to retain vivid museum recollections were overrepresented in the sample. The sample was also hindered by a wide age variation; from eight years to a maximum of fifty years. On the most basic level, the study ignores developmental issues, such as how cognitive structures organize experience and memory; thus a child’s recall is both structurally and functionally different from an adult’s recall. This is demonstrated in Loftus et al. (1992) research on the film exhibit at a science centre in that children had less accurate memories. Lastly, as suggested by the episodic memory literature, it could be argued that spontaneous uncued recall is not the best indication of memory. Given the contextually dependent nature of memories, methods in which cues are used to prompt recall might provide more informative results.

Using qualitative methodology, Falk, Dierking, and Abrams (1996) tracked visitors in a natural history museum. This design was more sophisticated than previous research because open ended interviews were conducted immediately after the visit, and once again, several months later. As in the McManus (1993) study, memories tended to be of a very individualized nature. The authors concluded by stating that all of the individuals stored images and information that they later related to events or individuals.

One of the most thorough longitudinal studies of the long-term impact of museum exhibits was conducted by Stevenson (1991), who sent a questionnaire to families a few weeks after their visit to a science centre. Of those visitors, 99% said they had talked to someone else about the exhibits. Six months after the visit, a proportion of the visitor
groups were reinterviewed. On average, people remembered five exhibits spontaneously. Additional memories were prompted by photographs of the exhibits shown by the researcher, or by someone else in the group talking about the exhibit. Of the 1,699 memories that were elicited (spontaneously or with prompting), 847 were classed as elaborated; they were more than merely mentioned by the participants. These elaborations were further analysed in terms of descriptions, feelings, and thoughts. Descriptions of the exhibit or what the person had done were the most frequent, accounting for 60% of the memories. Conceptualizations and understandings accounted for 26% of the comments whilst feelings accounted for 14% of the comments: of those feelings, 23% of the people spoke of fascination and 14% of enjoyment, but feelings of annoyance and dissatisfaction were also mentioned.

Many museum educators hypothesize that visitors will continue to build on the knowledge gained in their visits in their everyday lives (Duensing, 1987); indeed, this is one of the primary mandates of museums. A prototypical experience of this ideal is recounted at the beginning of the paper by Tulley and Lucas (1991): a young woman Tulley met at a science reception told him that a week after assembling the lock and key exhibit that Tulley had studied needed to repair the lock on her sister's back door so her small children might play outside without adult supervision. The young woman was able to mend the lock. She said that without having encountered the exhibit she would never have had the confidence to respond to her sister's problem as she did. From this we can infer that a residue of conceptual knowledge from her visit to the museum was transferred to a new situation.

Presently, there is very little research available. At this point, I will summarize what is known from studies about exhibit memories conducted after the visit:

a) Episodic memories of visits and exhibits are stable. This finding is consistent with the episodic memory literature which suggests that episodic events are forgotten very
slowly.

b) Visitors report that they think and talk about the visit and/or exhibits after they leave.

c) There is suggestive evidence that conceptual knowledge may be transferred to new situations, or at minimum, related to events outside of the museum.

From the above summary, it is apparent that the current state of research focuses on "what": What do visitors remember? What do they do afterwards? This thesis will continue the focus on the "what," with a secondary focus on the "how": How are memories transformed over time? How do visitor characteristics (particularly characteristics relevant to experiential learning) influence memories?

To help develop a research framework and instrument which looks at memory processes and education, the literature involving children and museums provides some suggestions. Four studies that cover topics that can be transferred to adults, and are consistent with the assumptions underlying experiential education and episodic memory will be reviewed. These topics are pre-visit knowledge, post-visit environmental support, post-visit discourse, and the theoretical nature of memory transformations.

Pre-Visit Knowledge. Using sixth-grade students, Kubota and Olstad (1991) assessed how pre-visit knowledge interacts with the museum experience with exhibits. They found that decreased novelty accomplished by vicariously exposing children to exhibits produced better learning possibly by providing more of an opportunity to process the exhibits at a deeper level. One could therefore imagine a similar principle operating in the adult visitor's experience: adults with less domain knowledge might be more likely to spend their time assimilating the topic, rather than reflecting.

Post-Visit Connections. Other research has explored the role of incorporating
science centre experiences into instructional curriculum (Hidi, Weiss, Berndorff and Nolan, 1998). The results of this study indicate that children who interact with cooperative science exhibits are more likely to report positive emotional experiences, and that this interaction resulted in improved learning if the exhibit topic was tied to concepts covered in school afterwards. This indicates that there appears to be a need for some environment assistance to support children's museum learning. In adults, this might take the form of having events or discussions in one's everyday life to support concepts encountered in the museum.

Post-Visit Discourse. Henry (1992) evaluated the educational impact of an art gallery field trip on middle-school children, 18 months after their visit. At that time, children were given ten minutes to tell the researcher everything they remembered about their trip, and the responses were categorized. All of the students provided a description of the artworks, while 88% provided evaluations (e.g., likes, dislikes). Further, a large proportion of students, 78%, made statements about the formal analysis of an artwork; 88% mentioned the artist's role and 61% made interpretative statements. Additional analysis showed that there was a positive relation between students who engaged in talk after their visit, and the frequency of comments which were philosophical in nature. In relation to adult museum visitors, it could be the case that visitors who discuss the exhibits after their visit are more likely to develop sophisticated exhibit memories.

Memory Transformations. Research with children has also focused on memory aspects of museum visits. Comparisons were made of children's recall of a trip to an archaeology museum on the day of the trip, 6 weeks later, 1 year later, and then 6 years later (Hudson and Fivush, 1991). Over time, children remembered less about their visit, but what they did recall was just as accurate and detailed 6 years after the visit as immediately after the trip. In fact, without specific cues the visit was forgotten by most of the children after 1 year, but with appropriate cues, 87% could recall details of the
visit. Cues which were most effective were those which referred to unique activities or reminded children of memories in which they were active participants. Hudson and Fivush (1991) conclude that children's memories become more reconstructive and inferential over time and that the forgetting of an autobiographical event involves a decrease in the amount recalled, changes in accessibility and changes in memory content. All of this takes place at different rates.

In summary, we know that memories become reconstructed and inferential as time elapses from the visit (Hudson & Fivush, 1991) and that factors which could influence memory construction after the visit include pre-visit domain knowledge (Kubota & Oistead, 1991), post-visit discussions beyond description (Henry 1992), and connections to events outside of the museum (Hidi et al., 1998): all of these are associated with enhanced learning/memory outcomes.

Rationale of the Study

This dissertation examined adult visitors' memories of exhibits. The research was cast in the form of a memory study, and is located in the context of educational outcomes. Adults were chosen as participants because they have been neglected in the museum research field, and they are a key focus of the American Association of Museums policy agenda.

The main objective of this exploratory research was to examine what kind of memories visitors have of museum exhibits. A secondary focus was to determine whether there are any factors which influence the transformation of these memories after the visitor leaves the museum. One way to explore the above objectives is to interview visitors so that information about their memories of exhibits, and some personal characteristics that might influence these memories can be gathered. In previous museum studies, research has typically involved contacting people after their visit, and asking them to recall as much as possible. This present study explored
memories of exhibits beyond previous research in the ways described below. Since this was exploratory research, not all of the following points are connected to specific hypotheses, and some are investigative extensions of previous research.

First, this research limited its focus to a restricted number of exhibits which the visitors chose. This is in contrast to Stevenson’s (1991), and most of the other reviewed research which focused on the sheer quantity of recalled exhibits and memories. By allowing visitors to select which exhibits they want to talk about, these exhibits are more likely to be representative of optimal educational experiences that are qualitatively different from those exhibits that were simply noticed. For this reason, it is expected that memories for these exhibits will be more likely maintained, or developed over time when compared to relatively uninteresting exhibits.

Second, since a limited number of exhibits per visitor were investigated, a wide range of memory was assessed for each exhibit. One way to partition the data on memory for exhibits is to distinguish episodic from semantic memory (Tulving, 1972). In this thesis, a broad definition of episodic and semantic memory was used, such as that used by Conway (1997) in his paper of memory and identity. Basically, episodic memory refers to any sorts of memories for any experienced events, and semantic memory consists of conceptual knowledge. This is consistent with the diverse definitions of museum education. More specifically, episodic memory refers to descriptions of exhibits, as well as aspects of experience connected with the exhibit (e.g., affect, autobiographical memories). This is similar to the episodic memory as measured by Falk’s (1988) participants’ recall of the affective state, and Stevenson’s (1991) participants’ recall of exhibit descriptions. Semantic memory is used to refer to any general knowledge or understanding, such as the scientific explanations about the exhibits supplied in the study by Tulley and Lucas (1991).

Third, although I conducted interviews with visitors both at the museum and a few months after the visit as did Falk et al. (1996), the present research differed by using
a quantitative methodology. The benefit of interviewing participants at the time of their museum visit was that I could obtain a baseline with which to compare follow-up memories. This eliminated the guesswork involved in knowing what the visitor remembered at the time of the visit and provided the opportunity to track memory transformations over time.

Fourth, visitors were asked whether they had engaged in any post-visit explorations, such as talking or thinking about the exhibits. Museum studies indicate that most visitors report talking, thinking, or transferring knowledge to new situations (e.g., White & Barry, 1984; Falk & Dierking, 1990; Tully & Lucas, 1991). This is an integral component of experiential education — the correspondence between the learning task and outside activities. As I have previously noted, memory cannot be separated from its context, therefore, it is of primary importance to assess whether the exhibit experience is transferred, or integrated into the visitor’s everyday life. The research on children and museum exhibits suggests that post-visit activities are likely to result in enhanced memory outcomes (Hidi et al., 1998). As postulated by Vygotsky (1978), discourse with other people and the connection of new ideas with a familiar experience can help facilitate the development of a more comprehensive understanding of that topic. It was hypothesized that visitors who report reflecting or talking about the exhibit after their visit were more likely to have enhanced memories.

Fifth, studies on adults to date have not investigated whether visitor characteristics might influence memories of museum exhibits. In two of the three studies in this thesis, I examined whether memory of exhibits was related to visitor characteristics. The characteristics that were gathered were based upon the principles of experiential learning: domain knowledge and personal interest.

Domain Knowledge. As Kubota and Olstead (1991) have demonstrated, the understanding of an exhibit is better if a child has prior knowledge of the concept it was designed to convey. In the novice-expert literature, it has been robustly supported that
experts have more globally integrated patterns of domain-specific recall than do novices (e.g., Ericsson & Smith, 1991; Bereiter & Scardamalia, 1993). It was expected that visitors who have domain knowledge about the exhibit topic will have superior memory. In addition, in order for depth of processing to occur, the new information provided by the exhibit needs to be assimilated into people’s current schemata, within the person’s zone of proximal development (Vygotsky, 1978).

Personal Interest. Personal interest is considered an individual disposition (Krapp, Hidi, & Renninger, 1992), and according to Renninger (1992), individual interest involves both stored knowledge and the value of an activity relative to other activities. Renninger’s findings suggest that interest is a psychological state which has the potential of influencing subsequent activity, and that information may be processed differently depending on whether the task involves knowledge and value. Voss and Schauble (1992) state that value placed on an activity may motivate people to learn about a topic. This idea is corroborated in a study that examined children’s and adolescents’ learning about information about animals (Willoughby, Motz, & Wood, 1997). These authors suggest that for adolescents who have some knowledge for animal facts, interest in the sense of value beyond knowledge is important because it serves as an energizing factor to attend to the material.

Schiefele (1991) found that adults with a higher level of personal interest in a particular topic were more likely to use learning strategies which made connections with prior knowledge, and were more likely to have better recall of text-based material. Other research by Schiefele and colleagues (Schiefele, 1996; Schiefele & Krapp, 1996) has found that possessing personal interest in a topic was associated with the type of mental representation (high interest participants demonstrate propositional rather than verbatim representation), superior recall of idea units, and more elaboration. All of this was independent of prior knowledge or intelligence. Renninger (1992) found that children who had a personal interest in a certain topic had more accurate and more
detail recall of those topics than topics of noninterest. Additional research on the relation between personal interest and the structure of acquired knowledge indicates that personal interest impacts on the qualitative structure of knowledge, at least in the case of text comprehension (Hidi & Anderson, 1992).

Overall, the research indicates that personal interest influences learning strategies, knowledge representation, and domain-specific memory in both children and adults. By extension, visitors with high personal interest in the topic of a museum exhibit, may demonstrate superior memory of an exhibit. In fact, if visitors are interested in the topic, the value component of personal interest may serve as an energizing factor to attend to the exhibit and perhaps motivate them to further reflect and explore the topic after they have left the museum. Therefore, it is expected that visitors with high personal interest in the exhibit topic will be more likely to demonstrate a pattern of episodic, and particularly, semantic memory enhancement over time.

Sixth, since the focus was on a limited number of exhibits, visitors were asked to discuss an exhibit they found situational interest. In two of the three studies, participants will also be asked to discuss an exhibit they did not find situationally interesting which provided the opportunity to assess the impact of situational interest on museum exhibit memories.

Situational interest is an externally-triggered process that is elicited by situational characteristics (Krapp et al., 1992). Typically, research on situational interest explores the characteristics of stimuli that elicit interest across individuals as opposed to personal interest which studies the development of interest dispositions within individuals. Research on situational interest indicates that it can facilitate cognitive processing and improve learning outcomes (e.g., Hidi, 1990; Hidi & Baird, 1988; Mitchell, 1993) by contributing to the integration of cognitive and motivational functioning (Hidi & Berndorff, 1998). Situational interest has also been found to influence memory. For example, Wade and Adams (1990) found that situational interest played a role in college
student's recall of biographical text. Basically, the interesting material was memorable, and uninteresting, but nevertheless important material was not.

Both Mitchell (1993), and Hidi and Baird (1986) have proposed that situational interest is multifaceted, containing both triggering and maintaining features, or in other words, a catch and a hold mechanism. Catching interest involves ways of initially stimulating people, whereas holding interest involves empowering factors such as meaningfulness and longer-term involvement. In the context to museum memories, it is expected that memories of exhibits which visitors find situationally interesting will be enhanced than memories of exhibits which were judged as uninteresting. Exhibits which elicit situational interest may result in visitors reflecting on and linking the exhibits to their own experiences. This may lead to changes in the structural organization of knowledge that may be detected in exhibit memory transformation from the time of the initial to follow-up interview.

Overview of the Study

Three sites were chosen for this research: the Ontario Science Centre, the Hockey Hall of Fame, and the Art Gallery of Ontario. The diversity of museums gives this dissertation breadth. It should be noted that the Ontario Science Centre was the first site examined, and many of the following interview measures were developed in response to the findings at that site.

At each museum site, adult visitors were asked to choose two exhibits which they found interesting (one of which will be discussed with the interviewer, and one of which will be named only — the control exhibit). At the hockey hall and art gallery, visitors were, in addition, asked to indicate one exhibit they found uninteresting. Situational interest is generated by stimulus characteristics (Krapp et al., 1992), and exhibits which elicit this will be taken as representative of an optimal interaction experience. The role of situational interest was assessed by comparing the results
between the subjectively interesting and uninteresting exhibits at the hockey hall and art gallery.

In order to obtain a thorough overview of all aspects of exhibit memory, a comprehensive set of questions was developed. Visitors were asked to recall everything they could about the exhibit and/or exhibit experience. This was a measure of episodic memory. At each of the sites, this measure was obtained slightly differently. At the science centre, exhibit descriptors were compared against a standard set of descriptors for proportion of recall. At the hockey hall, the participants were asked to describe the exhibit, and the number of details in their protocols were tabulated. At the art gallery, visitors were asked to tell a friend about the artwork, and the number of details were tabulated. The semantic memory measure, at each site, was obtained using a similar method, although what counted as semantic memory varied across sites. At the science centre, it was defined as conceptual understanding of scientific principles, while at the hockey hall and art gallery, it was based on interpretation and demonstration of critical awareness, respectively.

Additionally, participants were asked to mention any emotion they experienced in relation to the exhibit. Also, at the hockey hall and art gallery visitors were asked whether the exhibit elicited any autobiographical memories, and to complete a series of experience scales on dimensions such as memorability, and personal relevance. These dimensions will be related to the recall of an autobiographical memory, since recall of one's past may influence how one experiences the exhibit. Afterwards, information about visitor characteristics was gathered. Visitors filled out measures assessing domain knowledge and personal interest.

A few months after the visit, participants were telephoned and asked the same set of memory questions as at the time of the initial interview, for each of the three exhibits. Once again, visitors were asked about episodic memory (details, affect, etc.) and semantic memory. The results of the initial and follow-up interview memory measures
were compared. By comparing the results of the memory measures, stability or transformations could be assessed. In addition, the visitor characteristics were analyzed to determine whether they were associated with certain memory profiles.

In the follow-up interview only, visitors were asked whether they engaged in any post-visit exploration activities such talking or thinking. Using these post-visit exploration responses, a measure of the integration of the exhibit into the visitor's everyday life could estimated. The influence of exploration activities on episodic and semantic memory patterns was also analyzed.

In the next three chapters, I will explore each museum site in turn. Each of the chapters can be considered a self-contained study with occasional references to findings from the other sites. In the final chapter, I will draw the findings from the different sites together using a tentative theoretical framework. Although there will be some indirect references to this framework in the next chapters, it will not be discussed in detail until the last chapter. This presentation sequence was adopted because the theoretical framework was developed in response to the memory findings of the different museums. While analyzing the data, I realized that in addition to theories of museum education and memory, I also needed a theory of visitor-exhibit interaction which could help explain the differences between exhibit memories at the different museum sites.
Chapter Two

Ontario Science Centre

Introduction

Educators and policy makers are becoming increasingly concerned with the level of general scientific literacy. Modern societies require a constant flow of scientific and technological ideas to ensure that they create adequate wealth to support social, medical and human services (CIAR, 1992). This increased interest in scientific literacy revolves around two fundamental issues. First, there is a concern that we are facing a shortfall of persons with scientific expertise who can serve as producers of innovation. Second, with increasing frequency, many contemporary dilemmas have a scientific and technological basis. To deal rationally and effectively with these complex matters, the public must be scientifically literate (Shamos, 1993).

A primary goal of science centres is to provide science education. For school children and adolescents, science centres may supplement formal science education within the school system. Such centres are intended to stimulate curiosity in children, and to encourage them to pursue careers in science, thereby ensuring that society has the expertise for future innovation and development. In relation to adults, the focus of science museums has been to provide accessible places to explore the secrets of science (Fowles, 1986) for the purpose of increasing the general level of scientific literacy. In this study, the contribution of science centres to scientific literacy in the general adult population will be explored through memories of exhibits. Adults are frequent visitors to science centres; they constitute the majority of visitors to the Ontario Science Centre (Ontario Science Centre, personal communication, 1993), and as such, are worthy of close attention in relation to increases in general scientific literacy. Adults are also likely
to be influential in introducing their children to science centres.

Overview of the Study

This study was designed in the form of a memory study. As visitors left part of the science centre, they were asked about two exhibits that had interested them. For one of the exhibits, visitors were asked to recall as much as they could about the exhibit, to explain what the exhibit was demonstrating, and to describe any emotion that was experienced relating to the exhibit. For the other exhibit, visitors were not requested to describe the exhibit or explain how it worked, but only to mention it. This was included in the research design as a control for the impact of discussing an exhibit with the interviewer at the museum site. Comparisons between the episodic memory of the two exhibits were compared to determine whether the on-site interview had an observable effect on memory. Comparisons between semantic memory were not conducted because it was not possible to assume that visitors had an equivalent level of semantic knowledge for two different scientific topics covered by the two exhibits, whereas for episodic memory, numerical proportion recalled could be easily compared.

One month after the visit, visitors were telephoned, and were asked the same set of questions as at the time of the initial interview for both of the exhibits. Once again, participants were asked to recall details about the exhibit, to explain the scientific principle, and to report whether they experienced any emotion. The episodic memory measures were compared against a set of standardized descriptors, and compared with the proportion recalled at the time of the initial interview. The semantic memory results from the initial and follow-up interview were also compared. By comparing the results of the semantic memory, coded on the basis of conceptual scientific understanding, stability or change could be assessed.

In the follow-up interview only, visitors were asked whether they participated in any post-visit activities such as talking or thinking about the exhibit, so that a measure
of the integration of the exhibit into the visitor's life after the science centre visit could be gauged. In addition, it was expected that visitors who engaged in post-visit discussion or thinking would be more likely to have enhanced memories of exhibits. It was also hypothesized that the type of emotion experienced at the time of the visit might impact the memory; for instance, curiosity might be associated with enhancement of semantic memory.

Method

Participants

The participants were recruited from the Ontario Science Centre in Toronto, which provides exhibits, interactive displays, and demonstrations of scientific and technological phenomena. Data were collected from a section called the Science Arcade, which contains approximately 50 exhibits that focus primarily on physical scientific concepts such as electricity, air pressure, and sound waves. For 39 adult individuals an interview was conducted both as they left the Science Arcade, and by telephone, one month later.

The initial interviews were conducted on Friday evenings when admission to the centre is free. It was thought that this would provide a demographically more diverse sample than would have been obtained at other times when a charge is made for admission. A continuous sampling method was used to gather data on adult visitors. The sampling method involves questioning the next available person after an interview has been completed. If this person was with a group, the interviewer addressed the entire group and allowed for self-selection within the group. Once verbal consent was obtained, adults were asked to participate in a semi-structured interview.

Of those who were asked to be interviewed, 43% agreed to participate, 12% could not participate due to inadequate English language, 18% refused on the grounds of fussy children, and 26% declined saying they were tired or did not notice anything.
Further, one person's data could not be used due to interviewer error. Of the 49 participants who agreed to participate, 3 refused to supply a follow-up telephone number, and it was impossible to contact 7 of the others for the follow-up interview. The final sample was, therefore, 39 participants, 23 males and 16 females, with an average age of 37 years (range 21 to 65).

Materials and Procedure

In a standard preamble, visitors were requested to participate in a research study about “what [they] found especially interesting in [their] visit from the section they were just leaving.” Visitors were supplied with a consent form (see Appendix A) that they were given time to read, and afterwards, to ask any questions they might have about their participation. If they verbally consented to participate, demographic information such as age and gender was gathered (see Appendix B for interview form).

The initial on-site interview had two sub-sections. One was labelled the “elaborated exhibit section.” Here, participants were asked to name an exhibit they found most interesting or worthwhile. They were later asked for a description of “what they saw and did with the exhibit, in as much detail as possible.”

Before the main study, each of the exhibits in the Science Arcade had been assigned standardized descriptors. The purpose was to develop descriptors which the average visitor would actually use, rather than to develop expert-based descriptions. This was developed by 2 raters who approached and interacted with the exhibits on separate occasions. The raters compared descriptors, and when there was disagreement, they conferred until an agreement was obtained.

For example, an exhibit which allows visitors to create new colors by adding or removing different coloured lights was coded as:
Descriptor One, 3 different coloured bulbs;
Descriptor Two, 3 lights on make dark shadow;
Descriptor Three, push button to turn off individual lights; and
Descriptor Four, get different colors depending on bulb combinations.

Descriptors of various exhibits ranged from a minimum of 3 to a maximum of 6.

This scheme resulted in a score being assigned to each participant's episodic memory, based on comparing visitor descriptions against the standard descriptors, with one point given for each item mentioned.

Next, visitors were asked "how the exhibit works, and/or what the exhibit was demonstrating." Then followed a question whether the visitors experienced any emotion in relation to the exhibit, and if so, what emotion. Most participants found it difficult to think of an emotion, so a list of 30 representative and varied emotions such as scared, disappointment or disgust was shown to them, from which they would choose one. The elicited emotions were categorized using a prototypical approach to the classification of emotions, although with some modifications (Shaver, Wu, & Schwartz, 1992). Since there was no mention of curiosity in this classification scheme, it was added as a separate category.

In the second section of the interview, entitled the "unelaborated exhibit section," the participants were asked to name another exhibit which interested them, or they found worthwhile. In this section, participants were not asked any questions, but only to name an exhibit.

There were two alternative versions of the initial interview, one in which the elaborated exhibit section was first, and one in which the unelaborated exhibit section was first. Participants were randomly assigned to a version.

Lastly, participants were asked to provide their first name only, and a phone number, so the interviewer could telephone them to ask some additional questions.
Some participants asked about the content of the telephone call, and were told that it was to see whether their experiences from the science centre stayed with them.

If the participant agreed to supply a telephone number, a follow-up interview was conducted one month later. There were two versions of the follow-up interview, one with the elaborated exhibit section first, and the other with the unelaborated exhibit section first. The sequence of presentation was in the reverse order to the order the visitor completed in the initial interview.

In the follow-up interview, the questions for the two exhibit sections were identical. The participants, using the exhibit name they supplied in the initial interview, were reminded of an exhibit they had chosen. Participants were asked for a description of their interaction with the exhibit. The episodic memory protocol supplied by the visitor was compared against the standard descriptors to obtain a measure of the proportion of details recalled. Then, the proportion of details recalled from the time of the initial and follow-up interview was compared.

Next, to assess semantic memory, participants were asked to explain what the exhibit was trying to demonstrate. The semantic memories from the initial and follow-up interview were also compared so that stability or transformations could be assessed.

Visitors were also asked to mention any emotions they had regarding the experience, so that the main elicited emotion at the time of the follow-up interview could be determined. In addition, only at the time of the follow-up interview, participants were asked whether they thought about, talked about, or investigated, any topic relating to the exhibit during the interval since visiting the science centre.

In both the initial and follow-up interviews, the information about the descriptions of the exhibits and the explanations were audio-recorded and transcribed.
Results

This section is divided into five parts. I first present the data for memory of episodic details of interaction with the exhibits. Next, the data from the initial and follow-up interviews involving the subject’s semantic memory of how an exhibit works are presented. I then examine emotions experienced by the visitors resulting from interaction with the exhibits. Fourth, the results of the post-visit exploration questions are reported. Lastly, I explore whether post-visit exploration activities and affect are associated with changes in episodic and semantic memory.

When visitors were asked to choose an exhibit which interested them, a wide variety of exhibits was selected. The exhibit most likely to be picked was one participants tended to call “orange balls.” It consisted of balls that travel along various track pathways and the ball’s pathway is dependent on the action of various levers and mechanisms which cause the balls to bounce, switch tracks, or create musical sounds. This exhibit was chosen by 21% of the participants. The second most frequently chosen exhibit was one that consisted of a series of differently sized pipes made out of various materials. The visitor pushes a button which results in air being forced through the associated pipe which creates a sound that varies in pitch; for instance, the narrow pipe creates a high pitch sound. This “organ” exhibit was chosen by 16% of the participants.

Episodic Memory

There were three memory measures for each participant, the on-site elaborated exhibit description, the follow-up elaborated exhibit description, and the follow-up unelaborated exhibit description. Episodic memory was measured by matching the descriptions against a standard set of descriptors to obtain a measure of the proportion of details recalled at the time of the initial and follow-interview.

In the following example, the participant described an exhibit which demonstrated the delay of sound via wire conduction.
Example of Episodic Memory

Participant: “You pick up the telephone and you talk into the microphone, and as you speak into the microphone, the sound, as you are speaking, it is heard delayed back to you.”

The standardized descriptors for this particular exhibit were:

- Descriptor One, pick up telephone;
- Descriptor Two, speak into phone;
- Descriptor Three, hear your own speech delayed; and
- Descriptor Four, hear the other person from the other end in regular time.

This participant received a score of .75 because he did not mention the last descriptor.

An inter-rater reliability check of the match between the standardized descriptors and the descriptors supplied by the visitor was conducted on 30% of the memories; the agreement was 92%. Finally, for each participant, the proportion of details from the two interviews was compared.
The mean proportion of episodic detail recalled for the elaborated experimental exhibit in the initial interview was 0.65, and the mean proportion of recall of detail of the same exhibit, one month later, was 0.61. Thus, overall, using a paired t-test, there was an insignificant difference in the proportion of details recalled between on-site and post-visit recall ($t(38) = 0.94, p = 0.35$).

The recall of the unelaborated control exhibit in the follow-up interview was 0.65.
It is a coincidence that this mean is the same as the mean for the elaborated exhibit in the initial interview) and was compared to the mean recall of the elaborated exhibit. There was no significant differences between these means using a paired t-test \(t(35) = -0.38, p = .70\). Thus, speaking about one's episodic memory at the time of the initial interview did not affect the episodic recall of the exhibit details.

Each participant's elaborated exhibit episodic memory at the time of initial interview was compared to the memory provided at the time of the follow-up interview. Visitors who supplied more details in the follow-up interview were classified as enhanced, and consisted of 28% of the participants. Visitors who supplied the same number or fewer details in the follow-up interview were classified as not enhanced, and consisted of 66% of the participants: 36% supplied the same number of details, and 36% supplied less details.

**Semantic Memory**

The semantic memory responses from the initial and follow-up interview were compared for change by having raters blind to whether the memory was from the initial or follow-up interview, and having them choose the most scientifically-based conceptual memory. There were three categories: deteriorated, stable, and enhanced semantic memory. The comparisons took into account three criteria: the number of scientific principles, the level of detail, and the accuracy of the explanation. An example of each semantic memory category is provided below.

Example of semantic memory coded as deteriorated:

Initial Interview - “Strike the gong, the gong vibrates, the air vibrates and gets to you through the air.”

Follow-Up Interview - “Demonstration of different types of tones.” (Coded as deteriorated because of the loss of scientific principles; provides a description of
the exhibit at the time of the follow-up interview.)

Example of semantic memory coded as stable:

Initial Interview - “It was about spatial awareness, logic to orient pieces into a cube.” (This participant is discussing an exhibit which requires one to form a cube out of wooden blocks.)

Follow-Up Interview - “Our spatial ideas. We have an idea of what we think should work spatially, but it actually doesn't work.” (Although the follow-up explanation is expanded, it does not contain new scientific principles.)

Example of semantic memory coded as enhanced:

Initial Interview - “For every reaction there is an [sic] reaction.” (Here the participant was explaining the orange balls exhibit; she was referring to the fact that when a ball hit something, it moved.”

Follow-Up Interview - “It was based on gravity. It used gravity to cause a lot of mechanical energy.” (The participant’s memory was coded as enhanced because of the more specific reference to gravity and mechanical energy.)

Inter-rater agreement on the coding of the entire data set of semantic memories was 84%. In the table below, the percentage of participants who fell into each semantic memory category is presented.
Table 2.1

Percentage of Participants Demonstrating Change in Semantic Memory from Initial to Follow-Up Interview

<table>
<thead>
<tr>
<th>Semantic Memory</th>
<th>Percentage of participants $^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deterioration</td>
<td>26</td>
</tr>
<tr>
<td>Stable</td>
<td>28</td>
</tr>
<tr>
<td>Enhancement</td>
<td>36</td>
</tr>
</tbody>
</table>

$^a_{\text{H} = 39}$.

As Table 2.1 shows, there was wide variability of memory patterns, with approximately one-third of the participants in each group.

Experienced Emotion

The presence of affect was assessed by asking visitors whether they experienced any emotion in relation to the elaborated interesting exhibit at the time of the initial and follow-up interviews. The following data are based upon the percentage of participants who reported a certain emotion for the elaborated exhibit.
Inspection of Table 2.2 shows that both at the science centre, and then one month later, the most common emotion elicited was enjoyment, followed by curiosity. Analysis of the exhibits which were most likely to result in the experience of anger or sadness were those that could be classified as brain teasers. Typical of comments of visitors who reported anger and sadness were: “I couldn’t figure out how to get the leather through the holes. I kept trying but just couldn’t.” The one participant who reported fear indicated that she felt scared because she felt that the children using the exhibit were exposed to heights.

Post-Visit Exploration

In the follow-up interview, participants were asked about connections between the exhibits and their everyday lives. The responses from the elaborated and unelaborated
exhibit were combined because there were no differences between them. The following data, then, were derived from the two exhibits for each of the participants, and are the percentage of participants who mention any post-visit exploration activity for either exhibit.

Table 2.3
Percentage of Participants Reporting Post-Visit Exploration Activities

<table>
<thead>
<tr>
<th>Exploration Activity</th>
<th>Percentage of participants*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talked</td>
<td>72</td>
</tr>
<tr>
<td>Reminded</td>
<td>33</td>
</tr>
<tr>
<td>Read</td>
<td>10</td>
</tr>
<tr>
<td>Changed behavior</td>
<td>15</td>
</tr>
<tr>
<td>No exploration</td>
<td>26</td>
</tr>
</tbody>
</table>

*% = 39.

* Percentage does not add up to 100% because participants were allowed to designate more than one activity, and the percentage is based on participants who report an activity for either exhibit.

As can be observed in Table 2.3, a significant majority of participants indicated that they had talked about the exhibit to others, usually friends or colleagues, after they had left the science centre. When asked whether anything in the real world had reminded them of either of the two exhibits, 33% of the participants indicated that something had. For example, a few participants stated that seeing a roller coaster reminded them of the "orange balls" exhibit, and some participants stated that the static on their clothing,
after coming out of the dryer, reminded them of the "electricity" exhibit which demonstrated static electricity.

In response to the query of whether they had done anything different as a result of seeing either the elaborated or unelaborated exhibit — for instance, turn off lights because they realized the amount of energy required — 15% of the participants replied they had. Very few participants reported reading about the exhibit topic.

Factors Influencing Memory Patterns

Post-Visit Exploration Activity. The exploration activities (talking and reminding) were collapsed since participants who reported talking to somebody about an exhibit were usually the same participants who reported noticing something connected to the exhibit, using a Chi-Square test ($\chi^2(1, N = 39) = 5.6, p = .02$). Therefore, participants endorsing one or both of the above activities were categorized as engaging in a post-visit exploration activity.

Episodic Memory. To test the hypothesis that post-visit exploration activity, regarding a specific exhibit, might be associated with enhanced episodic memory of that exhibit over time, a Chi-Square analysis was conducted. The result of this analysis indicates that there was no significant relationship between engaging in a post-visit activity and an enhanced episodic memory ($\chi^2(1, N = 39) = .96, p = .33$).

Semantic Memory. A Chi-Square analysis was also conducted to determine whether post-visit exploration might be associated with changes, or more specifically, the enhancement of semantic memory. No significant association or pattern was found

1 Embedded in the design of this study was the theoretical notion that episodic and semantic memory are distinctive forms of memory. A Chi-Square analysis was conducted to determine whether enhanced semantic and episodic memory profiles were associated; there was no significant association between the profiles, $\chi^2(1, N = 39) = .50, p = .48$. In other words, visitors who had episodic memories which became enhanced were not more likely to have semantic memories which became enhanced. This suggests that semantic memory is independent of episodic memory, and supports the theoretical distinction between the two memory systems.
Affect. Visitors who reported experiencing anger were not included due to low numbers, so that statistical requirements would not be violated. Therefore, the following analyses are based on participants who experienced joy and curiosity at the time of the initial interview.

Episodic Memory. A Chi-square analysis was conducted to assess whether there was an association between enhanced episodic memory and the type of emotion experienced (joy or curiosity) at the science centre. The results of this analysis did not indicate a significant relationship ($\chi^2(1, N = 35) = .14, p = .71$).

Semantic Memory. In order to determine whether there was a relationship between the presence of curiosity or joy and enhanced semantic memory, a Chi-Square technique was used. There was no significant relationship between these variables ($\chi^2(1, N = 35) = .78, p = .38$).

Discussion

The long-term impact of an interactive science exhibit was a strong episodic memory in the mind. This was evidenced by participants’ stable episodic memory for factual details about the exhibit when immediate and delayed scores were compared. In my study, episodic recall was high in the immediate interview, with nearly two-thirds of a standard set of details being remembered, and overall, there was no decrement over a month. This is not to say that no visitors showed deteriorated episodic memory, but that as a group, the immediate and delayed recall was not significantly different. It is unlikely that the lack of decrement was due to the priming effect of the initial interview because there was no difference in exhibit recall as a function of whether the exhibit was elaborated, or unelaborated, that is to say, merely mentioned.
One explanation of this accurate month-long memory was that the exhibits, that were highlighted by visitors, were indeed memorable. Apparently, once an episodic memory of an exhibit has been stored, the details were easily retrieved. It is possible that the one-month period from the initial to the follow-up interview was too short for memory deterioration. However, in general, this finding is consistent with the literature which suggests that episodic exhibit memories appear to be relatively stable (e.g., Bitgood and Cleghorn, 1994; McManus, 1993), and is similar to the findings that memories of museum visits remain vivid for many years later (Falk, 1988; Falk and Dierking, 1990). However, this study more conclusively confirmed this principle because memory was compared against standard descriptors, and comparisons from the time of the initial to the follow-up interview were used.

Whereas this finding corroborates previous research, the high level of retention over time is surprising, particularly if compared to the relatively poor recall of verbally encoded text-based material (e.g., Anderson, Goetz, Pichert & Halff, 1977). The dual coding theory of Paivio (1971, 1991) would explain this high level of memorability by stating that the additive effect of visual imagery to verbal codes results in better memory than verbal codes alone. Dual coding theory postulates knowledge representations consist of two separate, but partly interconnected systems: a nonverbal system for representing objects and events, and a verbal system specializing in language. The finding that pictures are more likely to be remembered than words has been robust (Paivio, 1971), and according to the theory, is due to the picture being coded both verbally and non-verbally. At the Ontario Science Centre, the high rate of memorability may be at least partially explained by the fact that the experience is being coded by both representational systems, thus resulting in high degree of memorability.

In terms of shifts in semantic memory after a science centre visit, participants were almost equally distributed into the categories of deteriorated, stable and enhanced semantic memory. Overall, as a group, there was no significant increase in scientific
understanding. A tentative explanation of this result is as follows:

a) About a third of participants’ articulation of scientific principles did not change over the one month period. That there should be such people is not, perhaps, surprising since scientific concepts are extremely resistant to change (Posner, Strike, Hewson, & Hertzog, 1982).

b) Another third of participants showed semantic memory deterioration. This may have been due to the fact that certain scientific concepts, derived from signs and captions on the exhibits in the science centre, remained available in memory for only a few minutes after reading them when participants were interviewed. Perhaps, too, they were caught up in the experience of exploring science. On either count, their semantic memory of science would have been more easily accessible immediately after seeing the exhibit. However, a month later, in another context, and perhaps because conceptualizations which they had voiced to the interviewer had no firm schematic base to build upon, these memories were no longer available.

c) A further third of the participants showed enhanced semantic memories. We might think about this in one of two ways. What may have happened is that, at the time of the initial interview, the subject was embarrassed by not being able to answer questions of explanation as accurately as he or she would have liked. Having been asked, and having experienced some lack of clarity, the person reflected upon them, to get his or her ideas straight.

Alternatively, this could be a genuine increase in understanding over time — with the enhanced memory undergoing an incubation, as it were. One factor which might have facilitated this incubation was engaging in post-visit exploration activities. For instance, a visitor might note a similar phenomenon in his or her environment or a discussion with someone might facilitate understanding, by shifting the exhibit’s scientific principle into the visitor’s zone of proximal development. Though this possibility may seem appealing, a direct test of this hypothesis did not support such an
Regardless of the finding that post-visit exploration was not associated with semantic memory, many visitors reported that once they had left the science centre, exhibits were associated with some post-visit thoughts and behaviours. A majority of participants, 72%, discussed an exhibit with others. This result was lower than Stephenson’s (1991) finding of 99%. Methodological differences between the studies may explain the difference because in this present study, I queried about only two specific exhibits, whereas Stephenson queried about many exhibits.

After a visit to the science centre, a subset of visitors demonstrated an increased awareness in scientific phenomena or understanding, or an increased ability to draw connections between scientific labels from the museum and real world events. Some visitors even reported changing their behaviours in response to what they learned from the exhibit; for example, switching off electric lights to conserve energy. This connection is an integral step in the enrichment of the general public’s scientific literacy, and is an important benefit of museum exhibits: to provide the visitor with a reference point when scientific information is encountered, to be able to say, “Oh yes, this is like the exhibit I saw.” It also serves as a starting point to reflect upon the scientific issues, and even to be associated with some changes of behaviour.

Overall, the type of discourse and real-world connections consisted of sharing descriptions of the exhibits, or noticing events, rather than questioning or reasoning. This may explain the lack of a relationship between post-visit behaviours and changes in understanding — that conceptual shifts require deeper reflection to have an observable impact. As Taylor (1986) found, visitors to an aquarium were more likely to use their on-site visit as an opportunity to reinforce previously held knowledge, rather than to acquire new knowledge (although this was not a longitudinal study). Perhaps the tendency of visitors to connect scientific principles to their environment was
evidence of visitors reinforcing their science knowledge after the visit, as in the case with aquarium visitors. Nevertheless, this does not negate the importance of visitors making connections between everyday events and exhibits; this in itself was an important outcome.

Behaviours such as reading an article about the exhibit topic or visiting the library in response to an exhibit were very rare. It may be unrealistic to assume that adult visitors will engage in behaviours or discourse involving scientific reasoning, in a manner similar to that taught in formal education environments.

In contrast to Stevenson (1991) who found that most participants experienced fascination, followed by enjoyment, in my study, I found a somewhat different pattern. In this present study, most participants reported enjoyment as their primary emotion, followed by curiosity. It is not clear why this difference was the case.

The presence of an affective response can be considered an indirect measure of a person’s involvement with the exhibit. This is particularly true when considering the case of curiosity. Curiosity is an integral component of the “flow experience” which provides the intrinsic motivation required to push the person to higher levels of performance. If a science exhibit can elicit the flow state, even to a small extent, the experience will be intrinsically rewarding and the visitor will be motivated to explore the topic of the exhibit outside of the museum (Csikszentmihalyi & Hermanson, 1995). This may, thereby, be reflected in changes of semantic memory. The results, however, indicated that the experience of curiosity within the science centre, was not related to shifts in semantic memory. It is possible that curiosity provided too gross of an estimate of involvement, particularly since the exhibits, which were part of this study, were all chosen because visitors found them situationally interesting.

One limitation of this study was the lack of information about visitors. It would be interesting to find out whether individual differences interact with changes in memory over time. Inclusion of additional visitor information was incorporated in the research
design for the next two sites, the Hockey Hall of Fame and the Art Gallery of Ontario.

In conclusion, the results of this study suggest that episodic memories of interacting with science exhibits were salient and stable. However, the pattern of semantic memory over time was variable, with equal proportions of visitors showing deteriorated, stable and enhanced semantic memory, with post-visit exploration activities or affect having no observable influence on the memory profile. Further, after a visit to the science centre, a minority of visitors linked the scientific principles of the exhibit to events in their everyday lives.
Chapter Three

Hockey Hall of Fame

Introduction

The Hockey Hall of Fame in Toronto\(^2\) is a privately-funded museum, with a varied collection of hockey artifacts, memorabilia, interactive exhibits and re-creations of scenes (e.g., Montreal Canadiens’ team change room). The artifacts consist of items such as hockey sticks, masks, ticket stubs, jerseys, and stamps.

The Hockey Hall of Fame’s vision is to be “the best place in the world to totally immerse yourself in the game you love. It is ‘Hockey Mecca.’” The Hockey Hall of Fame — as its mission states — is designed according to three principles: excellence (recognizing achievements), entertainment (presenting the spirit of the game), and education (using historical, social and physical elements).

Although the hockey hall is described as “hockey mecca,” it is also defined as a museum displaying many authentic artifacts that helps describe the history of hockey, and attempts to educate the public on the significance of hockey. As the education coordinator states, the hockey hall illustrates “the impact of hockey on our culture.” One of the goals of the hockey hall’s educational programme is to provide an arena in which students can use critical thinking skills. Considering its educational focus, it would not be unreasonable to assume that the goals would be similar for adults.

The Hockey Hall of Fame was included into this series of studies in order to consider a broad spectrum of museum experiences — from art to science exhibits to artifacts. The Hockey Hall of Fame is an unique site because it offers the opportunity to study contemporary artifacts. The hall and its artifacts might be considered representative of “low” culture. A more helpful framework would be to view it as a

\(^2\) Recently, I noticed that the hockey hall is being referred to as the Hockey Hall of Fame and Museum.
place where people are bound by the artifacts to a particular historical time of their lives through associations and memories (Cupchik & Izadpanah, in press).

Overview of the Study

The design of this study mirrors the methodology used at the Ontario Science Centre, but there were some modifications to the research interview. The study retained the form of a memory study with adult participants interviewed during and after their visit. The interview form, however, was expanded to capture more aspects of memory. In addition, the expansion included a control for situational interest, and a gathering of information about visitor characteristics.

As participants were exiting the hockey hall, they were asked to choose three exhibits, two of which they found interesting (one was discussed and the other was not discussed and served as the control) and one which they found uninteresting. This allowed for a comparison of memory between peak museum exhibit experiences (the interesting exhibit condition) and mundane museum exhibit experiences (the uninteresting exhibit condition). I take the view, consistent with Hidi and Berndorff (1998), that although situational interest may have an externally triggered process, once something becomes situationally interesting, it can lead to autonomous engagement which may or may not be short term. This may, as it proceeds, influence affective and cognitive knowledge structures. It was expected that for the subjectively interesting exhibit, memory would be more likely to become enhanced.

As at the Ontario Science Centre, measures of episodic and semantic memory and affect were gathered in much the same way at the hockey hall — by asking visitors for a description, their understanding, and emotional response to the exhibit. However, for episodic memory, standard descriptors were not used, and for semantic memory, interpretation and/or critical awareness were the criteria, not scientific principles. In terms of episodic memory measurement, there was a shift from using standardized
descriptors to counting the number of details mentioned by the participant. Although this suggests a decreased emphasis on accuracy, this change in methodology was due to an adaptation to the types of exhibits at the hockey hall. At the Ontario Science Centre, the exhibits involve a series of sequential steps that the visitor participates. This is similar to a science exhibit where there is a defined set of steps; thus standardized descriptors were developed for the exhibits. In contrast, at the Hockey Hall of Fame, interaction often involved looking at exhibit cases containing many different items. Rather than itemizing the entire set of items (e.g., fifty stamps), I decided that the memory measure should reflect the fact that visitors might remember more information about a few items, thus number of details would be more relevant than descriptors.

Also, as at the Ontario Science Centre, comparisons between episodic memory between the elaborated and unelaborated interesting exhibit were compared to determine whether the on-site interview had an observable effect on memory. Comparisons between semantic memory were not conducted because it was not possible to assume that visitors had an equivalent level of semantic knowledge for the topics covered by the two exhibits, whereas for episodic memory, number of details recalled could be easily compared.

In addition to the above memory measures, other aspects of experience were collected. Hockey hall visitors were also asked whether they experienced affect or autobiographical memories in relation to the exhibit, and to rate their experience along a series of experience dimensions (e.g., personal relevance, memorability). It was expected that ratings of memorability would be associated with memory patterns, and since the artifacts represent an historical time period that is recognizable to most visitors, it was hypothesized that a high proportion of visitors would report an autobiographical memory, and that ratings of personal and social relevance and some of the other experience dimensions would be associated with the presence of an
autobiographical memory. It was also hypothesized that a high proportion of visitors would experience positive emotions.

A few months after the initial interview, visitors were telephoned and were asked the exact same questions as in the first interview about all aspects of their episodic and semantic memory for each of the three exhibits. This included the interesting exhibit not discussed in the initial interview. The results of the initial and follow-up interview were compared with each other. By comparing the results of the memories, the stability or transformation of memories was assessed.

Further, in the follow-up interview, visitors were asked whether they participated in any post-visit exploration activities such as talking or thinking about the exhibit. It was expected that post-activity rates would be high because hockey tends to be more integrated into many peoples' everyday lives; there are simply more cues or events available to elicit the memory. It was also expected that participants who engaged in post-visit exploration activities would provide memory responses that demonstrated enhancement from the time of the initial to the follow-up interview.

At the time of the initial interview, information about visitor characteristics was gathered; these included, domain knowledge, and personal interest in hockey.

Domain Knowledge. Although research on hockey expertise could not be located, research on baseball expertise was available. Baseball experts were found to have superior recall of baseball text comprehension to baseball novices (Chiesi, Spilich & Voss, 1979). The authors argue that the improved recall was due to differences in the conceptual organization of baseball knowledge structures. If one extrapolates from research on baseball to hockey, then one would expect that visitors with high domain knowledge would have different memory profiles than visitors with low domain knowledge.

Personal Interest. The research on personal interest indicates that it is associated with more sophisticated knowledge representation, increased elaboration and superior
domain-specific memory (e.g., Schiefele & Krapp; Renninger, 1992). Since personal interest is a state which has the potential of influencing cognitive activity (Renninger, 1992), it was expected that visitors who have a high level of personal interest in hockey would cognitively represent the exhibit information differently, and engage in more cognitive elaboration than visitors who have a low level of personal interest in hockey, and that the above activities would be reflected in higher rates of enhanced semantic memory.

Method

Participants
Participants were recruited from visitors attending Toronto’s Hockey Hall of Fame. The exhibits that participants were asked to choose from were limited to the hockey artifact display cases on the main floor (of which there are approximately 15 thematically-arranged display cases). For example, one display case shows the evolution of hockey equipment by highlighting the difference in the materials used in past and present equipment construction. Another display case consists of artistically adorned National Hockey League’s goal-tender masks that reflect each goalie’s personal style.

Permission to collect data from the participants was obtained through the education and archives department. Half-way through the data-collection process, the marketing department stated that it objected to an external researcher and ordered all interviewing terminated. After much interdepartmental and investigator negotiating, a finite number of data collection days were granted for the fall. Thus initial interviews were conducted across two seasons — spring and fall. Interviewing usually occurred on weekends. An attempt was made to collect data during weekday hours, but unless there was a hockey game in the evening, visitor volume was very low. The on-site interviews were conducted adjacent to the hockey hall exit.
Data on adult participants were gathered using a continuous sampling method. The sampling method involved questioning the next available person after an interview had been completed. If the next person was in a group, the interviewer addressed the entire group, and allowed for self-selection. Visitors with children were not asked to participate because the focus of the research was on adults who go to the hockey hall for personal reasons, rather than for their children. Once verbal consent was obtained, adults participated in a semi-structured interview. Most of the interview was orally conducted, but the final section (concerning visitor characteristics) was completed by the visitors in written form.

Of those visitors who were asked to participate, 47% agreed, 4% could not participate due to inadequate English language, 47% declined saying they were tired or short of time, and 2% were not interviewed because they lived outside of North America. Of the 86 participants who agreed to complete the initial questionnaire, 2 refused to supply a follow-up telephone number, and 27 could not be contacted for the follow-up interview because they were not available or their phone number was no longer in service. The mean time between the initial and follow-up interview was 19 weeks (range 16 to 23). The final sample consisted of 57 participants (39 males and 18 females), with an average age of 33 years (range 17 to 57).

In the follow-up interview, the majority of interesting exhibits were recalled, regardless of whether the exhibits were discussed at the time of the initial interview or not. A total of 8 interesting exhibits could not be recalled, of which 5 were merely mentioned and 4 were discussed at the time of the initial interview. In contrast, a total of 13 uninteresting exhibits could not be recalled.

There were two unelaborated exhibits: an interesting and uninteresting condition, however, questionnaires included only one unelaborated condition (participants were asked about either the interesting or uninteresting exhibit). For this reason, the total number of unelaborated exhibits available for discussion is lower than the number the
number available for the elaborated exhibits. In other words, the difference in the number of exhibits discussed in the follow-up interview was not necessarily due to a difference in the rate of exhibit recall, but an artifact of the methodology.

Materials and Procedure

In a standard preamble, visitors were requested to participate in a research study about “visitor reactions to exhibits at the Hockey Hall of Fame.” Visitors were supplied with a consent form (Appendix C) which they were given time to read, and if needed, to ask questions. If they verbally consented to participate, demographic information such as age, gender and place of residence was gathered.

The initial on-site interview consisted of two main sections (see Appendix D for the interview questionnaire). The first section focused on memories of the exhibits. The second section focused on the visitor characteristics of domain knowledge and personal interest in hockey.

Memories of Exhibits. The exhibit memory section was divided into three sub-sections, one sub-section for each exhibit. The participants chose 2 exhibits that they found interesting, and 1 exhibit that they found uninteresting. There was another uninteresting exhibit condition in the original interviews, but this will not be discussed since peak exhibit memories were the focus of this study and incorporation another set of analysis would complicate presentation of the results.

One of the interesting exhibits, and the uninteresting exhibit was labelled “elaborated interesting exhibit” and “elaborated uninteresting exhibit” respectively. “Elaborated exhibits” were ones that were discussed during the initial interview, thus the term, “elaborated.” In both the elaborated interesting, and elaborated uninteresting exhibit conditions, participants were asked to take a moment and imagine the exhibit. They were then asked detailed information about their exhibit memories.

Visitors were asked, “If you were to tell a friend about this exhibit, how would
you describe it?" This was considered a measure of episodic memory. In contrast to the Ontario Science Centre, standard descriptors were not used at the hockey hall. Instead, the verbatim protocols which visitors provided were assessed, at a later time, for number of details. This number was used as a baseline measure of episodic memory.

Next, visitors were requested to explain their understanding of the exhibit, or/and what the exhibit trying was demonstrate. This was used as a baseline measure of semantic memory.

Then visitors were asked whether the exhibit induced any emotion, and if so, what type. Most subjects found it difficult to think of an emotion, so a list of 30 varied emotions (such as disappointment, anger or awe) was shown to them, from which they could choose one. The elicited emotions were categorized using a prototypical approach to the classification of emotions, although with some modifications (Shaver, Wu, & Schwartz, 1992). Since there was no mention of nostalgia or curiosity in this classification scheme, nostalgia was placed in the love category, and curiosity was added as a new category.

Participants were then asked whether they experienced any sort of autobiographical memories as a consequence of viewing the exhibit. In the pilot phase of the research, the term autobiographical memory was used, but it was found that most participants did not understand this phrase, so it was changed to "personal memory."

Participants were also asked to rate (on a scale from 1 to 7) their experience of the exhibit on the following dimensions: social relevance, personal relevance, memorability, and familiarity. Participants' ratings of the exhibit were categorized as high intensity if the dimension was rated as a 6 or 7, or low intensity if the dimension was rated as 5 or less. Some of these ratings were analyzed for their association with an autobiographical memory, and episodic and semantic memory patterns.

The remaining interesting exhibit was labelled, "unelaborated exhibit." Participants were asked to name or point out the exhibit, but they were not required to
Visitor Characteristics. The second major section of the initial interview was concerned with gathering information on visitor characteristics. In this section, a measure of domain knowledge, and personal interest was collected.

There was also a section assessing primary purpose of visit, but this will not be furthered mentioned because preliminary analysis did reveal any significant findings, thus in order to keep the presentation of the results focussed, results related to purpose of visit will not be presented.

Domain Knowledge. Multiple methods were used to gather information on visitors’ level of hockey domain knowledge; however, in order to simplify presentation of the results, only the most objective measure was used in this dissertation in order to simplify presentation of results (although some of these measures were used in Appendix F in relation to the personal interest measure). An estimate of hockey exposure was the measure that was used as domain knowledge.

Basically, this was a checklist of hockey players’ names based upon the author checklist pioneered by Stanovich and West (1989) that was used to measure out-of-school reading. In responding to the checklist, participants indicate whether they are familiar with a particular hockey player by placing a check mark next to the hockey player’s name. The checklist was designed in a way so that socially desirable responding was eliminated by the inclusion of foils, which are names that are not hockey players. In order to develop a hockey exposure checklist which discriminated between visitors, pilot testing on 12 hockey hall patrons was conducted. Only hockey player names which had a hit rate between 30% to 50%, and foils which did not have many hits, were included in the checklist. In the final version, eight foils and eight National Hockey League players, representing a time span of approximately 50 years, were selected (see Appendix D for interview questionnaire that contains the player checklist).
Participant's completed checklists were used to obtain a domain knowledge score. This score was determined by taking the proportion of the correct hockey names that were checked and subtracting the proportion of foils that were checked.

Personal Interest. An estimate of the level of personal interest in hockey was assessed using a method requiring the visitor to rank-order a series of five leisure activities which included the target activity, watching hockey.

In order to offer a selection of leisure activities relevant to visitors, pilot testing was conducted at the hockey hall (12 participants) and the art gallery (11 participants). Pilot participants were asked to rank-order various activities which included the target activities for the hockey hall and art gallery — viewing hockey and art. The highest rank-ordered activities at each site were selected as the final personal interest measure. Where there was a large discrepancy between rankings of the same activity at the two sites, the activity was not included. Activities which were selected included: going to the mall, reading books, playing cards, going to the movies (see Appendix D for the interview questionnaire which shows the activities selected).

Participants were asked to rank-order the activities they valued from 1 to 5 (1 being the most valued, and 5 being the least valued). Theoretically, personal interest consists of the inter-relationship between knowledge and value, but in this thesis, personal interest was solely based upon the value placed on watching hockey. This was decided primarily because value placed on watching hockey appeared to have more explanatory value than using the combined measure. A secondary reason was that since there was a measure of domain knowledge, it was thought that value of the activity beyond knowledge would be an important factor to assess. Ranking of the relative frequency of activity participation was not included in any of the analysis.

There were multiple versions of the initial interview to which participants were randomly assigned. The presentation of each exhibit section was counter-balanced so that sometimes the elaborated interesting exhibit was first, or the unelaborated
interesting exhibit was first, and so on, but the visitor characteristic section was always the last section completed.

At the end of the initial interview, participants were asked to provide their first name and phone number so the interviewer could telephone to ask some additional questions about their hockey hall experience. None of the participants asked about the content of the follow-up telephone call.

If the participant agreed to supply a telephone number, a follow-up interview was conducted a few months later. A standard introductory preamble informed participants that they would be asked many of the same questions as in the initial interview. They were instructed to respond based on their present experience, and not try to recall their answers from the initial interview.

In the follow-up interview, questions for all three of the exhibits were identical to those in the initial interview. The participants were reminded of an exhibit they had chosen at the time of the initial interview. Participants were then asked to describe the exhibit. In order to track episodic memory, the number of details provided was compared to the number supplied at the time of the initial interview.

Next, to assess semantic memory, participants were asked to explain what the exhibit was trying to demonstrate. The semantic memories from the initial and follow-up interview were compared so that stability or transformations could be assessed based on the criteria of critical awareness or differentiation.

Further, visitors were asked to report any emotions or autobiographical memories they had when remembering the exhibit, and to rate their experience of the exhibit on a series of experience dimensions scales. Also, some of the intensity ratings were analyzed to determine whether there were any associations with autobiographical memory, and semantic and episodic memory patterns.

In addition, only at the time of the follow-up interview, participants were asked whether they thought about, talked about or investigated any topic related to the exhibit
since they left the hockey hall.

There were multiple versions of the follow-up interview to which participants were randomly assigned. The presentation of each exhibit section was counter-balanced so that sometimes the elaborated uninteresting exhibit was first, or the unelaborated interesting exhibit was first, et cetera.

Results

The results section is divided into six parts. First, I present the findings regarding episodic memory which are followed by associations between it and visitor characteristics. Then I provide data describing semantic memory which are followed by associations between it, and visitor characteristics. Third, affect and autobiographical memory findings are presented. This is followed by looking at the post-visit activity rates, and subsequent analyses to determine whether these activities are associated with episodic or semantic memory measures. Fifth, I explore some associations between autobiographical memory and the experience dimensions. Lastly, I look at a visitor’s ratings of the memorability of an exhibit to determine whether they are associated with episodic and semantic memory patterns. Unless otherwise stated, all findings refer to the elaborated interesting exhibit condition; this was done in order to keep the results focussed on peak exhibit experiences, rather than less optimal (uninteresting) experiences or the unelaborated interesting exhibit which was meant to be a memory control.

The reader is referred to Appendix E to view descriptive summaries of the visitor characteristics and to Appendix F to view the association between the hockey interest measure and levels of hockey involvement and playing. Appendix G contains supplemental analyses defining personal interest as a combination of value placed on watching hockey and self-rated hockey knowledge. See Appendix H to view the descriptive results of the experience dimension ratings.
Episodic Memory

Episodic memory was measured by tabulating the number of details in visitors' verbatim protocols when asked to describe the exhibit. Inter-rater reliability, on the frequency tabulation of the number of details on 30% of the protocols was 83%.

In Figure 3.1, the number of episodic memory details visitors provided for each of the exhibit conditions at the time of the initial and follow-up interview are plotted. Recall that an episodic memory measure was not available for the unelaborated interesting exhibit condition at the time of the initial interview, and as discussed previously, the low number of unelaborated interesting exhibits is due to the design of the interview questionnaire.
Figure 3.1. Mean numbers of hockey hall episodic memory details (SE) for elaborated interesting exhibit (n=57), elaborated uninteresting exhibit (n=55) from the initial interview and elaborated interesting exhibit (n=55), elaborated uninteresting exhibit (n=62) and unelaborated interesting exhibit (n=35) from the follow-up interview.

Figure 3.1 shows that the number of details provided at the time of the initial and follow-up interview appear similar for both the interesting and uninteresting exhibit. A 2 x 2 repeated measures ANOVA was conducted with situational interest as the first factor (interesting, uninteresting), time of interview (initial, follow-up) as the second factor, and the number of details as the dependent variable. This analysis showed that
time of interview had no significant effect on participants' responses, and there was no significant interaction effect. However, a significant effect was found for situational interest ($F(1, 40) = 21.09, p < .001$). Thus, it seems that situational interest was associated with participants' recall of exhibits both in the initial and follow-up interview; more was recalled about interesting than uninteresting exhibits.

Further inspection of Figure 3.1 demonstrates that the number of episodic memory details provided for the elaborated and unelaborated interesting exhibit conditions in the follow-up interview look similar, and indeed, using a paired t-test, there was no significant difference ($t(33) = .54, p = .59$). This indicates that the impact of talking about the exhibit to the investigator at the time of the initial interview was not a major contributing factor to the stability of episodic memory.

The number of details provided by each participant for the elaborated interesting artwork at the time of the initial interview was compared to that provided at the time of the follow-up interview. Forty-six percent of the participants who supplied more details in the follow-up interview; this was called the "enhanced episodic memory" category. Since the primary focus of the research was on visitors who were stimulated to develop ideas encountered within the hockey hall after their visit, and so that statistical requirements would not be violated, participants with the same and lower number of details group were collapsed into one group called the "not enhanced episodic memory" category, which consisted of 58% of the participants. The not enhanced episodic memory category consisted of 13% of the participants demonstrating stable episodic memory and 45% of the participants demonstrating deteriorated episodic memory.

Visitor Influences on Episodic Memory

In this section, visitor influences on episodic memory patterns will be analyzed. I will present the findings regarding the influence of domain knowledge, and personal
interest on the episodic memory patterns.

Since this section, and future sections involve multiple Chi-Square comparisons, the alpha level considered to be significant was lowered to accommodate the increased likelihood of a Type I error. Therefore, although I will highlight findings which are significant at the \( p = .05 \) level, these results should be considered as suggestive, rather than conclusive.

**Domain Knowledge.** In order to assess whether an enhanced episodic memory pattern was associated with domain knowledge, a Chi-Square analysis was performed. Visitors who demonstrated enhanced episodic memory were not more likely to be individuals who had high hockey knowledge than those who had no such knowledge \( (\chi^2 (1, N = 53) = 0.45, p = .5) \).

**Personal Interest.** An analysis was conducted to explore whether enhanced episodic memory was associated with a high degree of personal interest. Using a Chi-Square analysis, the results indicated that there was no significant difference between low or high hockey interest visitors and whether they demonstrated enhanced episodic memory \( (\chi^2 (1, N = 52) = 2.8, p = .09) \).

**Semantic Memory**

Participants were asked to discuss their understanding of the exhibit. Change of semantic memory from the initial to follow-up interview was assessed by having raters, blind to the interview condition, compare the quality of the responses. There were three categories: deterioration, stability, and enhancement. In order to be coded as a memory which was deteriorated or enhanced, there had to be a shift in at least one of the following criteria: differentiation (concept is expanded, use of examples to illustrate the point) or critical awareness (drawing cultural or social connections to the exhibit topic).
Inter-rater reliability on 50% of the semantic memory comparisons was 80%.

An example of each semantic change category — deteriorated, stable and enhanced — is provided below.

Example of semantic memory coded as deteriorated:

Initial Interview - “How it [hockey equipment] developed throughout the years, it was very cumbersome in the beginning, now it is aerodynamic. In the beginning it was not very protective, now it is very protective.”
Follow-Up Interview - “How far equipment has developed in the past 50 years.” (Coded as deteriorated because of loss of examples.)

Example of semantic memory coded as stable:

Initial Interview - “Progression of hockey.”
Follow-Up Interview - “History of hockey, and [sic] evolution, and equipment.”
(Although different words are used, the concept is the same.)

Example of semantic memory coded as enhanced:

Initial Interview - “Little stamps, about 60 to 70, first hockey stamp up to 1993.”
Follow-Up Interview - “How hockey has impacted society, stamps are a statement of what we find important.” (The participant’s memory was coded as enhanced because of the increased critical awareness of the value of stamps than the factual details initially provided.)
In Figure 3.2, the percentage of visitors in each semantic change category is presented for the elaborated interesting and elaborated uninteresting exhibit.

![Figure 3.2: Percentage of participants in each semantic memory category for interesting exhibit (n=53) and uninteresting exhibit (n=43).](image)

*Figure 3.2. Percentage of participants in each semantic memory category for interesting exhibit (n=53) and uninteresting exhibit (n=43).*

The main trend to observe in the above figure is that the semantic memory of both the interesting exhibit and the uninteresting exhibit remained stable for the majority of the participants. A one-tailed McNemar analysis shows that a semantic memory of an interesting exhibit memories was not more likely to remain stable ($p = .4$) or become enhanced ($p = .5$) than a semantic memory of an uninteresting exhibit.
Qualitative Analysis of Semantic Memory. The semantic memories provided at the time of the initial interview were categorized as basic or advanced in order to obtain a baseline measure of quality. Basic memories were those that captured the theme of the exhibit, but did not extend beyond a basic summary. Advanced memories included any elements beyond a thematic summary of the exhibit. Inter-rater agreement on 50% of the protocols was 83%.

Below are some examples of semantic memories which were coded as basic and advanced.

Basic semantic memory
- “Gives a good history of the sport of hockey.”
- “History and evolution of the game.”
- “Evolution of goal masks.”
- “Shows different logos of different teams.”

Advanced semantic memory
- “Evolution of equipment, much better today, much easier to skate than before, has made [the] sport easier and faster, pads were heavier, and therefore more difficult to move.”
- “Women’s hockey, to put emphasis on it, that it exists in a male dominated sport.”
- “The historical consistency of the game, part of the culture here in Canada, seems stronger than basketball in the States.”
- “How the years slipped by, how the game has become squalid by commercialism.”
Seventy percent of the protocols were coded as basic, 26% of the protocols were coded as advanced, and 4% of the visitors could not supply any sort of explanation.

Visitor Influences on Semantic Memory

Domain Knowledge. One factor which might help explain the longitudinal semantic memory pattern is domain knowledge. Below, in Table 3.1, visitors were categorized according to their semantic memory pattern as a function of hockey knowledge.

<table>
<thead>
<tr>
<th>Hockey Knowledge</th>
<th>Semantic Memory</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deterioration</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Stable</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>High</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Enhancement</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>27</td>
</tr>
</tbody>
</table>

As the above table shows, visitors who had a high level of domain knowledge were spread over the three semantic memory categories while low knowledge visitors tended to be clustered in the stable memory category. A Chi-Square analysis revealed that there was a suggestive difference between high and low knowledge visitors in
terms of their semantic memory patterns \( \chi^2(2, N = 53) = 6.7, p = .04 \).

Personal Interest. To test the hypothesis that visitors with a high level of personal interest in hockey were more likely to demonstrate enhanced rather than not enhanced semantic memories, a Chi-Square analysis was conducted. There was no significant pattern of results; visitors who had higher personal interest scores were no more likely to demonstrate enhanced semantic memories than visitors with low personal interest in hockey \( \chi^2(1, N = 53) = .48, p = .49 \).

Experienced Emotion

The presence of affect at the time of the initial and follow-up interview was assessed by asking visitors whether they experienced any emotion in response to the exhibit. In the table below, the main emotion elicited at each interview time is presented.

Table 3.2
Main Emotion Elicited at the time of the Initial and Follow-up Interview

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Percent of Participants Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Initial Interviewa</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>44</td>
</tr>
<tr>
<td>Love</td>
<td>30</td>
</tr>
<tr>
<td>Curiosity</td>
<td>5</td>
</tr>
<tr>
<td>None</td>
<td>21</td>
</tr>
</tbody>
</table>

\( a_n = 57, b_n = 52 \).
As Table 3.2 shows, there was almost no variability in the type of affect visitors experience — enjoyment and love were by far the most common emotions. No negative emotions were reported by any of the participants. Also note that just over half of the participants reported no emotions at the time of the follow-up interview.

Autobiographical Memory

Participants were asked whether they experienced a personal memory in response to the exhibit at the time of the initial and follow-up interview. Listed below are some representative examples of autobiographical memories that participants shared.

- "When I was young we lived on a farm with a pond and we used to skate on it when it was cold. We used a tin can as a puck and my brothers used to use me as a target so I was very bruised after."
- "The skates I used to wear when I played hockey as a child."
- "Sitting in front of the TV and watching hockey with my family."
- "Gretsky’s overtime goal against Calgary."
- "Reliving the moments, especially the 1972 World Cup. I was in the school gymnasium watching the game."
- "I remember my father explaining me [sic] hockey."
- "Watching the Ducks play."

Note that the memories tended to consist of two types: memories where the participant is active, and memories where the participant is passive, or to use other terminology, a “self-event” and “other-event” respectively (Thompson, Skowronski, Larsen & Betz, 1996). There was a trend, although not statistically analyzed due to the low frequency, that other-events (memories of watching hockey games) were more
likely to be mentioned in the initial interview, while memories of self-events were more likely to be mentioned in the follow-up interview.

In the table below, the percentage of participants who reported recalling an autobiographical memory is presented.

Table 3.3

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>At Initial Interview</th>
<th>At Follow-Up Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>61</td>
<td>52</td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>48</td>
</tr>
</tbody>
</table>

As observed in Table 3.3, slightly fewer participants reported an autobiographical memory at the time of the follow-up interview.

Post Visit Exploration

In the follow-up interview, participants were asked whether they engaged in any behaviors or thoughts related to the exhibit after they left the hockey hall. The following data are the percentage of participants who mentioned a behavior for either interesting exhibit. Visitors were asked whether they spoke about, or discussed an exhibit with anybody after they left the hockey hall. About 60% of participants reported that they had talked about an exhibit. The majority of participants, 67%, reported that they
thought about an exhibit after leaving the hockey hall. Lastly, 26% of the participants reported that an exhibit was associated with a change in the way they thought about a topic or that an exhibit had affected them in some way. No visitors reported reading about a topic or looking up any information after the visit.

Qualitative analysis of the post-visit explorations revealed that many of the participants were cued by something in their environment which reminded them of the exhibit. Many bought something at the hockey shop which served as a cue. Below are some examples of the types of thoughts participants reported.

- “Every time I see an old shirt, every time I see an old Boston shirt, I think of the old jerseys.”
- “The ways the masks were designed, the colors. I was impressed.”
- “I thought of when guys used to wear the real small ones [masks], thought about it whenever hockey was on. I bought a puck at the Hockey Hall of Fame, and so every time I open the freezer I think of that exhibit.”
- “Had my picture taken with Stanley Cup so it’s in my bedroom. My Dad and I are rivals because we support opposing teams.”
- “Recalling how good a defenseman he [Bobby Orr] was and comparing him to defensemen today.”

Below are some examples of the types of topics visitors reported discussing.

- “I told them [friends] how effective the pre-game ritual feeling came through with this exhibit.”
- “Described how fantastic this exhibit was done, so well done.”
- “Told everyone who would listen, really loved this experience, never thought I would every get so close to these things.”
• “Said it was well done, made you feel like a player.”
• “Oh yeah, told Dad. We talked about that for a while [masks].”

In general, most conversations after the visit consisted of describing exhibits, and/or sharing personal reactions. There was little direct evidence that visitors reflected about the exhibits on a questioning level.

A minority of visitors reported that the exhibits had affected them in some way — that it affected the way they thought about hockey. Although participants were asked this question in relation to a specific exhibit, it appeared that almost all of the participants responded to the collective character to the hockey hall, and by extension, hockey itself. Many visitors lamented the changes in hockey over the years, that it had changed for the worse by becoming too commercialized. However, other visitors indicated they had developed a deeper connection to hockey.

Post-Visit Exploration Associations with Memory. Since participants who reported talking to somebody about an exhibit were typically the same participants who reported thinking about the exhibit as shown using a Chi-Square analysis ($\chi^2(1, N = 52) = 13.7, p = .0002$), these post-visit activity categories were collapsed. Therefore, participants endorsing one or both of the above activities were categorized as engaging in a post-visit exploration activity.

Episodic Memory. To test the hypothesis that post-visit exploration activity might be associated with enhanced episodic memory, a Chi-Square analysis was conducted. There was no significant pattern between visitors who did or did not engage in a post-visit activity and an enhanced episodic memory from the initial to the follow-up interview ($\chi^2(1, N = 52) = .34, p = .56$).

Semantic Memory. A Chi-Square analysis was also conducted to determine whether post-visit activities might be associated with the enhancement of semantic
memory. No significant association was revealed ($\chi^2(1, N = 52) = .08, p = .9$).

Experience Dimensions Associated with Autobiographical Memory

Thus far, memory measures such as autobiographical memory have been individually presented. In this section, I explore the hypothesis that, at the time of the initial interview, being reminded of an autobiographical memory would be associated with visitors’ experience of the exhibits.

Familiarity. In Table 3.4, visitors were categorized according to whether they recalled an autobiographical memory during their visit and how familiar the exhibit seemed to them.

<table>
<thead>
<tr>
<th>Familiarity</th>
<th>Presence of Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
</tr>
</tbody>
</table>

Inspection of the table shows that visitors who experienced an autobiographical memory tended to rate the exhibit as highly familiar. The result of a Chi-Square analysis indicates that this association was suggestively significant ($\chi^2(1, N = 57) =$
Memorability. Another hypothesis was that the recall of an autobiographical memory might be associated with visitors’ rating of the exhibit memorability. In the table below, visitors are categorized according to the presence of an autobiographical memory as a function of the memorability rating.

Table 3.5
Frequency of Participants Reporting an Autobiographical Memory as a function of Memorability

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>Memorability</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>High</td>
<td>11</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Yes</td>
<td>Total</td>
<td>38</td>
<td>19</td>
<td>57</td>
</tr>
</tbody>
</table>

Table 3.5 shows that visitors who recalled an autobiographical memory were more likely to rate the exhibit as highly memorable. This difference was confirmed using a Chi-Square analysis ($\chi^2(1, N = 57) = 4.5, p = .03$).

Personal Relevance. In Table 3.6, visitors were categorized according to whether they recalled an autobiographical memory during their visit and to what degree the exhibit was personally relevant for them.
Table 3.6
Frequency of Participants Reporting an Autobiographical Memory as a function of Personal Relevance

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>Personal Relevance</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27</td>
<td>8</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>11</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>19</td>
<td>53</td>
<td></td>
</tr>
</tbody>
</table>

As the above table shows, if a visitor recalled an autobiographical memory, then he or she tended to rate the exhibit as highly personally relevant. Using a Chi-Square, it was found that there was a significant difference between visitors who recalled an autobiographical memory pattern and those who did not in terms of their rating of personal relevance ($\chi^2(1, N = 57) = 8.2$, $p = .004$).

Social Relevance. The presence of an autobiographical memory was also analyzed using a Chi-Square analysis to determine whether it was associated with a rating of high or low social relevance. There was no significant difference between visitors (recalling a memory or not) in terms of social relevance ($\chi^2(1, N = 57) = .49$, $p = .49$).
Experience Dimensions Associated with Episodic and Semantic Memory

Memorability. To test the hypothesis that visitor's ratings of the memorability of an exhibit might be associated with observed changes in longitudinal memory measures, Chi-Square analyses were conducted. In fact, whether visitors rated the exhibit as high or low in memorability was not significantly associated with enhancement in either episodic \( \chi^2(1, N = 53) = .001, p = .97 \) or semantic memory \( \chi^2(1, N = 53) = 1.14, p = .29 \).

Discussion

The long-term effect of observing a hockey hall exhibit was a stable episodic memory. It is unlikely that the on-site interview contributed to the stability of these episodic memories because there was no significant difference between the episodic memory of the elaborated and unelaborated interesting exhibit at the time of the follow-up interview. This finding suggests that exhibit memories were indeed very salient and memorable over time. Even uninteresting exhibits appeared to be remembered; however, this was perhaps due to a floor effect because visitors recalled relatively little about the exhibit in the first place.

In contrast to the science centre, where the follow-up time was one month, the time span between the interviews at the hockey hall was almost five months. This longer follow-up time provided even stronger evidence that episodic memory of exhibits is relatively stable, regardless of individual differences (e.g., personal interest, domain knowledge) between visitors. The present finding, that exhibits found interesting were memorable, corroborates Falk and Dierking's (1991) results which

3 Theoretically, this study is based on the idea that there is a dissociation between episodic and semantic memory. To test this idea, a Chi-Square analysis was conducted to determine whether there was an association between enhanced episodic and semantic memory. Results did not indicate a significant association \( \chi^2(1, N = 53) = .97, p = .32 \). This is similar to the results from the science center and suggests that the distinction between the two memory systems may be conceptually valid.
showed that memories of museum experiences remain vivid over a long period of time.

As at the science centre, dual coding theory can serve to explain the high level of episodic memory retention (see previous chapter for an explanation of dual coding theory). Thus, the high rate of memorability may be, at least, partially explained by the experience being coded by both verbal and nonverbal representational systems.

Viewing hockey artifacts at the hockey hall was not associated with the enhancement of semantic memory; however, neither did this type of memory deteriorate over time. The most likely reason for the lack of deterioration was that the semantic memories provided in the initial interview tended to be very basic, so unless a visitor forgot the exhibit, it would be difficult to provide a semantic memory which was more simplified. The majority of participants demonstrated stable semantic memory over time for both the interesting and uninteresting exhibit. In the case of an interesting exhibit, possessing a high level hockey knowledge was less associated with stable semantic memories. Perhaps these high knowledge visitors had more conceptual structures that could be connected the experience, and after a period of reflection, possessing domain knowledge provided visitors with a basis to judge whether the information was important or not, thus resulting in enhanced memory (important information) or deteriorated memory (less important information). However, overall, when considering the stability of the semantic memories, it is important to place it in context. Although the hockey hall promotes an educational mandate, the prime purpose of the hockey hall is to be a “hockey mecca.” Perhaps the experience of hockey mecca does not stimulate the cognitive reflection required to enhance one’s understanding of concepts.

Questions about post-visit exploration activities revealed that the majority of participants thought about an exhibit that they had found interesting after they had left the hockey hall. Almost as many participants mentioned that they had discussed an exhibit after their visit. The topics of conversation consisted of sharing their reactions to
the artifacts: the amazement, the awe, and the nostalgia. Perhaps this was the case because the hockey hall was designed to celebrate the collective culture of hockey, and most of these artifacts were recognizable to visitors. Visitors who reported reflecting on an exhibit usually mentioned that something in their everyday environment served as a reminder. Since hockey is interwoven into the cultural fabric of Canadian culture (and to similar degree, the northern United States), it is difficult not to encounter something associated with hockey in one’s everyday life which could serve as a memory cue for the recall of the exhibit. In other words, there is less separation between the artifacts and the lives of the visitors. In addition, some visitors reported that items they bought at the hockey hall shop were instrumental as memory cues.

There was no evidence of elaborative interrogative questioning (asking why questions) which encourages learners to integrate new information with existing prior information (Wittrock, 1974) in the post-visit explorations. Maybe not using this strategy contributed to the lack of the association between changes in episodic or semantic memory or perhaps enhanced memories require information which is at the edge of one’s zone of proximal development.

One question which goes to the heart of the hockey hall experience is the question about the impact of the exhibit on the visitor. Although not many visitors answered this question, the visitors who did indicated an awareness of a shift in one’s relationship with hockey — either a distancing or an increased closeness. Some visitors felt more connected or closer to the culture of hockey while others experienced distance from the exhibits (usually dismay at the commercialism). This increasing or decreasing of one’s relationship with hockey, probably captures the experience of the hockey mecca more than shifts in one’s knowledge.

Personal interest was not associated with the memory patterns. Perhaps the lack of findings regarding the contribution of personal interest was due to the fact that to attend the hockey hall in the first place, a visitor already has a certain baseline level of
personal interest as compared to people who do not visit the Hockey Hall of Fame (as shown in Appendix E), thus the measured difference between low and high interest visitors was not large enough to be meaningful in terms of memory outcomes. In addition, personal interest may have more of an impact on the type of exhibit a participants chooses as interesting rather than memory outcomes.

The majority of visitors reported that they experienced a positive emotion at the time of viewing the artifact; almost half of the visitors report experiencing enjoyment as their primary affect, followed by experiencing love. No one reported a negative emotion. Only 21% of participants reported experiencing no affect in the initial interview, although this increased to almost half in the follow-up interview, thus as a group, it appeared that many visitors not longer experience any affect related to the exhibit after their visit was complete. This lessening of affect over time may have been a result of exhibits at the hockey hall lacking in complexity (hence in their ability to stimulate complex cognitive processing), and which resulted in minimal associations between affect and cognitive knowledge structures of specific exhibits.

Recalling an autobiographical memory was an integral component of artifact experience for about half of the visitors both at the hockey hall and afterwards. These memories tended to have a reminiscent quality. For many museum educators, reminiscence is an important category of experience — the re-experiencing and remembering of past events (e.g., Silverman, 1991).

Indeed, if a visitor recalled an autobiographical memory, the artifact was rated as more familiar and memorable. It could be that connecting one's past experience with the artifact increased one's experience of familiarity and memorability since it became fused with one's own memories. In fact, if visitors did not experience a connection with their past through recalling an autobiographical memory, the artifact was rated as less personally relevant.

Although certain visitors may rate an exhibit as highly memorable, this rating was
not related to enhanced episodic or semantic memory. This suggests that experience of memorability is more of an experiential aspect of experience, rather than an accurate estimate of memory.

In summary, this study revealed that episodic memory for hockey artifacts that visitors found interesting was highly stable over a five month period. The majority of the visitors did not demonstrate any shifts in semantic memory, although this was most likely due to the nature of the hockey hall experience which does not promote reflective cognitive experiences. Many visitors lost their feeling of affect after the visit, and autobiographical memory was an integral part of the experience, even after the visit. Recalling a personal memory was associated with increased ratings of familiarity, memorability and social relevance. Visitor characteristics such as domain knowledge, and personal interest were not strongly associated with memory change over time, although domain knowledge was suggestively associated with semantic memory patterns. One reason for the lack of association could be that domain knowledge and personal interest are based upon cognitive elements, while hockey hall experiences tend to be primarily based upon affective or reactive responses. This idea will be further discussed in the final chapter.
Chapter Four

Art Gallery of Ontario

Introduction

An art gallery was included as a site of investigation in this dissertation so that a broad spectrum of different types of museum and exhibit experiences could be assessed, particularly including a gallery since attending it is such a distinctive type of museum experience, as compared to a science centre or “curiosity cabinet” (the hockey hall). Galleries are typically associated with the concept of “high culture” which is considered serious, culturally important, and tends to be associated with the middle- and upper-classes. A more helpful model, for the purpose of this research, is to view the pieces of art as works which illustrate the development of style, subject matter and meaning-making over time (Cupchik & Izadpanah, in press). In other words, art is formally evaluated in the context of development or change, contrasting and comparing techniques and representations from other artworks from past to present. As a consequence, viewing artwork tends to involve searches for meaning which requires reflective modes of viewing.

One approach to art is to view it as a semiotic instrument aimed at affective and cognitive development (Vygotsky, 1971). Art allows individuals to redefine, modify and question schemas, thus not only serving as entertainment, but also developing processes such as memory, emotion, and thought (Miall, 1989). From this viewpoint, an art gallery is a place where the development of these higher psychological processes may have an enduring educational impact which continues after the visit is complete. Educational measures, then, should encompass a variety aspects of memory involving emotion and thought.
Overview of the Study

The design of this study was based on same methodology used at the Ontario Science Centre and the Hockey Hall of Fame. The study retained the form of a memory study, with adult participants interviewed during and after their visit. The interview form, however, was expanded from the one used at the Ontario Science Centre to capture more aspects of memory. This included a control for situational interest, and gathering of information about visitor characteristics. The questionnaire almost mirrors the one used at the Hockey Hall of Fame, although the wording, and coding of some of the measures were altered. These modifications will be described below.

As participants were exiting a section of the art gallery, they were asked to choose three pieces of art, two of which they found interesting (one was discussed with the interviewer, and the other one not was discussed served as the control) and one which was not interesting. This allowed for a comparison of memory between peak museum artwork experiences (the interesting artwork condition) and mundane museum artwork experiences (the uninteresting artwork condition). Although situational interest may have an externally triggered process, once something becomes situationally interesting, it can lead to autonomous engagement which may or may not be short term, and as it proceeds, may influence affective and cognitive knowledge structures (Hidi & Berndoff, 1998). It was expected that for the uninteresting artwork, memory would be more likely to deteriorate.

In addition, as at the Hockey Hall of Fame, comparisons between episodic memory between the elaborated and unelaborated interesting artwork were compared to determine whether the on-site interview had an observable effect on memory. Comparisons between semantic memory were not conducted because it was not possible to assume that visitors had an equivalent level of semantic knowledge for the artwork, in other word, memories were not specifically coded for domain expertise elements which makes it difficult to compare the semantic memories, whereas for
episodic memory, number of details recalled could be easily compared.

Measures of episodic and semantic memory were gathered and coded in a slightly different way at the art gallery than at the other two sites. Instead of asking visitors to describe the artwork, visitors were asked what they would tell a friend about it. This left it up to the visitor to structure their response. This response was considered as an indicator of both episodic and semantic memory. For episodic memory, the verbatim protocols were analyzed for the number of details provided. As was the case at the Hockey Hall of Fame, I decided it would be more relevant to use the number of details supplied at the time of the initial interview rather than generate standardized descriptors which would not necessarily be important in terms of memory for artwork. For semantic memory, qualitative analysis was conducted. The reason for the overlap of the measures, and the open-ended wording of the question was that I did not want to direct visitors to engage in an interpretative mode of approaching the piece of art, particularly since the generation of interpretation can alter viewers' responses (Cupchik & Shereck, in press). The focus of this research was on the typical visitor, and the above method of assessing memory seemed least likely to alter visitor experience.

In addition to episodic and semantic memory, memory measures involving other aspects of experience were collected. Art gallery visitors were asked whether they experienced any autobiographical memories or emotions in response to viewing the artwork. One function of art is to provide new ways of approaching life events with which the viewer may identify, thus it was expected that a high proportion of participants would report experiencing affect and recall autobiographical memories as they read "texts" embodied in the artwork.

Visitors were also asked to rate their experience on a series of scales which reflect arousal (e.g., complexity, challenge, etc.), constructivist (e.g., personal and social relevance) and other assorted dimensions (e.g., memorability, etc.). The arousal variables were based on formal structural characteristics that are called collative
variables (Berlyne, 1960, 1974): these are thought to affect the psychological state of individuals by eliciting conflict and uncertainty. It was hypothesized that the collative variables would be associated with enhanced semantic memory patterns. Also, it was expected that the constructivist and other dimensions might be influenced if the visitor recalled an autobiographical memory.

A few months after the initial interview, visitors were telephoned and were asked the exact same questions as in the first interview about all aspects of their episodic and semantic memory for each of the three pieces of art, including the interesting artwork not discussed in the initial interview. The results of the initial and follow-up interview were compared with each other, and stability or change of memories was assessed.

Further, in the follow-up interview, visitors were asked whether they participated in any post-visit exploration activities such as talking or thinking about the artwork. It was expected that post-activity rates would be low because, at least as represented in galleries, art may not be integrated into most people's everyday lives. However, it was thought that visitors who do engage in post-visit exploration would be more likely to have enhanced semantic memories. This hypothesis was based on the literature suggesting that discussing an artwork (particularly generating interpretations) may result in a shift of the viewer's experience of it (e.g., Henry, 1992; Cupchick & Shereck, in press).

At the time of the initial interview, information was gathered about the visitor's level of domain knowledge, and personal interest in art.

Domain Knowledge. Research on art expertise indicates that novice and experienced viewers demonstrate differences in their viewing styles. This difference can be conceptualized along a continuum between interpretative activity and affective processes (Winston & Cupchik, 1992) where experienced viewers favour the generation of abstract meaning in response to ambiguous stimuli, and novice viewers favour affective responses to representation of familiar stimuli. In an art gallery, therefore,
visitors with high domain knowledge were predicted to have demonstrate enhanced memory because of the increased depth of processing which occurs as a result of the interpretative activity.

**Personal Interest.** The research on personal interest indicates that it is associated with more propositional knowledge representation, increased elaboration and superior domain-specific memory (e.g., Schiefele & Krapp; Renninger, 1992). Since personal interest is a state which has the potential of influencing subsequent activity (Renninger, 1992), it was expected that visitors who have a high level of personal interest in art might be more likely to represent the exhibit information differently, engage in more cognitive elaboration, and that these activities would be reflected in higher rates of enhanced semantic memory than visitors who have a low level of art interest.

**Method**

**Pilot Testing**

Pilot testing was conducted to assist in question wording and selection. Twenty visitors were interviewed about their reactions to the permanent Group of Seven collection at the Art Gallery of Ontario. Qualitative inspection of the interview responses indicated that visitor reactions tended to be remarkably homogeneous. Visitors consistently stated they experienced warm feelings (e.g., peaceful, happy) and remembered visits “up North.” After some consideration, the decision was made to change the focus of the data collection to artworks which were more diverse in terms of geographical and temporal location.

**Participants**

The Art Gallery of Ontario, in Toronto, is primarily a provincially-funded art gallery with a varied collection of paintings, sculptures and film. The artwork which participants could choose were limited to one wing consisting of three adjoining rooms.
The artworks consisted of international contemporary pieces from 1900 to 1960. There was a mixture of artwork styles ranging from a blue Picasso painting, a Rodin torso sculpture and an O'Keefe eggplant although not all of the artworks were as recognizable as the ones just mentioned. According to the curator, the thematic organization of the artwork in the first room was to provide a kaleidoscopic overview of achievements (with attention to invention and discovery) in the 20th century. The second room displayed art that highlighted the influence of non-Western culture and the place of dream and unconscious in this century's art. The artwork in the final room emphasized the undraped figure.

The initial interviews were conducted across three seasons — summer, fall and winter. Interviewing often occurred Wednesday evenings when admission to the gallery was free because it was thought visitors would be more demographically diverse than when a charge was made for admission. Interviewing was also conducted on Saturday and Sunday afternoons. An attempt was made to collect data during weekday hours, but there were not enough visitors to warrant an interviewer's presence.

Data on adult participants were gathered using a continuous sampling method. The sampling method involved addressing the next available person after an interview had been completed. If this person was in a group (which was infrequent), the interviewer addressed the entire group and allowed for self-selection. Visitors with children were not asked to participate because the focus of the research was on adults who go to the gallery for personal reasons, rather than for their children. Once verbal consent was obtained, adults participated in a semi-structured questionnaire. When needed, participants were taken to a bench close-by so that questionnaires could be completed in a comfortable manner. Most of the interview was orally conducted, but the final section (concerning visitor characteristics) was completed by the visitors in written form.
Of those visitors who were asked to participate, 49% agreed, 5% could not participate due to inadequate English language, 45% declined saying they were tired or were not interested, and 1% were not included because they resided outside of North America. Of the 93 participants who agreed to complete the initial questionnaire, follow-up data could not be obtained for 31 participants because they were rarely home (24), the telephone number was out of order (3), they had moved (3), or they declined to be interviewed when contacted (1). The mean time between the initial and follow-up interview was 18 weeks (range 15 to 21). The final sample consisted of 65 participants (25 males and 40 females), with an average age of 36 years (range 17 to 70).

In the follow-up interview, the majority of interesting pieces of art were recalled, regardless of whether the art was discussed at the time of the initial interview or not. Of the interesting artworks, a total of 15 pieces of art could not be recalled, of which 9 were merely mentioned and 6 were discussed at the time of the initial interview and of the elaborated uninteresting artworks, a total of 4 could not be recalled.

There were two unelaborated artworks: an interesting and uninteresting condition, however, questionnaires included only one unelaborated condition (participants were asked about either the interesting or uninteresting exhibit). For this reason, the total number of unelaborated exhibits available for discussion is lower than the number the number available for the elaborated artworks. In other words, the difference in the number of artworks discussed in the follow-up interview was not necessarily due to a difference in the rate of exhibit recall, but an artifact of the methodology.

In addition, the difference between the number of elaborated interesting and uninteresting artworks discussed at the time of the initial interview was the result of 11 participants stating that they could not think of an uninteresting artwork at the time of the initial interview.
Materials and Procedure

The exact same methodology was used as at the Hockey Hall of Fame, but there were some minor modifications to the questionnaire to reflect the new museum setting (e.g., such as “visitor reactions to the artwork at the Art Gallery of Ontario” in the preamble). For brevity, I will not present the complete methodology and procedure, since it is similar to that at the hockey hall. The reader is referred to the Materials and Procedure section in Chapter Three for a review. However, changes which were more substantial than minor wording will be highlighted. The Art Gallery of Ontario consent form and questionnaire is available in Appendix I and J respectively.

Memories of the Artwork. Episodic and semantic memory was gathered and coded differently than at the Hockey Hall of Fame. At the Art Gallery of Ontario, participants were asked, “If you were to tell a friend about this artwork, what would you say?” Visitor responses were transcribed, and afterwards, tabulated for quantity of details. This was considered a measure of episodic memory. The qualitative aspects of these responses were used as a baseline measure of semantic memory. This was compared to the semantic memory supplied at follow-up, and judged in terms of criteria such as the addition or subtraction of presence of interpretation or examples.

In the original interview, visitors were asked whether the artwork had a specific meaning for them, but this will not be further discussed in this dissertation.

As at the Hockey Hall of Fame, participants were asked to rate (on a continuum from 1 to 7) their experience of the exhibit on a series of scales, but at the Art Gallery of Ontario, there was an expanded number of scales. These scales reflected arousal/collative dimensions (powerful, complex, challenge, and expressive), constructivist dimensions (social and personal relevance), and other dimensions (familiar and memorable).

Visitor Characteristics. As at the hockey hall, an exposure checklist was developed as a measure of domain knowledge, although the checklist was based on
visual artist's names. In order to develop an art exposure checklist which discriminated between visitors, pilot testing on 11 art gallery patrons was conducted. Only artist names which had a hit rate between 30% to 50%, and foils which did not have many hits, were included in the checklist. In the final version, eight foils and eight visual artists were selected from the Renaissance to Expressionism time periods (see Appendix J for the interview questionnaire which shows the artists selected).

An estimate of personal interest in art was assessed using the same rank-order method as described in Chapter Three, although, of course, the target activity was viewing art. As at the hockey hall, personal interest was based on the value placed on viewing art.

In the follow-up interview, the participants, using the artwork title, were reminded of an artwork they had chosen at the time of the initial interview. Some participants were not aware of the artwork title, so a prompt was supplied. In total, 4 interesting pieces of art required a prompt.

Results

The results section is divided into six parts. First, I present the findings regarding episodic memory which are followed by associations between it and visitor characteristics. Then I provide data describing semantic memory patterns, and immediately following, visitor characteristic influences on semantic memory patterns are presented. Third, other memory measures including affect, and autobiographical memory are provided. This is followed by looking at post-visit exploration rates, and subsequent analyses to determine whether these activities are associated with episodic and semantic memory measures. Fifth, I explore some associations between autobiographical memory and experience dimensions. Sixth, some other analyses associated with semantic and episodic memory patterns are presented. Unless otherwise stated, findings refer to the elaborated interesting exhibit condition; this was
done in order to keep the results focused on peak exhibit experiences, rather than less optimal (uninteresting) experiences or the unelaborated interesting exhibit which was meant to be a memory control.

The reader is referred to Appendix K to view the descriptive summaries of the visitor characteristics, and to Appendix L to view the association between the art interest measure and levels of art involvement. Appendix M contains supplemental analyses defining personal interest as a combination of value placed on viewing art and self-rated art knowledge. See Appendix N to view the descriptive results of the ratings of the experience dimensions.

Episodic Memory

Episodic memory was measured by tabulating the number of details contained in visitor's transcribed protocols in response to being asked to tell a friend about the exhibit. Inter-rater reliability of the frequency tabulation of the details in 30% of the protocols was 86%. In Figure 4.1, the mean number of episodic memory details visitors provided for the pieces of art at the time of the initial and follow-up interview are plotted. Recall that episodic memory measures were available only for the uninteresting and interesting elaborated condition at the time of the initial interview, and from all three pieces of art (including the unelaborated condition) at the time of the follow-up interview, and as discussed previously, the low number of unelaborated interesting exhibits is due to the design of the interview questionnaire.
To assess the relationship between the factors in Figure 4.1, a 2 x 2 repeated measures ANOVA was conducted with situational interest as the first factor (interesting, uninteresting), time of interview (initial, follow-up) as the second factor and the number of details as the dependent variable. This analysis showed that time of interview had no effect on participants' responses. However, situational interest, had a
significant effect on how the participants responded \( F(1, 43) = 16.53, p < .001 \). There was also a significant interaction effect between situational interest condition and time of interview \( F(1, 43) = 6.07, p = .02 \).

Simple effects paired t-test showed that for the elaborated artwork, the number of details provided at time of interview for the elaborated interesting exhibit was significantly different from the number of details provided at the time of the follow-up interview \( t(57) = -2.9, p < .005 \); more details were provided at the time of the follow-up interview. In contrast, there was no significant difference in the number of details provided for the elaborated uninteresting exhibit from the initial and follow-up interview \( t(47) = .75, p = .46 \).

Further inspection of Figure 4.1 shows that the number of episodic memory details provided in the elaborated and unelaborated interesting exhibit conditions in the follow-up interview appears similar; indeed, there was no significant difference between the two conditions \( t(24) = -.87, p = .39 \). This suggests that the impact of talking about the artwork to the investigator at the time of the initial interview was not a significant contributing factor to the episodic memory pattern. However, there was no significant difference between delayed memory for the unelaborated exhibit and immediate memory for the elaborated exhibit \( t(27) = -.43, p = .25 \).

The number of details provided by each participant for the elaborated interesting artwork at the time of the initial interview was compared to that provided at the time of the follow-up interview. Participants who supplied more details in the follow-up interview consisted of 52% of the participants; this was called the "enhanced episodic memory" category. Since the focus of the research was on visitors who were stimulated to develop ideas encountered within the art gallery after their visit, and so that statistical requirements would not be violated, participants with the same and fewer number of details were collapsed into one group which was called the "not enhanced episodic memory" category, which consisted of 48% of the participants. The not
enhanced episodic memory category consisted of 19% of the participants showing stable episodic memory, and 29% of the participants showing deteriorated episodic memory.

Visitor Influences on Episodic Memory

In this section, visitor influences on episodic memory patterns will be analyzed. Since this section, and future sections analyzing visitor characteristics and experience dimensions involve multiple Chi-square comparisons, the alpha level considered significant was lowered to accommodate the increased likelihood of a Type I error. Although I will highlight findings which are significant at the $p = .05$ level, these results should be considered as suggestive rather than conclusive.

Domain Knowledge. In order to assess whether an enhanced episodic memory pattern was associated with domain knowledge, a Chi-square analysis was performed. Visitors who demonstrated enhanced episodic memory were not more likely to be comprised of individuals who had high art knowledge than those who had low art knowledge ($\chi^2(1, N = 58) = .03, p = .88$).

Personal Interest. An analysis was conducted to explore whether enhanced episodic memory was associated with a high degree of personal interest. Using a Chi-Square analysis, the results indicated that there was no significant difference between visitors who were low or high interest, and whether they demonstrated enhanced episodic memory ($\chi^2(1, N = 54) = 2.7, p = .10$).

Semantic Memory

Change of semantic memory from the initial to follow-up interview was assessed by having raters, blind to the interview condition, compare the quality of the responses. There were three categories: deterioration, stability and enhancement. In order to be
coded as a memory which was enhanced or deteriorated, there had to be a shift in one of the following criteria: interpretation (incidence of specific interpretation), or differentiation (idea is expanded, use of examples to illustrate the point). Inter-rater reliability on 50% of the semantic memory comparisons was 84%.

An example for each semantic change category — deteriorated, stable and enhanced — is provided below.

Example of memory coded as deteriorated:

Initial Interview - "Behind it I imagine something intriguing. Picasso’s eccentricity comes out in his paintings. Who is the female? What was going on?"
Follow-Up Interview - "Impressed with it, I would go again [to see it]. It was an amazingly complex painting of a woman."

Example of memory coded as stable:

Initial Interview - “Lively, interesting composition, more than one side, element to the piece.”
Follow-Up Interview - “Very energetic, full of life, pleasant to look at from my point of view and nice composition.”

Example of memory coded as enhanced:

Initial Interview - "Provocative, tactile, big, bronze with some light green."
Follow-Up Interview - “Sculpture was evocative, sensual, theme on mother and child relationships.”
In Figure 4.2, the percentage of visitors in each semantic change category is presented for both the elaborated interesting and uninteresting artwork.

![Bar chart showing percentage of participants in each semantic memory category for interesting artwork (n=61) and uninteresting artwork (n=48).]

**Figure 4.2.** Percentage of participants in each semantic memory category for interesting artwork (n=61) and uninteresting artwork (n=48).

Of particular note in the above figure is that the semantic memory of 39% of the interesting pieces of art become enhanced over time. A one-tailed McNemar test shows that the semantic memory of an interesting artwork was more likely to become enhanced than a semantic memory of an uninteresting artwork (p = .04)
Visitor Influences on Semantic Memory

Domain Knowledge. One factor which might help explain the longitudinal semantic memory pattern is domain knowledge. A Chi-Square analysis revealed that there was no significant association between art domain knowledge (high or low) and semantic memory patterns (enhanced, stable or deteriorated) ($\chi^2(1, N = 58) = .28, p = .59$).

Personal Interest. In Table 4.1, participants were categorized according to whether they had enhanced semantic memory as a function of their level of interest in art.

<table>
<thead>
<tr>
<th>Personal Interest in Art</th>
<th>High</th>
<th>Low</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Enhanced</td>
<td>10</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Enhanced</td>
<td>13</td>
<td>11</td>
<td>24</td>
</tr>
</tbody>
</table>

In the above table, note that participants who fell in the low interest category were more likely to have memories which were not enhanced, while high interest visitors were slightly more likely to have memories which were enhanced. A Chi-Square analysis determined that the difference between low and high interest visitors in terms of their semantic memory patterns was suggestive ($\chi^2(1, N = 59) = 3.9, p = .05$).
Experienced Emotion. The presence of affect was assessed by asking visitors whether they experienced any emotion in relation to the artwork at the time of the initial and follow-up interview.

Table 4.2
Main Emotion Elicited at the Time of the Initial and Follow-up Interview

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Percent of Participants Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Initial Interview</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>55</td>
</tr>
<tr>
<td>Curiosity</td>
<td>14</td>
</tr>
<tr>
<td>Love</td>
<td>8</td>
</tr>
<tr>
<td>Fear</td>
<td>6</td>
</tr>
<tr>
<td>Sadness</td>
<td>6</td>
</tr>
<tr>
<td>No affect</td>
<td>22</td>
</tr>
</tbody>
</table>

$^a N = 65$. $^b N = 55$.

As Table 4.2 shows, the most common emotion was enjoyment at the time of the initial and follow-up interview. A minority of visitors reported negative emotions such as fear or sadness. Also note the minimal change in the percentage of participants who report no affect between the initial and follow-up interview.

Autobiographical Memory. At both interview times, participants were asked whether they experienced a personal memory in response to the artwork. Listed below
are representative examples of autobiographical memories that participants shared.

- "How people were working at home, back in my time. I used to do logging, and it personally touched me. I was pulling like this."
- "When I didn’t get into the Faculty of Education. I had to go away for 2 days, my whole body reacted to the internal emotional state."
- "It reminded me of a Jackson Pollack in Buffalo, a good splatter painting that I saw in Buffalo."
- "The sculpture garden in New York, walking through the garden on a summer day."

In the table below, the percentage of participants who reported recalling an autobiographical memory is presented.

Table 4.3

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>Percent of Participants At Initial Interview(^a)</th>
<th>Percent of Participants At Follow-Up Interview(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>54</td>
<td>44</td>
</tr>
<tr>
<td>No</td>
<td>46</td>
<td>56</td>
</tr>
</tbody>
</table>

\(^a\)\(n = 65.\) \(^b\)\(n = 59.\)
As observed in Table 4.3, an almost equal number, about one-half of participants, reported an autobiographical memory at the time of the initial and follow-up interview.

Post-Visit Exploration

In the follow-up interview, participants were asked whether they engaged in any behaviors or thoughts related to the artwork after they left the art gallery. The following data are the percentages of participants who mentioned an exploration for either of the artworks they found interesting. Visitors were asked whether they spoke about, or discussed an artwork with anybody after they left the art gallery. Forty-nine percent of participants reported that they had talked about an artwork. Just over one-half of the participants, 51%, reported that they thought about an artwork after leaving the gallery. Lastly, 27% of the participants reported that an artwork was associated with a change in the way they thought about a topic or had affected them in some way; the topics participants mentioned mirrored comments made when they were asked to tell a friend about the artwork so this finding will not be discussed further. Participants who reported reading about a topic or looking up any information after the visit consisted of 6% of the participants.

Below are examples of the types of thoughts participants reported.

- “Recalled the image of it, those striking eyes, but I really wanted to forget about it because it was so disturbing.”
- “How much I enjoyed looking at it. I like that work more than any other work I’ve seen. I had a feminist reaction because their bodies are always so big and their heads are so small.”
- “I just liked the style and the way it presented, the technique, that’s what I’m trying to say.”
"I thought about it a little. Saw it, remember it. My background reminded me, it was hard work."

As shown above, there were a variety of types of thoughts about the artwork including personal recollections, affective responses, and reflections. As demonstrated in the examples below, there was a diversity of topics, ranging from personal recollections inspired by the artwork to sharing opinions about aesthetic responses or wondering about art techniques, when discussing the artwork with somebody after their visit.

- "Telling my girlfriend how the artwork reminded me of my drinking years and how many regrets I had surrounding those times. The lost years for me."
- "To my classmate — what dots. I'm curious about this type of art. I'm not familiar with it."
- "My friend saw it too. I just said that it was beautiful."
- "My fascination with the artwork, we shared our experience after we had seen the sculpture."

Post-Visit Exploration Associations with Memory Patterns. Since participants who reported talking to somebody about an artwork were typically the same participants who reported thinking about the artwork as shown using a Chi-Square analysis ($\chi^2(1, N = 59) = 7.8, p = .005$), these post-visit activity categories were collapsed. Therefore, participants endorsing one or both of the above activities were categorized as engaging in a post-visit exploration activity.
Episodic Memory. To test the hypothesis that post-visit exploration activity might be associated with enhanced episodic memory, visitors were categorized according to whether they reported engaging in a post-visit exploration related to the elaborated interesting artwork by episodic memory pattern.

Table 4.4

<table>
<thead>
<tr>
<th>Post-Visit Exploration</th>
<th>Episodic Memory</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not enhanced</td>
<td></td>
<td>14</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Enhanced</td>
<td></td>
<td>23</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>37</td>
<td>21</td>
<td>58</td>
</tr>
</tbody>
</table>

Table 4.4 shows that visitors who did not engage in any post-visit exploration activities were more likely to have memories which were not enhanced while participants who engaged in a post-visit exploration were more likely to have enhanced episodic memories. Using a Chi-Square analysis, it was determined that participating in a post-visit exploration was suggestively associated with enhanced episodic memory ($\chi^2 (1, N = 58) = 4.5, p = .03$).

Semantic Memory. A Chi-Square analysis was conducted to determine whether post-visit exploration activities might be associated with the enhancement of semantic memory. No significant association was revealed ($\chi^2 (1, N = 57) = .63, p = .42$).
Experience Dimensions Associated with Autobiographical Memory

Thus far memory measures such as autobiographical memory have been individually presented. In this section, I explore the hypothesis that being reminded of an autobiographical memory in relation to an artwork would be associated with visitors’ experience of the artwork on dimensions such as memorability, social relevant and personal relevance.

Memorability. To test the hypothesis that an autobiographical memory was associated with the experience of memorability, visitors were categorized according to whether they recalled an autobiographical memory in relation to the artwork during their visit and how memorable the artwork seemed to them.

Table 4.5

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>Memorability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
</tr>
</tbody>
</table>
As shown in Table 4.5, visitors were more likely to report that the artwork was highly memorable if they experienced an autobiographical memory, and visitors who did not experience a memory were less likely to rate the artwork as memorable. Using a Chi-square analysis, the memorability of an artwork was found to be significantly associated with the presence of an autobiographical memory ($\chi^2 (1, N = 65) = 7.1, p = .008$).

Social Relevance. Participants were categorized according to whether they recalled an autobiographical memory in relation to the artwork, and how socially relevant the artwork seemed to them during their visit.

Table 4.6

<table>
<thead>
<tr>
<th>Presence of Memory</th>
<th>Social Relevance</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Yes</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>37</td>
</tr>
</tbody>
</table>

As an examination of Table 4.6 indicates, if a participant did not experience an autobiographical memory, then he or she was less likely to rate the artwork as high in social relevance. Social relevance was found to be associated with the presence of an autobiographical memory using a Chi-square analysis ($\chi^2 (1, N = 64) = 5.58, p = .02$).
Personal Relevance. The presence of an autobiographical memory was also analyzed using a Chi-Square analysis to determine whether it was associated with ratings of personal relevance. There was no significant difference in the personal relevance rating category between visitors who recalled an autobiographical memory and those who did not ($\chi^2(1, N = 65) = 1.7, p = .19$).

Factors Associated with Episodic and Semantic Memorability

To test the hypothesis that visitors' ratings of the memorability of an artwork might be associated with changes in longitudinal semantic memory (deteriorated, stable or enhanced), a Chi Square analysis was conducted. This relationship was not significant ($\chi^2(2, N = 61) = 2.7, p = .26$). Nor were ratings of memorability significantly associated with patterns of episodic memory change ($\chi^2(2, N = 58) = .07, p = .96$).

Complexity. The analyses below explore whether ratings of complexity were associated with episodic or semantic memory patterns.

Episodic Memory. One factor which might help explain the episodic memory pattern is visitor's ratings of the complexity of the artwork. In the following analysis, the three categories of episodic memory are used - enhanced, stable, and enhanced - are used because in this case, doing so did not violate any statistic assumptions (e.g. not more than one expected value less than 5). Below, in Table 4.7, visitors were categorized according to their episodic memory pattern as a function of their complexity rating.

4 In contrast to the previous two sites, enhanced episodic and semantic memory profiles from the art gallery were significantly associated ($\chi^2(1, N = 56) = 7.75, p = .005$). However, the methodology at the art gallery was different from the other two sites in that episodic and semantic memory measures were based upon the same protocols, thus the significant association may be the result of a methodological artifact.
Table 4.7
Frequency of Participants by Episodic Memory Pattern as a function of Complexity

<table>
<thead>
<tr>
<th>Episodic Memory</th>
<th>Complexity</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Deterioration</td>
<td>2</td>
<td>13</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Stable</td>
<td>3</td>
<td>8</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Enhancement</td>
<td>17</td>
<td>13</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>34</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

Note that visitors whose episodic memories became enhanced were most likely to rate the artwork as extremely complex. A Chi-Square analysis was conducted to explore whether episodic memory patterns and ratings of complexity were associated. There was a significant association between the type of episodic memory and a high rating of artwork complexity ($X^2(2, N = 56) = 8.7, p = .01$).

Semantic Memory. Participants were also categorized according to their semantic memory pattern and their rating of the complexity of the artwork.
Table 4.8
Frequency of Participants demonstrating Semantic Memory Change as a function of Complexity.

<table>
<thead>
<tr>
<th>Semantic Memory</th>
<th>Complexity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>Total</td>
</tr>
<tr>
<td>Deterioration</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Stable</td>
<td>8</td>
<td>19</td>
<td>27</td>
</tr>
<tr>
<td>Enhancement</td>
<td>14</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>36</td>
<td>59</td>
</tr>
</tbody>
</table>

Note that in Table 4.8, that visitors who had enhanced semantic memories were more likely to rate the artwork as complex. A Chi-Square analysis was conducted to explore whether semantic memory patterns and ratings of complexity were associated. There was a significant association between semantic memory and the complexity rating of artwork ($X^2 (2, N = 59) = 8.5, p = .01$).

Discussion

The findings regarding visitors' episodic memories of peak (interesting) artwork experiences indicate that the long-term impact of viewing an artwork left a stable residue in the mind. This high level of memorability may be explained using dual coding theory (Pavio, 1971, 1991) which would state that the artworks were remembered so well because they were coded both verbally and nonverbally (see Chapter 2 for a full explanation of dual coding theory). Actually, visitors as a group,
had memories that encapsulated more aspects of the viewing experience over time. Further, situational interest had an overall impact on episodic memory in that visitors recalled fewer details about a relatively uninteresting artwork than an interesting artwork. There was also an interaction effect between time of interview and situational interest; over time, only the interesting artwork was likely to have an episodic memory which became enhanced. Furthermore, there was no observable difference between the episodic memories of an interesting artwork which was discussed with the interviewer, and an interesting artwork which was not discussed. This suggests that the observed pattern of episodic memory was not due to the priming effect of the study.

When the episodic memory findings were more closely examined, it appeared that visitors who had more to say — about 30% — were the ones who engaged in some sort of post-visit exploration activity, whether it was talking, or thinking about the artwork. This finding suggests that post-visit explorations increased what visitors considered important enough to mention when re-constructing their episodic memory of the artwork five months later.

On the other hand, post-visit exploration activities were not associated with the enhancement of semantic memory. Even though the content of these post-visit explorations focussed on a broad variety of topics, they did not facilitate understanding by providing a zone of proximal development to shift visitors’ understanding of the artwork. As Henry (1992) found with children, discussion of an artwork had to go beyond mere description to be associated with more sophisticated understandings. Perhaps the post-visit explorations did not proceed enough beyond description to have an impact on semantic memory.

Almost one-half of the visitors reported engaging in some sort of post-visit exploration activity. This finding is encouraging for art educators because it suggests that gallery-based art experiences were not separated from the context of people’s everyday lives as many art educators were concerned that they might be it (e.g., Worts,
Therefore, even though there were few obvious supports, or cues, to elicit artwork memories, these artworks were remembered, discussed, and reflected upon by many visitors after they leave the gallery. Very few visitors reported researching information about the artwork, but this sort of formal educational exploration may not be necessary for these types of museum artwork experiences.

About two-fifths of the participants demonstrated enhanced semantic memory, with the memory undergoing incubation after the visit. As in the case of episodic memory, situational interest was associated with an increased likelihood of semantic transformations; the semantic memory of an artwork judged as uninteresting was less likely to become enhanced. Certain factors were associated with this enhancement process; more specifically, complexity, and situational and personal interest in art. In the case of an artwork, semantic memory enhancement may possibly be the result of a stimulus characteristic such as complexity, which elicits conflict and uncertainty. Although not specifically tested, one way to view the impact of complexity and situational interest is to use Mitchell’s (1993) idea of a trigger and hold mechanism. For instance, complexity of an artwork may have initially stimulated visitors to simplify the artwork’s meaning in an effort to understand it, thus serving as a trigger, and the maintenance aspect of situational interest contributed to this attention allocation so that over time, the meaning of the artwork became comprehensible. In conjunction, personal interest may have had an additional attention sustaining influence the information encountered.

In contrast to personal interest, domain knowledge of art had no observable impact on delayed semantic memory. One plausible explanation for this lack of relationship is that domain knowledge may not be connected to depth of processing, and consequently, have limited impact on whether semantic memories become enhanced. For example, some research has indicated that novice recall surpasses expert recall in many domains (see Adelson, 1984 for a review) because novices tend to attend
throughly to the material whereas experts may be more selective (Neves & Anderson, 1981). A similar case could be argued for the lack of a relationship between domain knowledge and both semantic and episodic memory.

In short, even though the absolute memory quality may differ, both low and high art knowledge visitors were equally likely to demonstrate enhanced memories. This interpretation of the findings suggests that visiting an art gallery was a type of equal opportunity excursion for participants — that formal art knowledge was not required to experience growth. This should be reassuring to the many visitors who fret about "not knowing anything about art" — that they, too, are likely to demonstrate educative outcomes.

In terms of experienced emotion, about one-half of the participants reported that the artwork elicited emotion in both interviews; there was very minimal change in the percentage of participants who reported experiencing no affect between the initial and follow-up interview. This suggests that the general affective experience associated with artworks has a significant level of staying power, particularly if compared to the affect decline at the Hockey Hall of Fame. Perhaps the more complex cognitive processing that occurs in relation to artwork results in more affective-cognitive connections linked to the artwork and thus increased affect staying power.

Although there was some diversity in the type of affect experienced, the majority of visitors reported experiencing enjoyment, even though the discussed pieces of art were not necessarily "happy" works, indeed, many of them had a dark undertone. It could be that the enjoyment experienced partially refers to the inherent pleasure of the "flow" experience of connecting with the artworks (Csikszentmihalyi & Hermanson, 1995).

Autobiographical memories were recalled by about one-half of the visitors both at the time of the on-site and the follow-up interview. This high proportion could be interpreted to mean, that to a certain degree, visitors identify with the "texts" in the
artworks, matching or connecting their own experiences and narratives with those represented in the artwork.

There appeared to be a cluster of activity around autobiographical memory. The presence of an autobiographical memory was associated with high ratings of social relevance. One reason for the association between autobiographical memory and social relevance is that the Art Gallery of Ontario is considered a majority institution. Majority institutions tend to stress societal universals, while community institutions tend to stress oppositional cultural narratives (Clifford, 1991). With the emphasis on societal universals, the visitor can easily identify and relate to the artwork themes, particularly if the artwork elicits an autobiographical memory.

In addition, the presence of an autobiographical memory was associated with the judged memorability of the artwork. Perhaps it was the case that since the participants remembered their autobiographical memory, this experience of memorability was transferred to the artwork. However, visitor estimates of the memorability of an artwork were not associated with enhanced episodic or semantic memory; thus, the experience of artwork memorability should be viewed as an experiential phenomenon, associated with the recall of an autobiographical memory, rather than an accurate estimate of memory outcomes.

In conclusion, this study indicated that visiting an art gallery, as assessed through memories of an artwork, did have an enduring educational impact. In fact, as a group, visitors had expanded episodic memories of their interesting artwork experience after a five-month period than at the gallery. Visitors tended to engage in post-visit activities, and if they did they were more likely to have enhanced episodic memories. Most exciting was the finding that many visitors demonstrated a gestation of semantic memories after the visit. This gestation process was linked to the complexity rating of the artwork which, as discussed earlier, is most likely associated with situational interest. In addition, it was suggestively associated with personal interest in art.
Further, visitors with low domain knowledge need not be concerned that they might not benefit from their visit; in this study, they were equally likely to have enhanced semantic memories as high domain knowledge visitors. Many visitors personally connected with the artwork, both through the experience of affect, and the reminding of an autobiographical event at both interview times. This reminding of an autobiographical memory was linked to the experience of the artwork as memorable and socially relevant, although the memorability judgement was experiential and was not linked to measured memory outcomes.
Chapter Five

Discussion

Preface

What stands out when the findings across the different museum sites were compared was, what did and did not get remembered. On the surface, memory patterns from the three museums looked very similar. This occurred regardless of what kind of exhibit it was, whether an hockey artifact, science exhibit or artwork. Visitors had no difficulty recalling the episodic details, providing indirect support for the dual coding theory (Paivio, 1971, 1991). Overall, exhibit experiences were salient and memorable. As mentioned in previous chapters, one theory which explains this high level of memorability is using dual coding theory. As to semantic memory, assessed using different criteria at each of the sites (e.g., scientific principles, critical awareness or interpretation), profiles were distributed across all of the categories — enhanced, stable or deteriorated — although the proportion of visitors in each category varied. Affect was an extremely common aspect of visitors' experience at each of the three sites, both within the museum and after the visitors had left. Furthermore, the recall of an autobiographical memory was also reported by about one-half of the visitors at the art gallery and hockey museum, both on-site and afterwards. Moreover, some of the experiential dimensions were connected to the recall of an autobiographical memory.

In addition to the similar set of memory profiles, both at the Hockey Hall of Fame and the Art Gallery of Ontario, the visitor characteristics of domain knowledge and personal interest were, at most, only suggestively associated with episodic and semantic memory. It is a possibility that the manner in which the characteristics were measured, or the way the memories were coded, was inappropriate. This option will be discussed in the limitations of the present study section. One the other hand, one plausible
interpretation of the lack of visitor characteristic associations is that visitors were not using these factors in the development of their exhibit memories. These negative findings particularly regarding the visitors' characteristics raises the question: What were visitors doing at the museums, particularly if they were not exercising domain expertise or enriched knowledge structures? Clearly, something was going on because at each site there was a lot of activity around affect, post-visit exploration, and most strikingly, where it was assessed, autobiographical memory.

Ferarri and Mahalingam (1998) argue that it is important to discriminate between the cognitive development involved in mastering semiotic tools, which is typically associated with formal pedagogy, and cognitive development that characterize how individuals become persons. These authors state that action in particular cultural contexts can transform or affirm a person's narratives by enriching or validating them, and suggest that research might look at how people's narratives change after participation in an educational activity. As Rogoff (1997) states, a person develops and learns through participation in activities in the context of community meanings. One such educational activity, where these transformations might occur, is by visiting museums.

I would like to suggest that what is being developed in museums is the developing of individuals becoming persons, or in other words, developing practical and cognitive skills which are integral to self-development. Since self-development occurs in the service of identity formation (Ferarri & Mahalingam, 1998), one could examine the memory profiles of exhibits for evidence of such identity formation.

Karp (1992) states that, in the context of museums, the performance of social roles such as viewing and/or interacting with exhibits informs one's identity. This is especially relevant because exhibits viewed by visitors are representations of community values and narratives (e.g., Karp, 1991, 1992; Pearce, 1992; Sherman & Rogoff, 1994). This applies not only to cultural exhibits, but also to science exhibits.
So, if museum exhibits are sites of community "identity," and attending museums informs an individual's identity, it could be the case that visitors attend museums to compare or contrast their own personal identities to the community identities represented by the exhibits: museum exhibits as sites of interplay between personal and community identity. One way to view this is as "goodness of misfit" (Valsiner & Cairns, 1992) which occurs when there is discrepancy between personal and collective cultures or identities. Sometimes this misfit may be large, which might result in facilitating a change of personal identity, whereas at other times, this the misfit may be minimal which might result in the affirming of personal identity. The definition of personal identity to which I am referring is the experience of belonging to a group that shares a similar set of experiences, and historical interpretations. Shared experiences can affirm one's identity by validating them, whereas experiences which are presented differently can facilitate reconstruction of one's identity by moving it closer to the collective representation of the events.

The memory research literature suggests that the recall of memories is both influenced by, and influences identity. For example, Ross and Conway (1988) showed that the recollection of events tends to enhance one's commitment to certain beliefs. In relation to museum exhibits, the recall of autobiographical memories, and even the recall of exhibit memories may influence certain beliefs about one's identity. On the other hand, Neimeyer and Metzler (1994) found that recall of memories was dependent on the identity of the individual; for example, certain individuals were more likely to recall memories which confirmed their identity, while other individuals were more open to memories which suggested revised versions of their personal identity.

To adapt Neimeyer and Metzler's model for museum use, in place of individual identity, I will place exhibit identity. By exhibit identity, I mean any quality of the exhibit that visitors might respond to; for example, the exhibit being recognizable from the visitors' pasts. If the principles underlying the impact of identity on memories are
transferrable, then perhaps, certain types of museum exhibits would be more likely to either affirm or transform personal identity.

Even though the sets of memory patterns were superficially similar, differences emerge if they are closely examined, which suggests that the deep structure underlying these memories was different. This structural difference may be suggestive of different visitor-exhibit interaction orientations, which are the result of the exhibit qualities. Thus, it is not adequate to simply present the museum memories, or provide examples of identity issues, but also place the results in the context of the exhibit qualities. One perspective which can help us understand these exhibit quality differences is the "self-versus-stimulus orientation" framework, which will be described in the next section.

In sum, personal cognitive development, as defined by Ferrari and Mahalingam, may be involved at all the museum sites; however, whether this resulted in an identity which was transformed or affirmed might be dependent on the specific type of visitor-exhibit interaction. Thus, the purpose of this discussion is twofold: first, to present an exhibit orientation framework, and to determine whether the memory patterns fit this framework, and second, to use the framework as a guide to explore instances of personal cognitive development, or more specifically, instances of affirmation or transformation of identity. This framework was not introduced earlier in this thesis because it was developed in response to the pattern of results found at the various museums. I should stress, rather emphatically, that the statements made in the context of this discussion are suggestive, rather than conclusive, due to the low number of participants and museum sites, and the design of the research study.

Much new ground has been covered in this discussion, therefore I will revisit the museum education model used in the introductory chapter to ease the transition. Next, I will present some ways museum educators describe visitor interactions at specific sites, which will show that many of the experiences they mention can be located within the stimulus-versus-self framework. Afterwards, the framework will be described as
applied to the museum sites included in this dissertation. Finally, I will then explore whether the principles of the framework were reflected in the visitor patterns of exhibit memories, and where appropriate, highlight instances of identity themes. Lastly, limitations of the current study and suggestions for further research will be presented.

Museum-based Descriptions of Visitor Interactions

I will offer two levels of descriptions, one on a general level, and the other on a more specific level. As introduced in the first chapter, when I reviewed the history of museums and the current perspectives on museum education, there has been an increasing focus on visitor education and experience in the museum field. In fact, one of the major challenges facing contemporary museums is the balancing between the curatorial and educational orientations.

On a very general level, the museum perspectives can be represented something like this: art historians and curators focus on the collection and display of “authentic objects,” and argue that these objects should be the focus of the museum experience, that museums should be storehouses of “treasures.” On the other hand, educators tend to focus on the “authentic experience” of the visitor. Authentic experience is a simulation of an experience by immersing oneself with evocative props (Roberts, 1997).

These orientations have come into conflict — whether to design displays with objects as the focus or to design displays with visitor experience as the focus. Without balance, authentic artifact museums become warehouses, whereas authentic experience museums become meaningless playgrounds. Clearly, some blend of the perspectives would be most beneficial for visitors.

Now, I will very briefly present a few quotes from museum educators describing their educational agendas at different sites. Even though educators, collectively, emphasize visitor experience, the educational goals must also take into account the inherent qualities of the exhibits. For example, an educator at an art gallery wants
"visitors [to] appreciate the thought behind the artwork so that the visitor may leave with a new way of approaching and looking at a work of art" (Soren, 1990, p. 256). Notice here that the emphasis is on the artwork, with no mention of the visitor experience.

An educator from an historical house wants visitors to have an "immersion in the past" and that this experience "envelop" the visitor (Soren, 1990). This educator appears to be stressing the affective tone of the experience, and does not directly refer to the artifacts.

At a science centre, educators wish to present "experiences of real stuff ... [and] capture attention and inspire the public. The intention [is] that visitors would have made some conceptual links, made a connection" (Soren, 1990, p. 257). Here, I believe, the educator is referring to authentic visitor experience when discussing attention and inspiration, yet at the same time, is referring to the authentic object when discussing the conceptual understanding or the principles of the exhibit.

So, in short, both at a general and specific level, there is differential focus on the exhibit (the authentic artifact) or the visitor (the authentic experience). This mirrors some of the principles of the stimulus-versus-self orientation framework which are described in the next section.

Self-versus-Stimulus Orientation Framework

The self-versus-stimulus orientation model draws heavily on Cupchik & Izadpanahi's (in press) theorizing and research; however, it will be modified for the purpose of this research with an increased emphasis on personal identity issues. Presentation of the framework will be accomplished by using the museum sites included in this dissertation as representative examples. Within this framework, the hockey hall emphasizes self-oriented experience, whereas the art gallery emphasizes stimulus-oriented experience, and the science centre involves both orientations.
The Self-Orientation at the Hockey Hall of Fame. At the hockey hall, the focus is an immersion into a "hockey mecca"; it is the authenticity of the (re-)experiencing that is important. This emphasis on the self is partially due to the artifacts — they are located within the realm of contemporary culture which expresses a specific historical period that is recognizable to most visitors. As a consequence, modes of approaching the artifacts tend to be reactive since visitors focus on the identification of these artifacts from their past. If the objects were associated with affect in the past, then individuals will be likely to experience some degree of that affect again (Zillmann, 1994), thus the primary experience of visitors is mood modulation, because the object recognition elicits feelings and memories. Associated with this object identification is a focus on the creation of experiences which are connected with past narratives or identities of the visitor. At the hockey hall, a somewhat idealized version of hockey culture is celebrated, and through this celebratory diversion, visitors are enabled to re-affirm their personal histories and identities.

The Stimulus-Orientation at the Art Gallery of Ontario. Art museum educators want visitors to understand the "thoughts behind the artwork". Part of appreciating the thought behind the artwork is comparing the artwork to developments, and transformations, of artwork styles and subject matter, across other works and time (Cupchik & Izadpanah, in press). In other words, artwork cannot be considered in isolation, but is connected to events which have happened before. This process involves formally evaluating artwork in a search for meaning and principles in relation to other works. Part of the process of aesthetic reception involves the deautomatizing of perception. This deautomatizing of perception results in engaging visitors in ways which are ambiguous, and requires a slower, more reflective, mode of approaching the artwork. This may result in visitors experiencing tension and conflict as they attempt to
match their present understandings with the principles represented in the artwork.

The Dual Orientation at the Ontario Science Centre. The science centre represents a combination of the two orientations mentioned earlier. On the one hand, exhibits are designed so that a self-oriented experience is elicited by relying on mood modulation such as eliciting feelings such as pleasure and excitement. By creating a certain atmosphere when visitors are exploring the secrets of science, the visitor develops a closer affiliation to the scientific community by sharing the excitement and joy of science. The main difference from the hockey hall is that the science centre seeks to create an identity that may not be historically rooted in the visitor's past.

On the other hand, the science centre exhibit also seeks to emphasize a stimulus-orientation by slowing down the interactive process so that a reflective mode of thinking will emerge, and as a result, visitors will attempt to match their current knowledge with the scientific principles demonstrated by the exhibit. As in art, there is a set of formal principles in science which need to be viewed in the context of previous knowledge and development.

Exhibit Memories using the Self-versus-Stimulus Orientation Framework

In this section, I will show how the self-versus-stimulus orientation positions are associated with psychological processes such as memory for museum exhibits, and issues of identity which emerge through these memories. This will be done by threading in some of the dissertation findings.

Hockey Hall of Fame. The artifacts at the hockey hall reflect an era that was rooted in visitors' past histories. These artifacts elicited memories and feelings, and through these experiences, visitors' belonging to the collective hockey culture was reinforced.
At the hockey hall, both during and after the hockey hall visit, the recalled memories could be thought of as reminiscent. Many of these reminiscence memories centred on events in the mythology of hockey (a goal in a 1972 hockey match against “the Russians”), or personal hockey narratives (watching Hockey Night in Canada with dad).

Consistent with the hypothesis that hockey hall experiences are connected to the affirmation of one’s personal identity within collective hockey culture is the finding that visitors who were reminded of an autobiographical memory rated the artifacts as extremely personally relevant. This finding may suggest that recalling an autobiographical event creates the experience of personal relevance because the autobiographical memory becomes fused with, in a broad sense, with the artifact’s “text”.

At the hockey hall, about one-third of the visitors endorsed love (of which nostalgia is subsumed) as their primary emotion, whereas at the art gallery and science centre this emotion was rare. Everything at the hockey hall is constructed to promote this self-oriented idealized experience of love; for instance, the entry passes are designed as collector hockey cards. Even people who are not hockey fans would be tempted to place them in a box of mementos, and experience them as keep-sakes — items that invoke nostalgia.

The love and types of memories experienced by the visitors can be considered a variant of what Bellelli and Amatulli (1997) call nostalgia-memory. Nostalgia-memory has the function of “reconstructing identity and the self’s cohesion [and] confirming and idealizing the social order” (p. 217).

Many visitors lost their affective experience by the follow-up interview. This is congruent with Zillman’s (1983) theory of excitation-transfer which states that the last phase of mood modulation, such as at the hockey hall, is complete dissipation.
The majority of hockey hall visitors reported talking and thinking about the exhibits after their visit. These post-visit explorations focus on the sharing or reflecting on the authenticity of the experience. When visitors were asked how an exhibit affected them, they spoke about increased closeness or distancing from hockey. Perhaps in the instances where visitors felt distanced, the self-oriented experience was processed as inauthentic.

Episodic and semantic memories of the exhibit experience were stable. The stability of these memories is perhaps due to the diversionary nature of a Hockey Hall of Fame visit, which is more concerned with situated emotions rather than cognitive transformations. However, visitors who had a high degree of hockey knowledge were more likely to have enhanced semantic memories. It could be that domain knowledge enabled them to evaluate the exhibits in relation to their historical developments, and therefore, they were less likely to engage in object recognition.

Self-oriented experiences, at least at the hockey hall, limited the variability of the semantic memory outcomes regardless of the level of situational interest. There was consistency across the interest conditions; the profiles of the interesting and uninteresting semantic memories were similar. One reason for the minimal influence of situational interest could be that it is a cognitively-loaded concept, whereas experience at the hockey hall tends to be affectively-laden. Situational interest could be tapping into aspects which are not relevant to the assessment of experience and memory at the hockey hall. The same case could be made for personal interest. However, it is more likely that for one to even attend the hockey hall in the first place, one already has a high level of personal interest, and therefore there was a ceiling effect.

Overall, it appears that the hockey hall memories were congruent with the principles of self-oriented experience with its emphasis on mood modulation, and binding people to times and places. Moreover, a major theme across the various sets of memory measures was the affirmation of personal narratives and identity.
Art Gallery of Ontario. The memory profiles of art gallery visitors appeared consistent with the stimulus-orientation framework, and there was some suggestive evidence that art experiences may be important in terms of identity transformation.

Art gallery visitors, as a group, have episodic memory profiles that incorporate more aspects of experience over time. This type of gestation was not observed at the hockey hall or science centre. In order to explain the presence of expanded episodic memories, individual visitor profiles were examined for cues. Visitors who engaged in post-visit exploration, whether it be discussing or thinking about the artwork, tended to expand their episodic memories over time. If the post-visit explorations are qualitatively examined, there was a multiplicity of types: sometimes it consisted of the re-affirming of experiences, whereas many revealed reflective processes, with visitors attempting to match what they knew about technique or past personal narratives, with the principles and meanings of the artwork. This matching was not as prevalent in hockey hall post-visit explorations. At the art gallery, this type of rehearsal provided the visitor with the opportunity to add new details to the experience. However, although these explorations resulted in expanded episodic memory, they were not associated with enhanced semantic memories. This is possibly because visitors required new knowledge or someone to highlight critical connections to fill in the gaps, so that a change in deeper conceptual structures could result.

However, the enhancement of semantic memory was more likely to occur if the visitors already had a high degree of personal interest in art, although this finding was suggestive. Further, visitors who rated the artwork as extremely complex tended to have both semantic and episodic memories which became enhanced after the visit. Therefore, it is not surprising that these factors, personal interest and complexity, were sensitive to artwork memories. The reason is because both factors are involved in the cognitive organization of knowledge, and that the stimulus-orientation at the art gallery is based on cognitive elements. It may be the case, although not empirically assessed,
that these enhanced semantic memories reflect subtle changes in visitor’s connection to communities or identities, particularly since art represents differences in meaning across time and places.

When the semantic memory profiles of interesting and uninteresting artworks were examined, a major difference emerged: the interesting artwork semantic memories were more likely to become enhanced. Situational interest seemed to have a long-term impact on the motivational and cognitive structures of visitors. This could be related to the trigger, in this case the complexity, and the maintenance function of situational interest, which is this case resulted in an increased amount of attentional processing devoted to the artwork in an effort to understand its meaning.

At the art gallery, there was a higher frequency of negative emotions: interesting art is not equivalent to positive affect. At the art gallery, visitors were less guided to experience a particular affective experience because a reflective-orientation is less geared to create simulations of people’s pasts or mood modulation. This corroborates Iran-Nejad’s (1987) findings that interest results from intellectual activity and not how much one likes something.

Strikingly, about half of the visitors recalled autobiographical memories. This is important since the recall of autobiographical memories influences identity (Ross & Conway, 1988). This suggests that, in participants, some form of activity around identity was occurring. However, it is not entirely clear how identity was being influenced, other than the fact that the autobiographical memories did not have a nostalgic or reminiscent quality, which serves to confirm one’s identity.

The stimulus orientation also suggests why, at the art gallery, the majority of visitors who reported recalling autobiographical memories rated the artwork as extremely socially relevant. This pattern could be interpreted to suggest that the experience at the art gallery was not as intimately connected with reflecting one’s
current identity, but rather challenges identity construction to be reconsidered in a socio-historical context. This fits with the idea that art can be viewed in the context of historical developments that are reflected in the representations of artwork, from different times and places, and are matched with current understandings (Cupchik & Izadpanah, in press).

In summary, the pattern of artwork memories appeared to be theoretically consistent with visitors using a reflective-orientation. Although the design of this thesis limits what can be stated about identity, it is clear that the idealized experiences of the hockey hall were not present, and in addition, perhaps, the enhancement of episodic semantic memory might be associated with personal cognitive growth (e.g., identity transformations). Once again, I emphasize that these interpretations are suggestive, and are an attempt to explain the enhanced episodic and semantic memories, particularly since they were not associated with domain expertise.

Ontario Science Centre. The science centre experience can be considered as consisting of both the stimulus-and-self orientation aspects of experience. Although there was less information collected at the science centre, the results provide partial support for the theory that both orientations were present, and that identity issues were relevant.

Designers develop science exhibits so that visitors feel stimulated by the process of discovery when dealing with a topic which may be quite unfamiliar. The manner in which the stimulation experience occurs is through affect modulation. At the science centre, and then one month afterwards, virtually every interviewed visitor reported experiencing some type of affect indicating that the affective connection to the science experience did not dissipate. It could be the case that this affective connection served to increase the sense of belonging to a scientific community through shared experiences. However, the question remains whether this affect is adequate to maintain the
connection, particularly if there were no previous personal narratives or identities in place. For instance, at the hockey hall, many visitors lost their affective reaction after the visit, however experiencing affect may not be as relevant to long-term maintenance of their connection because there are other supports, which take the place of affect, in sustaining hockey identity in their everyday environment.

Evidence of a stimulus-orientation to the exhibits was less clear. Overall, the pattern of semantic memories at the science centre was the most variable of all the sites: one-third of the visitors demonstrated enhanced semantic (scientific-based) memory, suggesting that for some visitors, some reflective processes may have occurred. This finding could be interpreted to suggest that for these visitors, the stimulus-orientation was the emphasis of their visit, whereas for the other visitors, the self-orientation was the emphasis of their visit. Perhaps these were the visitors who did not have enhanced semantic memories.

Overall, there is some support for the self-orientation focus, partial support for the stimulus-orientation focus, and some suggestive identity themes at the science centre, although more aspects of memory would be needed to draw more definitive conclusions.

In general, the findings supported the self-versus-stimulus framework, and the strongest evidence regarding identity issues was at the hockey hall. The framework was helpful in interpreting the pattern of results. One measure of the utility of a theory is whether it facilitates the generation of future research. Some, but not all, of the research suggestions flow from the principles of the orientation framework, and the associated identity issues, which will be described after the limitations of the current study are reviewed in the next section.
Limitations of the Present Study

One of the unexpected results of this dissertation was the lack of robust findings regarding the impact of visitor characteristics—domain knowledge and personal interest—on memory. While there were some suggestive results, as assessed using multiple Chi-square tests (with a lowered alpha for significance), the factors did not provide a solid framework. This made interpretation of the results difficult. The inconclusive relationship between visitor characteristics and memory might have to do with two factors: the coding of the memories, or the measures used to assess the visitor characteristics.

In terms of coding, visitors’ initial memories were used as a baseline comparison, rather than coded for a set of criterion-based elements. Using this coding method allowed for sensitivity, so that a variety of memory transformations could be captured; however, what was gained in sensitivity, was lost in specificity. In other words, the system did not code for the inclusion of elements associated with art or hockey expertise. Perhaps it was this theoretical juxtaposition, using a non-normative memory measure, and criterion-based visitor factors, which may have resulted in the weak associations. However, although other coding systems could have been used, it may very well be the case that the coding did indeed capture aspects of memory which were most relevant or important to museum experiences, namely, issues around critical awareness, interpretation, and scientific principles.

An alternative explanation for the lack of findings was that the visitor variables did not measure the concepts they were designed to assess. In the case of the domain knowledge, it could be that basing it on a domain exposure checklist was inappropriate. Nevertheless, in the literature, the recognition checklist model has been used in numerous research studies (e.g., Anderson & Freebody, 1983; Cooksey & Freebody, 1987; Stanovich & Cunningham, 1994), and appears to have a degree of reliability and validity in the assessment of knowledge.
The minimal relationship between memory and personal interest is more difficult to explain. Although there was variability in the personal interest measures among visitors, it could be that anyone who attends a particular museum already has a certain degree of personal interest in the topic, and the difference between visitors is not large enough to result in consistent observable differences in memory organization. For instance, as shown in the appendixes, visitors who never attend the hockey hall or art galleries have a much lower level of interest in hockey and art, respectively, than visitors who attend these sites.

In addition, the memory outcome measures used to access the impact of personal interest may not have been the most sensitive to its influence. For example, it may be the case that high personal interest may have resulted in a higher quantity of exhibits being remembered rather than more details of any one exhibit. In addition, it might also be the case that personal interest had an impact on the exhibit a visitor choose to discuss. For example, visitors with high personal interest in art may have found different paintings situationally interesting than visitors with low personal interest in art.

Suggestions for Future Research

The orientation framework introduced in this discussion was an effort to accommodate the diverse findings across the museum sites, therefore, the statements made in the context of the framework are suggestive, rather than conclusive. Further research is needed to validate this framework. Perhaps the first stage of this validation process would be to conduct qualitative interviews with visitors to determine the degree of corroboration between the framework and visitor's reflections.

A coding system which differentiates between different types of responses to exhibits might be helpful in illuminating the relationship between the stimulus-and-self orientation and exhibit memories. One such system, as devised by Cupchik and
Shereck (manuscript), coded artwork responses along the dimensions of concrete or abstract interpretations of the art scenes, as well as objective or subjective meaning of the event (situated in the outside world or in the experience of the viewer). For example, a combination of concrete-subjective responding would result in the viewer projecting their autobiographical experience onto the exhibit, whereas a combination of abstract-objective responding would result in the viewer expounding social or political ideas. This coding system would be most helpful at the art gallery, but could also be used at the hockey hall with some adaptation. There are two questions: First, considering the self-orientation at the hockey hall, one would expect higher rates along the concrete-objective continuum than at the art gallery and, second, it would be interesting to see if, and how, certain responses are more or less likely to transform over time; for example, are abstract-subjective responses (metaphorizing) more likely to transform over time than autobiographical projections?

In this dissertation, visitors chose exhibits based on situational interest. The art gallery was more sensitive to differences in situational interest than the hockey hall, most likely because gallery experiences tended to be more cognitively-based. A more affective-laden concept, such as having visitors choose a pleasing artifact, might have more discriminative value at the hockey hall since visitor experiences were based on affect modulation. It would be interesting to see how pleasing exhibit memories compare to interesting exhibit memories at all of the sites.

If participating in cultural niches necessarily results in the development of individual knowledge and expertise (Ericsson, 1996; Rogoff, 1997), then future research might explore how individuals transform themselves through practices such as viewing and interacting with museum exhibits. One way to look at this is to track the process by which cultural narratives are personalized and are incorporated in individual narratives of personal identity. More specifically, how do memories associated with exhibits' "texts" become more and more personalized over time, and eventually turn into
autobiographical memories? The experience of nostalgia using museum exhibits as mediating objects might also be a fruitful avenue to pursue in future exploration of these narratives of individual identity. Other related paths, such as Silverman’s (1995) research exploring the need for individuality and the need for community, and how these needs impact on the meaning-making of exhibits, might be worth exploring further.

As mentioned previously, a lot of attention has been given to the representation of objects, although most of the discourse is based on theoretical analysis rather than research findings. These concerns are often centred on the portrayal of cultures; in other words, how do visitors come to know others through museum representation? For instance, Re’em (1997) employed an ethnographic methodology to investigate the impact of visiting the Sperhus Museum of Judaica in Chicago on Christian children’s attitudes on Jewish people, heavily drawing on Bakhtin’s notion of ventriloquation. The inverse is how do visitors come to know themselves through museum representation? This is reflected at the hockey hall, and visitors’ concerns with their own identity and narrative. Similar modes of inquiry exploring identity issues would enhance our understanding of these important concerns.

Although personal interest was not strongly associated with memory patterns, I suspect that museums are more important in the development, and perhaps, in the maintenance of personal interest, rather than sites to assess the influence of personal interest on memory. Although not directly addressed, the self-formation concept used in this discussion involves the development of personal interest. There is much overlap between the concepts involved in personal interest, and the processes involved in the development of personal cognitive expertise as defined by Ferrari and Mahalingam (1998). For example, the above authors state that in transforming narratives, individuals are inspired to develop cognitively, in a way in which one will also consider the knowledge deeply. They state that this development is shaped by interest, but they
do not elaborate on how this interest is developed. Perhaps one way to study how this interest is developed is to follow the interrelationship between situational interest, which can lead to autonomous engagement, and eventually transform into personal interest (Hidi & Berndoff, 1998).

Although I chose to use the personal development model, partially in response to some of the findings linked to identity (e.g., autobiographical memories), perhaps a concept such as personal interest would be more suitable for the other settings, such as the science centre; for instance, science centres as places which promote young girls' personal interest in science (e.g., Nyhof-Young & Bernard, 1993; Hidi et al., 1998).

The memories in this dissertation were based on different types of objects — artworks, artifacts and exhibits, all of which were from different historical periods. For instance, the hockey hall displays contemporary artifacts that are associated with self-oriented experiences, and the hockey hall was designed to be a hockey mecca. The art gallery displays artwork from different eras that result in a stimulus-oriented experience, and the focus of the gallery is congruent with this. Within a museum context, self-versus-stimulus oriented experiences can be elicited not only from the historical location of artifacts, but also by the design and presentation of the artifacts. For example, some of the recent display methods at the Canadian Museum of Civilization present artifacts from a previous era in a context that elicits a self-oriented experience. These contexts or displays tend to be simulations, and typically, are walk-through dioramas with visitors participating and interacting with the scenes. The literature suggests that, for the most part, these display styles are effective in engaging visitors, and visitors seem to enjoy them. However, how these display methods impact on the approach-orientation, and consequently, the long-term impact on memories, or identity formation, has yet to be adequately explored.
Current Museum Policy in the Context of Results

In the introduction, segments of the educational policy statement from the American Association of Museums were presented. One of the main themes of the document was to promote the notion that museum and exhibit experiences should move visitors “in a long lasting way”. As the visitor memories in this exploratory research suggest, museum exhibits do move visitors in a long lasting way. The educational outcomes may be associated with aspects of development that centre on individual expertise and identity formation, rather than the mastering of semiotic tools or the learning of domain knowledge. Whether this individual development was in the service of identity formation or affirmation, among other educational aspects, was found to be dependent on the type of visitor-exhibit interaction orientation of the different museum sites. For instance, in this research, the hockey hall was more likely to supply a context to “confirm and validate accepted ideas”, by affirming visitors’ personal histories. On the other hand, the art gallery was more likely to facilitate visitors “to examine change critically,” resulting in enhanced their semantic memories (and perhaps, to re-evaluate identities). And lastly, the science centre offered the opportunity to experience “emotional … learning” by connecting affect with the experience of interacting with the exhibits.

Overall, exhibit memories were embodied in multiple layers — in the episodic and semantic layers, in the autobiographical memories and affect, and in the reflections and discourses. The memory layer emphasized, and the impact on identity, however, was dependent on the inherent qualities of the exhibit and the focus of the museum.
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Appendix A

Ontario Science Centre Consent Form
Research on the impact of exhibits and presentations

We are from the Ontario Institute for Studies in Education. Together with the Ontario Science Centre we are conducting research on the impact of exhibits and shows. We would be very pleased if you would take part. It will take just a few minutes of your time, and we would like to ask you what you found especially interesting in your visit today, your reactions to it, and your impressions of it. Your participation is voluntary. Please feel free to stop at any time.

If you like, this interview will end your involvement. You could be especially helpful, by allowing us to call you by phone in about a month, at which time we would like to ask you again about any impressions that still remain from your visit. In that case we will need your phone number, and your first name. Again you are under no obligation. Please feel free to decline to talk to us when we call. After we have called we will destroy our record of your phone number and your name, and at no time will your name be revealed to anyone outside our research group so your participation will be confidential, and completely anonymous. You will not be able to be identified.

Though we hope you will be able to take part in this research, we should say that there will be no direct benefit to you, and also that there will be no risk.

If you would like any further information about the project, please contact Professor Keith Oatley, at The Ontario Institute for Studies in Education, 252 Bloor Street West, Toronto M5S 1V6, phone 923-6641.

Thank you very much indeed.
Appendix B

Ontario Science Centre Questionnaire
Ontario Science Centre Questionnaire

Only the follow-up interview is presented because the initial interview was almost exactly the same, but without the post-visit exploration questions and the control item was not elaborated.

Subject Number Date

Science Centre Interview - Follow up (A)

Hello, I'm calling from the Science Centre. A few weeks ago you participated in a survey about the exhibits at the centre and I'm conducting the follow up call to determine how well the experiences stay with you. It will take about 5 minutes. Is right now a good time for you?

1. In the first interview you stated that you enjoyed the ___________
   (fill in standard cue name for control item) exhibit very much.
   Can you tell me what you saw and did in as much detail as possible?
   (Check standard items or record).

2. Do you have any idea of how it works/what it is trying to demonstrate?

4. Do you feel any emotions about this exhibit or experience? (Read some emotions if stuck)
   And how strongly?
   Emotion Intensity

3. Try to get details such as how much and with who, etc)
   Did you notice something in the real world that reminded you of this
Did you go to the library to research the exhibit topic?

Did you read about this exhibit topic in a newspaper, magazine? Did you read the article but before you would not have?

Did you talk about this exhibit to anybody else?

Did you do anything different as a result of this exhibit? (behaviors such as use less electricity)

5. In the first interview also you stated that you enjoyed the ____________ (fill in standard cue name for experimental item) exhibit very much.

6. Can you tell me what you saw and did in as much detail as possible?

7. Do you have an idea of how it works/what it is trying to demonstrate?

8. Do you feel any emotions about this exhibit or experience? (Read card with emotions if stuck)
   And how strongly?
   Emotion ___________________________ Intensity ___________________________

9. Try to get details such as how much and with who, etc)
   Did you notice something in the real world that reminded you of this exhibit?

Did you go to the library to research the exhibit topic?
Did you read about the exhibit topic in a newspaper, magazine? Did you read the article but before you would not have?

Did you talk about the exhibit to anybody else?

Did you do anything different as a result of this exhibit? (behaviors such as use less electricity)

Thank you very much
Appendix C

Hockey Hall of Fame Consent Form
Research on impact of exhibits

We are from University of Toronto. Together with The Hockey Hall of Fame we are conducting research on the impact of exhibits. We would be very pleased if you would take part. It will take just a few minutes of your time, and we would like to ask you about your responses to the exhibits. Your participation is voluntary. Please feel free to stop at any time.

If you like, this interview will end your involvement. You could be especially helpful, by allowing us to call you by phone in a few months, at which time we would like to ask you again about any impressions that still remain from your visit. In that case we will need your phone number, and your first name. Again you are under no obligation. Please feel free to decline to talk to us when we call. After we have called we will destroy our record of your phone number and your name, and at no time will your name be revealed to anyone outside our research group so your participation will be confidential, and completely anonymous. You will not be able to be identified in any way.

Though we hope you will be able to take part in this research, we should say that there will be no direct benefit to you, and also that there will be no risk.

If you would like any further information about the project, please contact Maria Medved at (416) 928-0599 or Dr. Oatley at (416) 923-6641 ext. 2525.

Thank you very much indeed.
Appendix D

Hockey Hall of Fame Questionnaire
Only the follow-up interview is presented because the initial interview was almost exactly the same, but without the post-visit exploration question, and not all the exhibits were elaborated. The measures used to gather visitor characteristics that were collected at the time of the initial interview are presented at end of this questionnaire.

Subject Number: _____ Date: _______ Inter: __
Hockey Hall of Fame -Follow-up Interview

Hello, I'm calling from University of Toronto. A few months ago you participated in a survey at the Hockey Hall of Fame. I'm conducting the follow-up interview. Is now a good time for you? (If not, get a good time to call back) It will take about 15 minutes.

Many of the questions I'm going to ask you are the same questions you answered in the first interview. What we are trying to see is if people remember anything about their visit. If you can't remember that's O.K. When you are answering the questions, don't try to remember what you answered the first time, just answer what you think about right now.

I. In the first interview you stated that you found the ______________________ (circle elaborated/unelaborated exhibit) exhibit uninteresting/interesting (circle). Take a moment and imagine it is in front of you.

If you were to tell a friend about this exhibit case, how would you describe it? (Probe for info, i.e. anything else describe what you saw, what did the labels say) (Probe for visual details- 6)

What was the exhibit case trying to demonstrate or show? (Did you learn anything?) (Get...
Did you experience any emotion while imaging the exhibit case? If yes, what was the emotion? How intense was the emotion compared to what you experience with other exhibit cases?

barely noticeable  1  2  3  4  5  6  7  as intense as ever felt

Did you experience any personal memories while viewing the case? If yes, what was the memory? (get an idea of the emotion i.e., happy, sad)

How intense was the personal memory?

barely noticeable  1  2  3  4  5  6  7  as intense as ever felt

From your image, please rate your experience of the exhibit case on the following scales as compared to other exhibit cases (show scale sheet).

not at all socially relevant  1  2  3  4  5  6  7  extremely socially relevant
not at all familiar  1  2  3  4  5  6  7  extremely familiar
not as all memorable  1  2  3  4  5  6  7  extremely memorable
all personally meaningful  1  2  3  4  5  6  7  extremely personally meaningful

Did you think of the exhibit after you left the museum? If yes, how many times?

never  0  1  2  3  4  5  6  7+ or can't remember

If so, what did you think? What made you think of the exhibit? (get as much as possible)

Did you talk to anyone about the exhibit after you left the gallery?

never  0  1  2  3  4  5  6  7+ or can't remember

If so, who? What did you say (get all)
Did the exhibit affect you in any way or did you do anything differently? For example, did you think about hockey in a new way?

Did you look up any information about the exhibit? If so, where/what.

Did you read any articles about hockey in a newspaper, or magazine that you wouldn’t have read before? If so, explain.

Any other comments?

II. In the first interview you stated that you found the (circle elaborated/unelaborated exhibit) exhibit uninteresting/interesting (circle). Take a moment and imagine it is in front of you.

If you were to tell a friend about this exhibit case, how would you describe it? (Probe for info, i.e. anything else describe what you saw, what did the labels say) (Probe for visual details- 6)

What was the exhibit case trying to demonstrate or show? (Did you learn anything?) (Get details, not visual but concepts)

Did you experience any emotion while imaging the exhibit case? If yes, what was the emotion? How intense was the emotion compared to what you experience with other exhibit cases?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

Did you experience any personal memories while viewing the case? If yes, what was the memory? (get an idea of the emotion i.e., happy, sad)
How intense was the personal memory?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

From your image, please rate your experience of the exhibit case on the following scales as compared to other exhibit cases (show scale sheet).

not at all socially relevant 1 2 3 4 5 6 7 extremely socially relevant
not at all familiar 1 2 3 4 5 6 7 extremely familiar
not as all memorable 1 2 3 4 5 6 7 extremely memorable
all personally meaningful 1 2 3 4 5 6 7 extremely personally meaningful

Did you think of the exhibit after you left the museum? If yes, how many times?
never 0 1 2 3 4 5 6 7+ or can’t remember
If so, what did you think? What made you think of the exhibit? (get as much as possible)

Did you talk to anyone about the exhibit after you left the gallery?
never 0 1 2 3 4 5 6 7+ or can’t remember
If so, who? What did you say (get all)

Did the exhibit affect you in anyway or did you do anything differently? For example, did you think about hockey in a new way?

Did you look up any information about the exhibit? If so, where/what.

Did you read any articles about hockey in a newspaper, or magazine that you wouldn’t have read before? If so, explain.

Any other comments?
III. In the first interview you stated that you found the exhibit elaborated/unelevorated exhibit uninteresting/interesting. Take a moment and imagine it is in front of you.

If you were to tell a friend about this exhibit case, how would you describe it? (Probe for info, i.e. anything else describe what you saw, what did the labels say) (Probe for visual details-6)

What was the exhibit case trying to demonstrate or show? (Did you learn anything?) (Get details, not visual but concepts)

Did you experience any emotion while imaging the exhibit case? If yes, what was the emotion? How intense was the emotion compared to what you experience with other exhibit cases?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

Did you experience any personal memories while viewing the case? If yes, what was the memory? (get an idea of the emotion i.e., happy, sad)

How intense was the personal memory?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

From your image, please rate your experience of the exhibit case on the following scales as compared to other exhibit cases (show scale sheet).

not at all socially relevant 1 2 3 4 5 6 7 extremely socially relevant
not at all familiar 1 2 3 4 5 6 7 extremely familiar
not as all memorable 1 2 3 4 5 6 7 extremely memorable
all personally meaningful 1 2 3 4 5 6 7 extremely personally meaningful
Did you think of the exhibit after you left the museum? If yes, how many times?
never 0 1 2 3 4 5 6 7+ or can’t remember
If so, what did you think? What made you think of the exhibit? (get as much as possible)

Did you talk to anyone about the exhibit after you left the gallery?
never 0 1 2 3 4 5 6 7+ or can’t remember
If so, who? What did you say (get all)

Did the exhibit affect you in anyway or did you do anything differently? For example, did you think about hockey in a new way?

Did you look up any information about the exhibit? If so, where/what?

Did you read any articles about hockey in a newspaper, or magazine that you wouldn’t have read before? If so, explain.

Any other comments?

Thank you very much for your help.

Would you be willing to be called again sometime in the future? yes or no
Visitor Characteristics

Subj. # ___

Please complete the following questions and return to the interviewer. Please ask if you have any questions, please do not hesitate to ask.

Please put a mark beside any statement which describes you. Mark as many as needed.

___ I have played for a professional team or organized league.
___ I play/have played on an informal organized recreational teams.
___ I play/have played pick up games, i.e. whoever shows up.
___ I have almost never or never play hockey.

Please put a mark beside any statement which which describes you. Mark as many as needed.

___ I work in an area which relates to the hockey.
___ I watch hockey games on television.
___ I read/listen for hockey scores on the radio or newspaper.
___ I do not follow hockey at all.

Here is a list of names. Some are real hockey players and some are not. See if you can recognize the real players and place a “X” beside their name. Do not guess, but check off those you know to be players. Remember some of the names are not players.

   ___ Ace Bailey      ___ Frank Terepocki
   ___ Lloyd Frost    ___ Walter Pratt
   ___ Denis Hockney  ___ Ralph Ceci
   ___ Eddie Giacomin ___ Harry Lumley
   ___ Mario Grunwaldo ___ Keith Catney
   ___ Steve Shutt    ___ Tom Hunt
   ___ Bill Barber    ___ John Bucyk

Please rank order from 1 to 5 the activities you did the most in the last year (1 being the activity you did the most, 5 being the activity you did the least):

___ view art           ___ play card games
___ read a book        ___ go to movie theatre
___ attend hockey event
Please rank order from 1 to 5, the activities which you have the most knowledge
(1 being the topic you know the most, 5 being the topic you know the least):

- art
- hockey
- books
- card games
- movies

Please rank order from 1 to 5, the activities you value the most
(1 being the activity you value the most, 5 being the activity you value the least):

- watching hockey games
- reading books
- viewing art
- going to movies
- going to the mall to browse/shop

Think about your visit to the Hockey Hall of Fame. Place a mark beside the main reason
for you visit. (Mark only one)

- An opportunity to understand and interpret the world around you.
- An opportunity to stimulate your mind.
- An opportunity to enjoy as social outing with friends/family.
- An opportunity for entertainment
Appendix E

Visitor Characteristics of Hockey Hall of Fame Participants
Visitor Characteristics of Hockey Hall of Fame Participants

Domain Knowledge. An objective hockey player recognition checklist, measuring domain exposure, was used as a measure of domain knowledge. Each participant's score was tabulated by calculating the proportion of real player names that were identified minus the proportion of foils identified. Some visitors identified more foils than real players, thus a negative result could occur. The mean and standard deviation player exposure recognition was 46 ± 35% (range -28 to 100). Since the range was so wide, the median (54% recognition) was calculated to determine if it was similar to the mean. It was very close to the average of 46%, and since very few visitors fell between the 46% and 54% recognition rate, the mean appeared to be a reasonable point to separate visitors into high and low exposure categories. Visitors with a score under the mean were classified as low hockey knowledge, and visitors over the mean were classified as high hockey knowledge. High hockey knowledge participants consisted of 49% of the participants, while low hockey knowledge participants consisted of 51% of the participants.

Personal Interest. The mean (with standard deviation) rank-order of the value placed on watching hockey was 1.9 ± 1.2 (1 being the most valued out of 5 choices). Fifty-four percent of the participants ranked watching hockey as their first choice.

The mean (with standard deviation) rank-order of visitors' self-evaluation of hockey knowledge, relative to other activities, was 1.8±1.1. Of the participants, 56%, reported that knowledge of hockey was the topic they knew the most about relative to the other activities which were rank-ordered (ranked as their first choice).

Visitors who ranked watching hockey as their most valued activity were classified
as high interest and visitors who ranked watching hockey their second to fifth choice were classified as low interest.

Even though personal interest was associated with the level of hockey involvement, I asked a small sample of the general public, who reportedly never would attend the hockey hall to rank the same activities which measured value placed on activities at the art gallery and hockey hall. I wanted to determine whether there would be a large difference between visitors who attend the hall, but report they have no hockey involvement, and people who would not attend the hockey hall. A total of ten people completed the ranking system.

The relative value of watching hockey was: 60% of participants ranked it as their third choice, 20% of participants ranked it as their last choice, and 20% could not complete the ranking scale because none of the activities were valued. This finding suggests that there was a large difference between the rankings of individuals who would never attend the hockey hall, and visitors at the hockey hall who report not being involved in hockey; apparently to attend the hockey hall was associated with a higher value placed on viewing hockey.
Appendix F

Relationship between Hockey Involvement and Playing and Personal Interest (based on Value placed on Watching Hockey)
Relationship between Hockey Involvement and Playing and Personal Interest (based on Value placed of Watching Hockey)

Hockey Knowledge. In order to verify that the personal interest measure differentiated between visitors, the mean rank order of the value placed on watching was tabulated for visitors who endorsed different levels of involvement in hockey.

Table F.1

<table>
<thead>
<tr>
<th>Hockey Involvement</th>
<th>Mean (SD) Rank of Personal Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>1.7 (0.9)</td>
</tr>
<tr>
<td>Watch</td>
<td>1.9 (1.1)</td>
</tr>
<tr>
<td>None</td>
<td>3.8 (1)</td>
</tr>
</tbody>
</table>

As Table F.1 shows, visitors who have a career related to hockey were more likely to rate watching hockey as a valued activity, whereas visitors who reported not being involved in any activities which involves hockey ranked hockey as less valuable. Using a Kruskal-Wallis analysis, the difference in mean rankings was found to be significant ($H (3, 51) = 9.1, p < .05$).
Hockey Playing. To further verify whether the personal interest measure differentiated between visitors, the mean rank order of the value placed on watching was tabulated for visitors who endorsed different levels of hockey playing.

<table>
<thead>
<tr>
<th>Hockey Playing</th>
<th>Mean (SD) Rank of Personal Interesta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Team</td>
<td>1.6 (.9)</td>
</tr>
<tr>
<td>Informal Team</td>
<td>1.8 (1.2)</td>
</tr>
<tr>
<td>Pick-Up</td>
<td>2 (1.4)</td>
</tr>
<tr>
<td>Never</td>
<td>2.2 (1.4)</td>
</tr>
</tbody>
</table>

As Table F.2 shows, visitors who play professional hockey were minimally more likely to rank watching hockey as a valued activity as compared to visitors who never play hockey. Using a Kruskal-Wallis analysis, there was no significant difference found in the mean rankings ($H (3, 51) = 1.3, p > .05$). Perhaps this was the case because opportunities to play hockey were influenced by factors other than personal interest such as work responsibilities.

Overall, the measurement of personal interest by asking visitors to rank how much they value watching hockey appeared to have some internal validity; the rank value of watching hockey was associated with the degree of hockey involvement.
Appendix G

Personal Interest in Hockey (based on Self-Ranked Knowledge and Value) of Hockey Hall of Fame Visitors: Supplemental Memory Analyses
Personal Interest in Hockey (based on Self-Ranked Knowledge and Value) of Hockey Hall of Fame Visitors: Supplemental Memory Analyses

Personal interest, based on knowledge and value, was measured by adding the rank-order placement of how much value was placed on watching hockey and the rank order value of self-assessed hockey knowledge. A Kendal Rank Correlation analysis between the rank ordering of self evaluation of hockey knowledge and value of viewing hockey was $W = .70, p < .05$. This finding indicates a significant level of association.

Visitors who had a total rank order of 2 were categorized as high interest, visitors with a total rank order below 2 were categorized as low interest.

Episodic memory. It was hypothesized that enhanced episodic memory patterns would be associated with the degree of personal interest. There was no significant difference between high and low interest visitors and whether they demonstrated enhanced episodic memory profiles ($X^2 (1, N = 53) = 1.9, p = .17$).

Semantic Memory. To test the hypothesis that visitors with high personal interest in hockey were more likely to demonstrate enhanced semantic memories, a Chi-Square analysis was conducted. There was no significant pattern of results; visitors who had higher personal interest scores were not more likely to have enhanced semantic memories than visitors with a low personal interest in hockey ($X^2 (1, N = 53) = 1.5, p = .23$).
Appendix H

Hockey Hall of Fame: Mean Intensity Ratings of Experience

Dimensions at the time of the Initial and Follow-Up Interview
Hockey Hall of Fame: Mean Intensity Ratings of Experience Dimensions at the time of the Initial and Follow-Up Interview

Participants were asked to assess their experience on a series of dimensions using Likert scales. In Table H.1, the mean intensity ratings of each dimension at each interview time are presented.

Table H.1
Mean Intensity Rating of Experience Dimensions at the time of the Initial and Follow-Up Interviews

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Initial Interview</th>
<th>Follow-Up Interview</th>
<th>T value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarity</td>
<td>5.1 (1.9)</td>
<td>5.3 (1.7)</td>
<td>-1.01</td>
</tr>
<tr>
<td>Memorability</td>
<td>5.7 (1.4)</td>
<td>5.7 (1.6)</td>
<td>-.37</td>
</tr>
<tr>
<td>Social relevance</td>
<td>4.9 (1.6)</td>
<td>5.0 (1.8)</td>
<td>-.63</td>
</tr>
<tr>
<td>Personal relevance</td>
<td>4.9 (1.6)</td>
<td>5.0 (2.0)</td>
<td>-.28</td>
</tr>
</tbody>
</table>

*a_{N} = 57, \ b_{N} = 52.

*p > .05

As shown in Table H.1, over time, visitor ratings of their experience appeared to be stable. In general, ratings were clustered in the high intensity end of the continuum which resulted in a non-normal distribution. A paired Wilcoxon analyses determined that all the dimension ratings remained stable from the time of the initial to follow-up interview.
Appendix I

Art Gallery of Ontario Consent Form
Research on the Impact of Art

We are from the Ontario Institute for Studies in Education. Together with the Art Gallery of Ontario we are conducting research on the impact of visual art. We would be very pleased if you would take part. It will take just a few minutes of your time. We would like to ask you what you which pieces of art stand out in your mind, and your reactions to them. Your participation is voluntary. Please feel free to stop at any time.

If you like, this interview will end your involvement. It would be especially helpful if you would allow us to call you and send you some questions in the mail in about one month about any impressions that remain from your visit. In that case we will need your phone number, first name, and address. Again you are under no obligation. Please feel free to decline to talk to us when we call. After we have called we will destroy our record of your number and address. At no time will your name be revealed to anyone outside our research group, thus your participation will be confidential and completely anonymous.

Though we hope you will be able to take part in this research, we should say that there will be no direct benefit to you, and also that there will be no risk.

If you would like any further information about the project, please contact Professor Keith Oatley, or Maria Medved at the Ontario Institute for Studies in Education, phone 923-6641.

Thank you very much indeed.
Art Gallery of Ontario Questionnaire

Only the follow-up interview is presented because the initial interview was almost exactly the same, but without the post-visit exploration questions, and some of the pieces of art were not elaborated. The measures used to gather visitor characteristics that were collected at the time of the initial interview are presented at end of this questionnaire.

Subject Number: Date: Inter: _

Art Gallery of Ontario - Follow Up Interview (A)

Visitor Interview
Hello, I'm calling from the University of Toronto. A few months ago you participated in a survey at the Art Gallery of Ontario. I'm conducting the follow-up interview. Is now a good time for you? (If not, get a good time to call back.) It won't take too long, about 10-15 minutes.

Many of the questions I'm going to ask you are the same questions you answered in the first interview. What we are trying to see is if people remember anything about their visit. If you can't remember certain thing, that's O.K. When you are answering the questions don't try to remember what you answered the first time, just answer what you think about right now.

I. In the first interview you stated that you found the __________ (fill in artwork title, elaborated/unelaborated) interesting/ uninteresting. Take a moment and imagine it is in front of you.

If you were to tell a friend about this artwork, what would you say? (How would you describe it, technique (brush strokes, style, content, visual details) ?

________________________________________________________

Does it have any meaning for you? If so what?
Did you experience any emotion from your image of the painting? If yes, what was the emotion (show emotion sheet)?

How intense was the emotion compared to what you experience other paintings?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

Did you experience any personal memories? If yes, what was the memory (the emotion and the memory needed)?

How intense was the memory?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

From your image, please rate your experience of the artwork on the following scales as compared to other artworks (show scale sheet).

not at all powerful 1 2 3 4 5 6 7 extremely powerful
not at all challenging 1 2 3 4 5 6 7 extremely challenging
not at all socially relevant 1 2 3 4 5 6 7 extremely socially relevant
not at all complex 1 2 3 4 5 6 7 extremely complex
not at all expressive 1 2 3 4 5 6 7 extremely expressive
not at all familiar 1 2 3 4 5 6 7 extremely familiar
not as all memorable 1 2 3 4 5 6 7 extremely memorable
not at all easy to visualize 1 2 3 4 5 6 7 extremely easy to visualize
all personally meaningful 1 2 3 4 5 6 7 extremely personally meaningful

Did you think of the artwork after you left the museum?

never 0 1 2 3 4 5 6 7+ or can’t remember

If so, what do you think? What made you think of the exhibit (get all)?
Did you talk to anyone about the exhibit after you left the gallery?  
never 0 1 2 3 4 5 6 7+ or can't remember
If so, who? What did you talk about? ________________________________

Did the exhibit affect you in anyway or did you do anything different? For example, cope differently think about art in a new way. ________________________________

Did you look up any information about the exhibit? Did you read any articles about art in a newspaper, or magazine that you wouldn't have before? If so, where/what?

Any other comments? _____________________________________________________________

II. In the first interview you stated that you found the __________________ (fill in artwork title, elaborated/unelaborated) interesting/uninteresting. Take a moment and imagine it is in front of you.
If you were to tell a friend about this artwork, what would you say (What would you describe it, technique, brush strokes, style)?

Does it have any meaning for you? If so, what? _____________________________________________

Did you experience any emotion from your image of the painting? If yes, what was the emotion (show emotion sheet)? ______
How intense was the emotion compared to what you experience other paintings?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

Did you experience any personal memories? If yes, what was the memory (the emotion
and the memory needed?

<table>
<thead>
<tr>
<th>How intense was the memory?</th>
<th>barely noticeable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>as intense as ever felt</th>
</tr>
</thead>
</table>

From your image, please rate your experience of the artwork on the following scales as compared to other artworks (show scale sheet).

<table>
<thead>
<tr>
<th>not at all powerful</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>extremely powerful</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all challenging</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely challenging</td>
</tr>
<tr>
<td>not at all socially relevant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely socially relevant</td>
</tr>
<tr>
<td>not at all complex</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely complex</td>
</tr>
<tr>
<td>not at all expressive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely expressive</td>
</tr>
<tr>
<td>not at all familiar</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely familiar</td>
</tr>
<tr>
<td>not as all memorable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely memorable</td>
</tr>
<tr>
<td>not at all easy to visualize</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely easy to visualize</td>
</tr>
<tr>
<td>all personally meaningful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>extremely personally meaningful</td>
</tr>
</tbody>
</table>

Did you think of the artwork after you left the museum?

<table>
<thead>
<tr>
<th>never</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7+ or can’t remember</th>
</tr>
</thead>
</table>

If so, what do you think? What made you think of the exhibit (get all)?

Did you talk to anyone about the exhibit after you left the gallery?

<table>
<thead>
<tr>
<th>never</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7+ or can’t remember</th>
</tr>
</thead>
</table>

If so, who? What did you talk about (get all)?

Did the exhibit affect you in anyway or did you do anything different? For example, cope differently think about art in a new way.

Did you look up any information about the exhibit? Did you read any articles about art in a newspaper, or magazine that you wouldn’t have before? If so, where/what?
III. In the first interview you stated that you found the (fill in artwork title, elaborated/unelaborated) interesting/uninteresting. Take a moment and imagine it is in front of you.

If you were to tell a friend about this artwork, what would you say (What would you describe it, technique, brush strokes, style)?

____________________________________________________________________

____________________________________________________________________

Does it have any meaning for you? If so, what?

____________________________________________________________________

____________________________________________________________________

Did you experience any emotion from your image of the painting? If yes, what was the emotion (show emotion sheet)?

How intense was the emotion compared to what you experience other paintings?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

Did you experience any personal memories? If yes, what was the memory (the emotion and the memory needed)?

____________________________________________________________________

____________________________________________________________________

How intense was the memory?

barely noticeable 1 2 3 4 5 6 7 as intense as ever felt

From your image, please rate your experience of the artwork on the following scales as compared to other artworks (show scale sheet).

not at all powerful 1 2 3 4 5 6 7 extremely powerful
not at all challenging 1 2 3 4 5 6 7 extremely challenging
not at all socially relevant 1 2 3 4 5 6 7 extremely socially relevant
not at all complex 1 2 3 4 5 6 7 extremely complex

Any other comments? ____________________________________________________
Did you think of the artwork after you left the museum?
never 0 1 2 3 4 5 6 7+ or can't remember
If so, what do you think? What made you think of the exhibit (get all)?

Did you talk to anyone about the exhibit after you left the gallery?
never 0 1 2 3 4 5 6 7+ or can't remember
If so, who? What did you talk about (get all)?

Did the exhibit affect you in anyway or did you do anything different? for example, cope differently think about art in a new way.

Did you look up any information about the exhibit? Did you read any articles about art in a newspaper, or magazine that you wouldn't have before If so, where/what?

Any other comments?

Thank you very much for your help.

Would it be O.K. to call you again sometime in the future? yes or no
Visitor Characteristics

Please complete the following questions and return to the interviewer. Please ask if you have any questions, please do not hesitate to ask.

Please put a mark beside any statement which describes you. Mark as many as needed.

___ I have formal technique training and/or am a professional painter.
___ I have taken a course(s) about painting techniques.
___ I occasionally paint and have not taken a course.
___ I have almost never or never paint.

Please put a mark beside any statement which describes you. Mark as many as needed.

___ I have a degree in art history or art-related field.
___ I have taken a course (at least one) about art history.
___ I read articles about art in the newspaper.
___ I do not or rarely follow art at all.

Here is a list of names. Some are real visual artists and some are not. See if you can recognize the real artists and place a “X” beside their name. Do not guess, but check off those you know to be artists. Remember some of the names are not visual artists.

___ Bernini ___ Catney  ___ Miro
___ Goya ___ Gericault
___ Frost ___ Tereposki
___ Bruegel ___ Vermeer
___ Nelson ___ Titian
___ Caravaggio ___ Hengst
___ Sardini

Please rank order from 1 to 5 the activities you did the most in the last year (1 being the activity you did the most, 5 being the activity you did the least):

___ visit galleries ___ play card games
___ read a book ___ go to movie theatre
___ attend hockey event
Please rank order from 1 to 5, the activities which you have the most knowledge
(1 being the topic you know the most, 5 being the topic you know the least):

- art
- hockey
- books
- card games
- movies

Please rank order from 1 to 5, the activities you value the most
(1 being the activity you value the most, 5 being the activity you value the least):

- going to hockey games
- reading books
- viewing art
- going to movies
- going to the mall to browse/shop

Think about your visit to the Art Gallery of Ontario. Place a mark beside the main reason
for you visit. (Mark only one)

- An opportunity to understand and interpret the world around you.
- An opportunity to stimulate your mind.
- An opportunity to enjoy as social outing with friends/family.
- An opportunity for entertainment
Appendix K

Visitor Characteristics of Art Gallery of Ontario

Participants
Visitor Characteristics of Art Gallery of Ontario Visitors

Domain Knowledge. An objective artist recognition checklist, measuring domain exposure, was used as a measure of domain knowledge. Each participant's score was tabulated by calculating the proportion of real artist names that were identified minus the proportion of foils identified. Some visitors identified more foils than real players, thus a negative result could occur. The mean and standard deviation artist exposure recognition was $53 \pm 36\%$ (range -38 to 100). Since the range was so wide, the median (50% recognition) was calculated to determine if it was similar to the mean. This was very close to the average of 53% and since no visitors fell between the 50% and 55% recognition rate, the mean appeared to be a reasonable point to separate visitors into exposure categories. Visitors with a score under the mean were classified as low art knowledge, and visitors over the mean were classified as high art knowledge. High art knowledge participants consisted of 51% of the participants, while low art knowledge participants consisted of 49% of the participants.

Personal Interest. The mean (with standard deviation) rank-order of the value placed on viewing art was $2.1 \pm 1.1$ (1 being the most valued out of 5 choices). Thirty-six percent of the participants ranked viewing art as their first choice.

The mean (with standard deviation) rank-order of visitors' self-evaluation of art knowledge, relative to other activities, was $2.8 \pm 1.4$. Of the participants, 25%, reported that knowledge of art was the topic they knew the most relative to the other activities which were rank-ordered (ranked as their first choice).

Visitors who ranked viewing art as their most valued activity were classified as high interest and visitors who ranked viewing art their second to fifth choice were classified as low interest.
Appendix L

Relationship between Art Involvement and Generation, and Personal Interest (based on Value place on Viewing Art)
Relationship between Art Involvement and Generation, and Personal Interest (based on Value of Viewing Art)

Art Involvement. In order to verify whether the personal interest ranking system differentiated between visitors, the mean rank order of the value placed on viewing art was tabulated for visitors who endorsed different levels of art knowledge.

Table L.1
Mean Rank (SD) of Personal Interest in Art According to Art History Involvement

<table>
<thead>
<tr>
<th>Art History Knowledge</th>
<th>Mean (SD) Rank of Personal Interest^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>1.2 (.6)</td>
</tr>
<tr>
<td>Course(s)</td>
<td>1.9 (1)</td>
</tr>
<tr>
<td>Read Articles</td>
<td>2.5 (1)</td>
</tr>
<tr>
<td>None</td>
<td>3(1.5)</td>
</tr>
</tbody>
</table>

^a n = 63

As Table L.1 shows, visitors who have a degree in art were likely to rank viewing art as a valued activity, whereas visitors who have no art education rank viewing art as less valued activity. Using a Kruskal-Wallis analysis, the difference in mean rankings was found to be significant (H (3, 63) = 16.2, p < .05).
Art Generation. The mean rank order with standard deviation of the value placed on viewing art was tabulated for visitors who endorsed different levels of art generation.

Table L.2
Mean Rank (SD) of Personal Interest in Art According to Art Generation

<table>
<thead>
<tr>
<th>Art Generation</th>
<th>Mean (SD) Rank of Personal Interest³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>1.3 (.5)</td>
</tr>
<tr>
<td>Courses</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Occasional</td>
<td>2.1 (1.3)</td>
</tr>
<tr>
<td>Never</td>
<td>2.7 (1.3)</td>
</tr>
</tbody>
</table>

n = 63

As Table L.1 shows, visitors who have professional artists were likely to rank viewing art as a valued activity, whereas visitors who have do not generate art rank viewing art as less valuable. Using a Kruskal-Wallis analysis, the difference in mean rankings was found to be significant (H(3, 61) = 12, p < .05).

Overall, the measurement of personal interest by asking visitors to rank how much they value viewing art appears to have a significant degree of internal validity; the rank value of viewing art was associated both with art education and generation.

Even though personal interest was associated with the level of art involvement and generation, I asked a small sample of the general public, who reportedly never (not in the past five years) visit art galleries, to rank the same activities which measured value placed on activities at the art gallery and hockey hall. I wanted to determine whether
there would be a large difference between visitors who attend the gallery, but report
they have no art knowledge or never generate art, and people do not attend galleries. A
total of ten people completed the ranking system.

The relative value of viewing art was: 20% of participants ranked it as their third
choice, 60% of participants ranked it as their last choice, and 20% could not complete the
ranking scale because none of the activities were valued. This finding suggests that
there was a large difference between the rankings of individuals who never attend
galleries, and visitors at a gallery who report not being involved in art; apparently to
attend a gallery was associated with a higher value placed on viewing art.
Appendix M

Personal Interest (based on Self-Ranked Knowledge and Value of Viewing Art) of Art Gallery of Ontario Visitors: Supplemental Memory Analysis
Personal interest, based on knowledge and value, was measured by adding the rank order placement of how much value was placed on viewing art and the rank order value of self-assessed art knowledge. A Kendall Rank Correlation analysis between the rank ordering of self evaluation of art knowledge and value of viewing art revealed a significant level of association, \( W = .46, p < .05 \).

Visitors who had a total rank order of 2 were categorized as high interest, visitors with a total rank order below 2 were categorized as low interest.

Episodic memory. It was hypothesized that enhanced episodic memory patterns would be associated with the degree of personal interest. There was no significant difference between high and low interest visitors and whether they demonstrated enhanced episodic memory profiles (\( X^2 (1, N = 54) = .26, p = .61 \)).

Semantic Memory. To test the hypothesis that visitors with high personal interest in art were more likely to demonstrate enhanced semantic memories, a Chi-Square analysis was conducted. There was no significant pattern of results; visitors who had higher personal interest scores were not more likely to have enhanced semantic memories than visitors with a low personal interest in art (\( X^2 (1, N = 59) = .54, p = .46 \)).
Appendix N

Art Gallery of Ontario: Mean Intensity Rating of Experience Dimensions

at the time of the Initial and Follow-Up Interviews
Art Gallery of Ontario: Mean Intensity Rating of Experience Dimensions at the time of the Initial and Follow-Up Interviews

In this section, participants were asked to assess their experience on a series of dimensions using Likert scales.

Table N.1

Mean Intensity Rating of Experience Dimensions at the time of the Initial and Follow-Up Interview

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Initial Interview</th>
<th>Follow-Up Interview</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>5.5 (1.4)</td>
<td>5.5 (1.2)</td>
<td>-.51</td>
</tr>
<tr>
<td>Challenge</td>
<td>4.8 (1.8)</td>
<td>4.9 (1.5)</td>
<td>-.22</td>
</tr>
<tr>
<td>Complexity</td>
<td>4.8 (1.6)</td>
<td>4.5 (1.7)</td>
<td>-.85</td>
</tr>
<tr>
<td>Expressiveness</td>
<td>6.0 (1.3)</td>
<td>5.8 (1.1)</td>
<td>-1.2</td>
</tr>
<tr>
<td>Familiarity</td>
<td>5.1 (1.3)</td>
<td>5.2 (1.6)</td>
<td>-.38</td>
</tr>
<tr>
<td>Visualizability</td>
<td>5.8 (1.5)</td>
<td>5.5 (1.4)</td>
<td>-1.61</td>
</tr>
<tr>
<td>Memorability</td>
<td>6.0 (1.3)</td>
<td>5.9 (1.3)</td>
<td>-.78</td>
</tr>
<tr>
<td>Social relevance</td>
<td>4.6 (2.0)</td>
<td>4.6 (1.7)</td>
<td>-.59</td>
</tr>
<tr>
<td>Personal relevance</td>
<td>5.2 (1.8)</td>
<td>4.7 (1.9)</td>
<td>-2.64*</td>
</tr>
</tbody>
</table>

* p < .05
Note that in Table N.1, visitor ratings of their experience appear relatively stable over time. In general, ratings were clustered in the high intensity end of the continuum resulting in a non-normal distribution. A paired Wilcoxon analysis was used to determine whether the dimensions remained stable from the time of the initial to the follow-up interview. The dimension, personal relevance, was the only one in which there was a significant change in rating; in the follow-up interview, ratings of personal relevance were significantly lower.