

Museums for Memory:
Exploring Design Elements That May Enhance Memory Recall
In Aging Individuals With Mild Cognitive Impairment (MCI)

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ABSTRACT

Millions of US aging individuals are at risk for mild cognitive impairment (MCI), the early stage of Alzheimer's disease (Ad). Ad is progressive; there is no clinical cure to date. Certain drugs treat symptoms yet fog memory. Memory activity is critical to strengthen cognition. The Phoenix Art Museum (PAM) and Banner Alzheimer's Institute (BAI) founded the Arts Engagement Program (AEP), a non-clinical, specialized arts program for adults with (MCI) and their caregiver. The museum environment is thought to enhance communication and raise self-esteem in certain MCI individuals. The interior surroundings may spurn memory enhancement. Scholarship to substantiate this theory is minimal; therefore, further studies are required. Empirical literature regarding design elements researched specific types of memory impairment was employed. The hypotheses that design elements of the museum's infrastructure and design elements from art themes enhance memory, and the results of these findings when applied to other environments enhance memory emerged. An experience-based study was performed. Semi-structured interviews noting design elements of both infrastructure and art were conducted after each of nine AEP sessions with volunteers from 8 dyads, a term used by the PAM as one caregiver and one MCI individual. The presiding docent was later interviewed. Volunteer interviews with dyads and docents was coded and ranked. Overlapping themes that tallied five or higher were considered significant due the low sample size. Results showed that neither group considered infrastructure design elements or art theme design elements a contributor to memory enhancement. The hypotheses proved null. Both groups expressed pleasure in experiencing the PAM's environment. Keywords: MCI, infrastructure, art themes.

DEDICATION

This thesis is dedicated to the memory of my parents. Without their devoted love and encouragement to do whatever I chose in life, I may not have sought this journey to achieve a master's degree at the age of 65. It is to thank my husband Robert for his support. It is for the memory of my dear friend, Ms. Lois Wells, who loved ASU and design. It is to thank Ms. Lezlie Masters, my former supervisor for allowing me to attend the ASU's Master's program while working full time. It is dedicated to every friend, coworker, student, professor and family member for his or her support and encouragement.

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CHAPTER 1

INTRODUCTION

Background

Alzheimer's disease (Ad) continues to threaten the US aging population. The Baby boomer (BB) cohort who has reached age 65 and continues to do so was born in the years 1946-1964. Age 65 is considered senior age and most vulnerable to memory impaired diseases. The US Census Bureau's most recent projection is 88.5 million individuals will be 65 in the year 2050, from those listed at 40.2 million in 2010. (US Census Bureau, 2010, p.1). Medicine has enabled man to live longer; yet there is no clinical cure for either AD, or Mild Cognitive Impairment (MCI) the beginning stage of AD.

Research opinions are divided on whether early detection can determine stages of AD. Snyder (2011, p. 338) refers to diagnosis of (probable) AD requires clinical examination, or the disease is generally found later at postmortem evaluation. Other critiques believe early stages cannot be detected and are also very costly to perform. Disease advancement is elusive and quick, making treatment, at times, too late. Yoon (2011, p.325) states that individuals showing preliminary signs of forgetfulness, yet are able to still function and communicate, is the crucial time to seek help. Whether an individual is prone to AD depends how one has taken care of his/her health, while genetic history and age are factors too.

Recent non-clinical approaches show that an individual's memory may be stimulated and responsive through interaction and involvement in a non-clinical setting, such as the art museum. The Phoenix Art Museum (PAM) and Banner Alzheimer's Institute (BAI)

founded the Arts Engagement Program (AEP) in 2007 for MCI individuals and their caregiver. The mission of the AEP states: “Involvement in the arts contributes to overall quality of life (QOL) by offering companionship and community participation” (Phoenix Art Museum brochure, 2007).

This experience based study was conducted at the PAM during AEP spring and summer sessions in 2014. Two hypotheses formed from the study: 1.) AEP docents and dyads noted elements of design from the museum’s infrastructure and design elements from art themes that enhance memory recall and 2.) noted elements as applied to other environments enhance memory recall. As there is yet no cure for AD, non-clinical approaches as museum activities that encourage MCI individuals to communicate with society, encourage self-esteem, may also enhance memory. Moro (2013, p. 121) states that since drugs are of limited benefit, cognitive stimulation represents a significant opportunity for secondary prevention.

Justification and Significance

The Federal Government spends more than \$100 billion on clinical research seeking a cure for AD (Alzheimer’s Disease Study Group, 2008). The massive effect of BB leaving the workforce daily, and those requiring immediate Medicare and Medicaid needs will greatly impact the nation’s economy. “The historic National Plan to Address Alzheimer's Disease, released by the U.S. Department of Health and Human Services in May 2012 and updated annually, calls for preventing and effectively treating Alzheimer's disease by 2025.” Retrieved from

<http://www.alzfdn.org/AboutAlzheimers/treatment.html>.

Individuals with cognitive impairment continue to lose communication skills and

contact with society daily. Caregivers who tirelessly provide for memory-impaired individuals are at personal health risk through exhaustive measures of daily caregiving. This may impact the caregiver, requiring their own hospitalization and additional escalation in healthcare cost.

Richardson (2013) noted that non-pharmacological interventions such as museum programs may reduce impact for both the memory impaired individual and caregiver, and improve QOL.

Integrating both clinical and non-clinical approaches for individuals in the early stages of MCI is thought to be the best initiative to prolonging disease advancement. According to Hattori (2011, p. 431) “the well-balanced administration of drug and non-pharmacological therapies is a matter of basic importance in the therapeutic strategy for AD.”

Future studies are required to seek out design elements that may trigger memory enhancement. Empirical research recognizes that early levels of memory impairment in individuals still allow them to enjoy the beauty and comfort in their surroundings. Halpern (2008, p. 65) noted: “we conclude that aesthetic responses can be preserved in the face of cognitive decline.”

Based upon empirical literature collected, research questions were developed of which one specifically references vision. As noted by Anderson (2013, p. 36) that searching the visual world is a complicated process in general. He refers to the overt attention, where the eyes move, and the covert attention upon objects that are selected for further processing. Normal and impaired vision seek to find meaning in the world they view and replicate meaning whether it is in a healthy or impaired brain.

As Rhoads (2009, p.8) notes that museums must extend research into looking at what more can be done in the museum to aide in memory recall. The endeavor to seek out the museum's elements of design in infrastructure and art theme design elements as enhancing memory is in early stages. Forging new territories in enhancing memory recall for MCI individuals is imperative to the US and global aging community. New research may lead to a non-clinical approach to assist many people that will fall prey to AD and dementia disease. As previously stated in this Abstract, there is no clinical cure to date for dementia related disease. Museum engagement programs now show that individuals with memory impairment elevate an individual's QOL and self-esteem. The ability to incorporate the collective elements of design from the infrastructure and art in the contribution to memory enhancement is a required study. The following questions were developed from this rationale and the literature review:

1. What design elements of the museum's infrastructure and art theme elements as observed by dyads and docents while attending the PAM's AEP enhance memory recall?
2. Will noted design elements when applied to other built environments enhance memory recall?

Definitions and Abbreviations

AD, museum history, design elements of the museum infrastructure, and foundation for art engagement programs as justification for a non-clinical approach to enhancing memory are discussed and defined.

Alzheimer's disease (Ad). Ad is a common form of dementia characterized by progressive deterioration of cognitive abilities and memory, resulting in executive dysfunction, behavioral disturbances, and impairment in the patient's ability to

communicate and complete the activities associated with daily living (Erder, et al., 2012, p. 474).

Mild Cognitive Impairment (MCI). Barry Reisberg, M.D., clinical director of the New York University School of Medicine's Silberstein Aging and Dementia Research Center notes:

Very mild cognitive decline (may be normal age-related changes or earliest signs of Alzheimer's disease). The person may feel as if he or she is having memory lapses — forgetting familiar words or the location of everyday objects. Friends, family or co-workers can detect during a medical examination or no symptoms of dementia.

Retrieved from:

http://www.alz.org/alzheimers_disease_stages_of_alzheimers.asp#stage2

Dementia.

Dementia is a general term for a decline in mental ability severe enough to interfere with daily life. Memory loss is an example. Alzheimer's is the most common type of dementia. Dementia is not a specific disease. It's an overall term that describes a wide range of symptoms associated with a decline in memory or other thinking skills severe enough to reduce a person's ability to perform everyday activities. [Alzheimer's disease](#) accounts for 60 to 80 percent of cases. [Vascular dementia](#), which occurs after a stroke, is the second most common dementia type. But there are many other conditions

that can cause symptoms of dementia, including some that are reversible, such as thyroid problems and vitamin deficiencies. Dementia is often incorrectly referred to as "senility" or "senile dementia," which reflects the formerly widespread but incorrect belief that serious mental decline is a normal part of aging. Retrieved from:

<http://www.alz.org/what-is-dementia.asp>. (2015, p. 2).

Binding. In cognition, binding is referred to as the mechanism responsible for representing different pieces of information such as names and faces, colors, and shapes into unified objects (Parra, 2009, p.1943).

Clinical (Pharmacological). Of or relating to a place where medical treatment is given of or relating to a clinic.

Retrieved from: www.merriam-webster.com/dictionary/clinical.

Non-Clinical (non-pharmacological). Referring to treatment without the use of drugs and outside clinics. Non-clinical environments such as museums are believed to benefit individuals by not producing a stigma as “patient” within a hospital. This has been known to help build a feeling of comfort and therefore promote self-esteem.

Baby Boomer (BB). A Baby Boomer was born during the demographic Post World War II years of 1946 and 1964, (U.S. Census Bureau, p. 2).

The Phoenix Art Museum (PAM).

The museum located in Arizona, is 285,000-square-foot (26,500 m²).

The museum hosts a vast collection of international artwork as well as over 18,000 works of American, Asian, European, Latin American,

Western American, modern and contemporary art, and fashion design. It has been a hub of community activity since 1959 and hosts year-round programs of festivals, live performances, independent art films and educational programs.

Retrieved from: <http://www.phxart.org/visit/aboutus/historyandmission>.

Arts Engagement Program (AEP). Adults with MCI and other dementia, together with their caregiver attend specialized art presentation programs at the Phoenix Art Museum, Phoenix, AZ. The Arts Engagement Program is an innovative approach that brings the benefits of visual and/or performing arts to individuals with Alzheimer's disease (and other dementias) and their care partners. Recent research suggests that involvement in arts and culture activities contribute to overall quality of life (QOL) by offering meaningful opportunities for companionship and community participation (Phoenix Art Museum handout brochure to patrons of the museum 2014).

Docent. As defined by the Associate Curator of Education at the Phoenix Art Museum (2014), A docent is a title given to persons who serve as guides and educators for the institutions they serve, usually on a voluntary basis at museums in general.

Dyad. Dyad is an internal name given by PAM for the MCI individual and caregiver (Associate Curator of Education, the Phoenix Art Museum 2014).

Caregiver. A family member or paid helper who regularly looks after a child or a sick, elderly, or disabled person with his or her activities of daily living. Erder (2012, p. 475) states: "With a growing emphasis on ambulatory rather than institutional care, the burden of caring for people with AD often falls upon the patient's family members who serve as informal caregivers."

Experience Based Design (EBD). Designing and improving experiences for patients, social care services, caregivers, staff and family members is the goal of experienced based design as developed by the National Health Services Institute for Innovation and Improvement (NHSI) in the UK. The approach captures experiences of those involved primarily with health services, but not limited to only this application. The evidence based design approach and philosophy is to deliver care that leave patients feeling safer, happier and more valued, and making staff feel more positive, rewarded and empowered. The NHS Institute was established in July 2005 to support the transformation of the NHS, through innovation, improvement and the adoption of best practice. Best practice from evidence based design standards is defined as: “A methodology for creating healthcare environments, informed by credible research to achieve the best possible outcomes and examine designs for subsequent decision-making (Newcomb, 2011, Ulrich, 2004). The experience-based philosophy is:

Using experience to design better healthcare is unique in the way that it focuses so strongly on capturing and understanding patients', caregivers' and staff experiences of services; not just their views of the process like the speed and efficiency at which they travel through the system. Instead, this approach deliberately draws out the subjective, personal feelings a patient and caregiver experiences at crucial points in the care pathway.

Retrieved from:

http://www.institute.nhs.uk/quality_and_value/experienced_based_design/the_ebd_approach_%28experience_based_design%29.html#sthash.t0SoGxPG.dpuf

Museum of Modern Art (MoMA), New York City. “Meet Me at the MoMA,” a program designed for individuals with dementia and their caregiver, originated at the Museum of Modern Art (MoMA), NY and funded by MetLife in 2007. The Museum and New York University (NYU) researchers studied the program’s participants, both quantitatively and qualitatively to evaluate dementia individuals and their caregiver’s responsiveness to aspects of the art program. Individuals noted that their self-esteem was enhanced through attending the program. The group census determined “Meet Me at the MoMA” are ingredients for continued success due in large to its structure and program makeup. It lessened agitation in certain AD individuals and enabled opportunities for informal conversation during the art sessions. As noted by one caregiver: “Overall, I believe the experience was intellectually stimulating for my mother and cognitively awakened her” (MoMA participant 2007).

The Museum Built Environment. Newcomb (2011) defines the Museum Built environment as:

The physical spaces, surroundings, furniture, and objects that make up a healthcare setting in which individuals work and heal. This includes design characteristics such as physical layout, ventilation systems, acoustics, access to nature and daylight, artificial lighting, and ergonomics.

Although museums’ are host to many types of patrons, the physical spaces to function and provide a comfortable experience are a requirement to all, least of all those undergoing problems with memory or physical problems.

Infrastructure. Webster defines infrastructure as: the resources (as personnel, buildings, or equipment) required for an activity. Retrieved from:

<http://www.merriam-webster.com/dictionary/infrastructure>.

Art Themes. For the purpose of this thesis subject, art themes include but are not limited to the elements of design used to create art by artists: line, perspective, color, vanishing point, two and three-dimensional art, to name a few.

Theme as defined by Merriam Webster is: the main subject that is being discussed or described in a piece of writing, a movie, etc.

Retrieved from: <http://www.merriam-webster.com/dictionary/theme>

Quality of Life (QOL). The social and emotional well being of caregiver and their loved one (Bartfay, E. & Bartfay, W. J., 2013, p. 98).

Conclusion

Certain MCI individuals attending arts engagement activities have experienced elevated self-esteem. There have also been citations of enhanced communication between caregiver and MCI individual upon attending the arts engagement activities and afterward. Better communication and elevating self-esteem are stimulated senses. The concepts that elements of design in the museum's infrastructure and elements from design in art themes, although new in theory, may also enhance memory. Generally, research focuses on a specific element of design as it relates to an aspect of the brain impairment and how the disease affects the mind. The culmination of elements of design that may cause memory stimulation is an energetic endeavor. It is critical for future studies to build on this topic. The numbers of individuals who may be victim to MCI or other dementia are staggering and may benefit from advanced research as proposed.

Keeping people mentally responsive and part of society helps to protect rise in healthcare cost factors. Strout, (2012, p.196) states that the aging demographic will make a considerable impact on the percentage living with cognitive decline and will present economic challenges to society.

The next chapter presents a conceptual framework posturing the museum's infrastructure of design elements as a means to elevate the museum experience, the AEP, and memory enhancement. The literature reviewed basic aspects of memory impairment and the disease, MoMA and the AEP contributions, historic changes to museum demographics, and elements of design from infrastructure and art themes. Design elements of the museum's infrastructure enhance memory may be in formative stages. However, every effort to advance non-clinical research pursuant to enhancing memory recall must be sought out. "Cognitive decline is one of the most feared consequences of aging" (Strout, 2012).

CHAPTER 2

LITERATURE REVIEW

Introduction

The conceptual framework in Figure 1 is the foundation for this study.

Research conducted by the Museum of Modern Art (MoMA) in quantitative and qualitative studies showed that art elevates positive emotion in people with AD and their caregivers.

Retrieved from: <https://www.moma.org/meetme/resources/index#history>.

The PAM's AEP adapts the same criteria of MoMA in that art engagement leads to increased QOL for both MCI/AD individual and caretaker at the time of the visit and in certain cases goes beyond into home life. These constructs that have been practiced and are advancing the popularity of the AEP and the special role of the presiding docent.

(Interview with PAM Assistant to Education and Docent Liaison, 2013). It is through the presiding docents energetic engagement with the audience that authenticates a closeness of art with the individuals of the AEP. In turn, the caregiver involved, benefits. Interaction between community and socialization that has been missing between the dyads begins to take a turn for the better. Design elements from the museum's infrastructure and art theme elements from the presiding docent presentations are defined and studied in this chapter to bring these elements into the fold as enhancements to memory.

According to Shikder (2012, p. 282) Research suggests that specialized lighting design is essential to cater for the elderly users of a building because of reduced visual performance with increased age. In this exploratory study, the elements of design enhance memory.

Refer to the second tier conceptual framework page 13 specific reference to individual listings within the conceptual framework.

The literature review includes the aging BB cohort, caregiver, and the aging global relevance, which are pertinent to this study. The embodiment of this information provides parameters for Chapter III Methodology.

Conceptual Framework

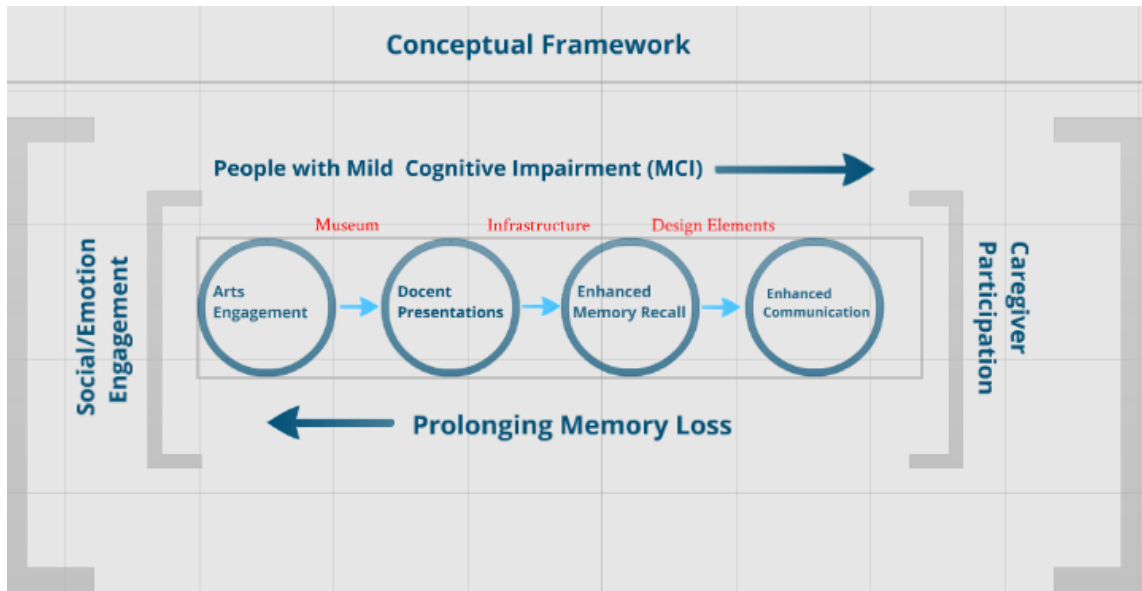


Figure 1. Components to a non-clinical approach that may enhance memory through museum environment and activity.

2nd Tier Conceptual Framework

A second tier conceptual framework follows to clarify subjects noted in the conceptual framework:

Art Engagement: AEP – A Museum’s Non Clinical Intervention Program, see page 15.

Docent Presentations: see AEP Docents, see page 17.

Enhanced Memory Recall: The museum experience (both structurally and programmatically) can be designed to provide an environment in which recall can be

spontaneous or contemplative, thus resulting in cognitive strengthening. (Camic, et al. 2013,

p.67).

Enhanced Communication: “It is of great importance to structure non-pharmacological interventions which increase the seniors’ cognitive reserves” (Teixeira, 2011, p. 175).

Museum Changes: see page 16.

Infrastructure: (Museum Infrastructure Elements): see page 18.

Design Elements: see pages 18, 19, 20.

People with Mild Cognitive Impairment (MCI): see page 15.

Caregiver Participation: see page 21.

Prolonging Memory Loss; see: Museum Changes: To Benefit A Variety of Attendees: see page 16. “Reminiscence assists people with dementia in connecting with and verbalizing about the past through the use of memory aids like photos and personal objects” (Rhoads, 2009, p.1).

Social/Emotional Engagement:

Silverman suggests that museums contribute to the pursuit of health and well-being in five major ways: Promoting relaxation; an immediate intervention of beneficial change in physiology, emotions or both; encouraging introspection, which can be beneficial for mental health; fostering health education and acting as public health advocates and enhancing healthcare environments. (Camic , 2013, p. 67)

Literature Review

The following literature amalgamates the complexities of a multi-faceted study striving to work with and aide in assisting individuals while a clinical cure still continues to be discovered for AD.

Discovery of Alzheimer's disease. In 1906 Alois Alzheimer, a German psychiatrist observed in a former patient's brain, severe atrophy and plaque buildup in the nerve cells. People, at the time were unaware of the disease, and considered the aging person to be forgetful and senile, as was expected as part of life. The name was later changed to honor Dr. Alzheimer's original discovery. Over 109 years later, clinical studies continue to seek a pharmaceutical cure for AD and dementia related diseases.

Mild Cognitive Impairment (MCI) and Non-Clinical Intervention. According to Karel, et al. (2012, p. 184) MCI is the intermediate state between normal aging and dementia. Non-clinical studies report that the stage of MCI can be augmented in certain individuals if caught early. The Campaign to Prevent Alzheimer's Disease (PAD2020) has an initiative with the Alzheimer's Association to promote the effort in developing a type of 'cognitive toolbox' that provides a brief cognitive checklist. Frequent assessment over time potentially raises early warning signs of disease advancement. Multimodal interventions are defined as multiple ways to address help for memory impaired individuals. One of five key ways to address multimodal intervention is by walking within the museum environment. Multimodal interventions show promise in the treatment of early Ad.

Pharmaceuticals alone do not constitute balanced treatment of MCI. "There is no consensus in the literature about pharmacological interventions, and it is not recommended the use of medicines for MCI treatment" (Teixeira, 2013, p. 175).

AEP: a museum's non-clinical intervention program. PAM, in conjunction with Banner Alzheimer's Institute (BAI), and funding from an anonymous donor founded the AEP in 2007. The AEP brings the visual arts and performing arts to individuals with AD

and other dementias and their caregivers, similar to the Museum of Modern Art's "Meet Me at the MoMA", a program as a means to enhance communication and reduce stress for dementia individuals and their caregiver. The opportunity to be involved with the arts and cultural activities is considered to add quality of life (QOL), offering meaningful opportunities for engagement and companionship, (Phoenix Art Museum AEP brochure).

Jan Dougherty, (2008) MS, RN, Director, Family and Community Services at Banner Alzheimer Institute, Phoenix, AZ. as part of the team that developed the AEP summarized that non-pharmacological care must be viewed with the same importance as pharmacological research.

Museum Changes: To Benefit a Variety of Attendees. Historically, museums had been imposing edifices seemingly available for only the educated, privileged, and wealthy. These structures housed precious artifacts and seen by only the rarified few. Centuries of gradual change redefined the museum's purpose, while broadening a scope for diversified patronage.

The 20th century introduced the Americans for Disabilities Act (ADA) to provide accessibility in all public buildings including museums. With the start of the 21st century, collaboration among doctors, investors, and influential museums as the MoMA, and the PAM have proven that arts engagement programs are a civic and important aspect for MCI Individuals and their caregiver. "Reminiscence assists people with dementia in connecting with and verbalizing about the past through the use of memory aids like photos and personal objects" (Rhoads, 2009, p.1).

According to George (2013) states that The National Institute on Aging and Alzheimer's Association (NIA/AA) aims to identify and treat the severity in pre-

symptomatic stages. It proposes that societal, political, and economic forces also shape Alzheimer's disease, even though its beginnings are a change in biological makeup. The broadening in scope of avenues to explore in the cure and/or prolonging disease advancement suggests that non-clinical approaches must be included in conjunction with clinical research methods. This is especially true since early stages of the disease are hard to pinpoint.

Museum engagement evokes emotions and stimulates recall. Memorabilia, whether it deals with sports, antique cars, dolls, or animals, stimulates the hippocampus, that part of the brain that acts to "record" information for longer periods of time. Museums cannot determine precisely how people will draw on their motor skills in the process of remembering. The museum experience (both structurally and programmatically) can be designed to provide an environment in which recall can be spontaneous or contemplative, thus resulting in cognitive strengthening. (Camic, et al. 2013, p.67). First time attendees at the AEP are warmly greeted from staff and those they have come to know as other participants.

AEP Docent. The presiding docent is the provider of the topic of discussion and group motivator to enjoy the moment during each AEP session. Volunteer docents at the PAM commit to an eighteen-month training program in art history, museum education theory and practice, and touring strategies. Interested docents apply for the additional AEP docent training. The Associate Curator for Education, the AEP Docent Liaison, and a staff member from Banner Alzheimer's Institute coach these individuals on MCI/dementia behavioral issues and communication strategies. The final decision to grant docent approval for the AEP is evaluated by the AEP team and determine if the

docent's presentation style and demeanor is a good fit in working with these individuals. Docents who have been accepted for this highly respected and most dedicated role are required to develop a topic outline.

Together, the administrative team evaluates the topic outline as created by the presenting docent and concurs if the topic and gallery location are appropriate. The Associate Curator for Education and AEP Docent Liaison observe each group session. After each session, the docents and management staff perform a "wrap up" meeting, designed to discuss the engagement session successes and ways to improve future sessions.

Museum Infrastructure Elements. The combination of structural components within the built environment can include but are not limited to concrete, concrete pillars, gypsum wallboard, wood finishes, fabric wrapped panels, stone, and glass. Stone and textured materials such as aggregate panels as create the element of space and introduce an element of color and texture. Environmental sounds from heating, ventilation, and air conditioning (HVAC) units can be harsh. Water features can offer a soothing affect, both visually and audibly within the museum's environment. It is the blending and balance that provides a pleasant environment for all attending the museum.

Design Elements of Light, Color, Sound and Circulation: affects upon MCI.

A variety of types of light fixtures and lamping produce different colors of light. One of the most critical aspects of infrastructure in the museum is lighting. A combination of artificial and natural light reach color quality, appropriate spotlighting for exhibits as well as ensures safety for circulation. Visual clarity is critical to the enjoyment of the experience. Glare can be an obstacle; harsh shadows may be distracting and almost

frightening to certain visually impaired individuals. For those individuals with memory impairment, insufficient lighting can create a feeling of disorientation. Physical deterioration of the aging eye can prevent a person's enjoyment of space and objects. Poor illumination changes color perception and produce disorientation and coupled with the aging eye, increases disruption and lack of clarity, and other multiple affects (Parra, et al., (2011, p. 1057).

Color is created by light, and is influential to mental functions prompting shape. Color arouses response mechanisms as seen in a red stop sign and its shape. Color stimulates emotions, shapes aesthetics, and brings the familiarity forward, unless the obvious cannot be detected because of poor eyesight. MCI individuals may have reduced recall because of inhibitors of visual processing. Such processing in the mind undergoes multiple areas of analysis to determine color, shape, size, location, etc. and reach perception and memory as integrated units (Kandel et al., 2011, p.1). Diminished vision in the elderly can change color perception. It may improve when light levels are higher yet avoiding glare problems is critical.

Sound as produced by a water feature is an audial and visual pleasantry. Harsh and obtrusive noises from mechanical equipment units impacts how a space is enjoyed; noise can create confusion in individuals with hearing problems. Hearing impairment together with noise related factors might cause disorientation for the older adult with AD impairment.

Floor surfaces may vary, thus causing a change in sound or distraction in a museum. Wall surface materials can be refractive, while others with cloth provide a part sound absorbing quality.

Placement of exhibits and art objects in galleries and throughout the museum's built environment create circulation. Circulation is key to the proximity of viewing art and art objects as well as providing experiences that delight, inform and inspire the guest (Hennessey, 2014, p. 320). Infrastructure is the museum's embodiment of architectural design, engineering, and aesthetics. Space, light, color, aesthetics, and sound create the museum's built environment for activity.

Exhibit spaces employ infrastructure materials that direct circulation and encourage viewpoints. Proper circulation and flow assist people for a more engaging proximity to art and artifact and aid in visual clues that is true for the memory impaired and physically challenged individuals. Circulation lacking in thoughtful orientation can perpetuate confusion in all visitors to a museum. Accessibility to art and art objects affects how people experience, learn, and enjoy exhibits.

Art Theme Elements. Certain art theme elements are, (but not limited to): line, perspective, vanishing point, color, and texture. The elements of art are components or parts of a work of art that can be isolated and defined. At the onset of MCI, shapes can still be defined in the mind, yet as the disease progresses, known shapes may become fractured depending on what part of the brain the disease is affecting.

As with elements of infrastructure, color is significant as a basic element in art as a vehicle for recall. The use of color and texture in art may encourage reminiscence. According to Lloyd –Jones, et al. (2005, p. 44) color provides a perceptual input to implicit memory systems, unconscious or unintentional retrieval, and may be represented at a perceptual level.

Shape is the primary means by which objects are differentiated from one another in

object recognition, with color and surface detail playing an important but secondary role (Biederman, et al., 2008). Shape provides visual memory as a means to index the information. Shape is more identifiable than color because color can strongly vary in an aging individual's vision together with the type of light source available for viewing. Memory has the function to retain information in short term and long-term functions. Short-term memory seeks to resolve the immediate tasks, while long term memory pertains to smell, taste, sound, and some aspects of vision. Communication is a complex process involving numerous brain functions and memory systems. If deterioration is present, methods to prompt aspects of the brain are missing, resulting in malfunction. Historically, Powell (2000, p. 2) noted that a dementing illness inevitably will affect a communicative ability.

The Caregiver. Caregivers search to find ways that best communicate with individuals and loved ones with impending memory loss. The approach in communication is often times difficult due to heightened frustration and emotional drain in communication. The vast majority of caregiving for AD and other dementia patients is provided by family caregivers and are at increased risk for becoming physically and/or mentally ill, secondary to the stresses of caregiving. (Richardson et al., 2013, p.2). Non-pharmacological interventions, Richardson further notes, can reduce the negative impact of caregiver burden on caregiver health, reduce premature institutionalization of patients, and improve QOL for patients, their families, and their loved ones.

The cost of caregiving from a financial standpoint is astronomical in proportion to the average income. AD and dementia related diseases affect all social strata's. Informal caregivers provide care at an estimated cost of \$18B per year and unpaid caregivers

provide more than 17 billion hours of care estimated at \$202B (Strout, et al., 2012, p. 195).

An older yet pertinent document by the (National Alliance for Caregiving ((NAC)) & American Association for Retired Persons ((AARP)), (2004), notes that approximately 25% of US households participate in some type of caregiving for adults over the age of 50, constituting 44.4 million caregivers. With current costs rising daily with healthcare, alternate ways to encourage memory enhancement are imperative. The growth in family caregiving has been associated with an aging US population, coupled with longer life expectancies, reduced services provided by healthcare systems, and reluctance to seek outside assistance (Keeling, 2008).

Impact of the Aging Baby Boomer Cohort. Baby Boomer (BB) was the name given to the post-World War II generation, born between 1946 and 1964. The largest cohort ever to be born to date, BB now the aging population, present a significant concern to their numbers who will need mental care assistance. Coughlin (2013) wrote: “the Baby Boomers are not the first generation to grow old. However, their absolute numbers will move issues associated with their aging to the top of the policy agenda.”

This cohort came of age at a time when the world of medicine developed new vaccines during the late 1940's and 1950's. Vaccines, such as polio and small pox, greatly reduced the spread of these one-time deadly diseases enabling for many a healthy lifestyle as they grew up. Now that great numbers of the BB cohort have past age 65, more and more are faced with memory impairment. The affliction generally begins in an individual's 6th decade of life” (Ward, et al., 2012, p.14).

Global Relevance. In a recent paper entitled “Alzheimer’s disease: a global challenge for the 21st century, (Costa et al. 2011, p. 390), references Dartigues (2009) who reviewed epidemiological data indicating that cases of dementia will increase exponentially over the next 40 years and will involve about 115 million individuals by 2050 To date, treatments for dementia are largely ineffective.

Loneliness is known as one of the four hardships of Asian culture and in old age, followed by health constraints, financial difficulties, and boredom. Aging in all cultures means loss of friends and loved ones, and those who face longevity are subject to emotional loss and generally lack interest in participating socially, thus placing themselves in physical and mental decline. Camic (2013, p. 67) notes that increasing evidence from quantitative and qualitative studies in different countries suggests that arts-based and other cultural programming can reduce adverse psychological and physiological symptoms and are positive determinants for survival, well-being, quality of life and, self-reported health.

“Prescription Art” at Dulwich Picture Gallery, London, England, is a sustainable channel developed to reach out to isolated individuals by partnering with local health officials. Since its inception in 2011, it has expanded to 80 more communities. Similar to “Meet Me At the MoMA” and Arts for Engagement, the program is designed to avoid stigmas and stereotyping about dementia patients. Another example of arts for the elderly in Canterbury, England is a project sponsored by The Department of Applied Psychology at Canterbury Christ Church University and Oxleas National Health Service Foundation Trust.

Hypotheses. The formulation of literature review poses many positive issues from arts engagement programs and activities to both MCI individual and caregiver. The gap lies within the environment that allows all of our physical abilities to participate both in the health body and mind as well as the MCI individual. It is with this understanding that two hypotheses were developed:

Hypothesis I:

Design elements from the museum's infrastructure and art theme elements as identified by the AEP docents and attending dyads enhance memory recall.

Hypothesis II:

Identified design elements by dyads and docents from the AEP enhance memory when implemented in other environments.

Conclusion

The 21st century introduces new measures to address non-clinical approaches as museum engagement. Further specialized studies are required in order to develop the strata of information needed to study the environment that assists in memory enhancement. Additionally, specialized studies are needed to strengthen the viability of this research that would initialize government for non-clinical funding. Continued research studies in regard to design elements, as a pivotal role in enhancing memory recall must be expanded. The Alzheimer's Association has provided people with memory loss, positive reason and hopes to explore arts engagement programs and is being adapted by more museums across the US. In addition, other countries such as the UK and China are adapting similar programs.

The following chapter discusses the methodology used in the experienced based study to observe and interview dyads and docents about design elements from the museum's infrastructure and art themes that collectively may enhance memory.

CHAPTER III

METHODOLOGY

Introduction

The PAM's Administrator of the AEP, the Associate Curator for Education, and the ASU Institution Review Board (IRB) granted the researcher permission to observe dyads and presiding docents at each AEP. There were nine sessions. Data collected from each session included: docent outline (see Appendix D, p. 97), transcribed docent presentations (see Appendix E, partial transcription, p. 113), transcribed docent interview (see Appendix F, partial transcription, p. 116) transcribed volunteer dyad interview (see Appendix G, partial listing, p. 119), photos taken of each session's exhibit gallery, art photos from AEP sessions and researcher's example of a(X4) (see p. 46) formatting of each gallery. During each of the nine presentations, a(X4) format enabled the researcher to capture activity with regard to the exhibit gallery environment at each AEP session.

The presentations were 90 minutes of which 30 minutes was allotted for the group to adjourn to the respective exhibit gallery from the Greenbaum Lobby. Spring Session commenced on Thursday, beginning 2/13/14, skipping one week and ending Thursday, 4/24/14, resulting in a total of six sessions. Summer session commenced on Thursday beginning 5/29/14 ending Thursday 6/26/14 resulting in three sessions. Sessions began at 1 pm and finished at 3 pm. Per the request of the PAM, semi-structured interviews conducted by the researcher were not to include comments or give inference to memory, memory loss or memory impairment with volunteer dyads and docents. The request was based on maintaining a positive experience for dyads, especially the MCI individual to not feel pressured or self conscious about memory impairment. The PAM requested that

by agreeing to join the sessions, engagement with dyads would show positive interaction and follow their philosophy "it is for the moment." The research agreed and accepted the PAMS request. Questions that were later asked of the dyads and docents did not have any connection to the word or term: memory. A short form announcing the researcher's background and study with ASU was given to dyads and docents who volunteered for the interview. The PAM's AEP screening process of MCI individuals attending the sessions was adapted for this study; no additional screening methods were utilized for MCI individuals.

This study employed an experience based design approach from the National Health Service Institute and Improvement, United Kingdom (NHSI). (see p. 8). Methodologies included observational research where Robson (2011, p. 99) noted that there are advantages in carrying out experiments in natural settings, as compared to research in a structured lab experiment, there is less chance of game playing as in a structured environment, and likely to have a more defined analysis in one's design approach.

The researcher recorded and transcribed each of the nine presentations and open discussion. All names were withheld. Each session was 90 minutes of which 30 minutes was allotted the group to adjourn to the exhibit gallery. After transcribing the presentations, key words relating to elements of design in infrastructure and elements of design in art themes were highlighted as a method of coding, then tallied to build mapping of design elements. A specific system such as Leichardt was not used to tally, the elements as the totals were so small. This same process was carried out for interviews with dyads and docents after each AEP session, and final overlapping counts.

Dyads who volunteered for this study were applicants as accepted by the PAM for the

AEP. Semi-structured questions about the exhibit gallery's infrastructure and art topic were asked to volunteer dyads. The questions were as follows:

- a. How did the wall and finishes in creating the space make you feel?
- b. Did lighting, whether natural light or artificial affect how you viewed the exhibit?
- c. How was audibility while viewing the exhibit?
- d. How was the experience of walking to the exhibit from the lobby?
- e. Did you feel or see surface textures that made a difference to the art viewing experience?

Interview time with dyads was between five and ten minutes.

The open-ended responses were recorded with permission and transcribed. All names of volunteer dyads were withheld. The transcriptions were then reviewed for words relating to elements of design and highlighted as a means of coding. The items were tallied without use of any specific system, as the numbers were so small.

Nine presenting docents granted interviews to the researcher. Docents were asked to discuss their views about the museums elements of design in infrastructure and the element of design from art as the gallery they had selected for their AEP session. The same open-ended questions asked to the dyads were posed to the docents. The open-ended responses were recorded with permission and transcribed. All names of docents were withheld. Key words taken from the docent interviews relating to elements of design in infrastructure and elements of design in art themes were coded and tallied per each of the nine sessions. The transcriptions were then reviewed for words relating to elements of design and highlighted as means of coding. The items were tallied without use of any specific system, as the numbers were so small.

The methodology incorporated the literature review from Chapter II with emphasis on the AEP engagement sessions, art theme elements and museum's elements of infrastructure. The consolidation of scholarship was applied to the research questions noted in Chapter I, (see page 4).

Qualifications to attend the AEP As an MCI Applicant

The PAM (2007) established the following questionnaire to qualify MCI individuals for attendance at the AEP:

- Does he or she primarily live at home?
- Has he or she been diagnosed with AD or another dementia by a healthcare professional?
- If so, is he or she in mild to moderate stages? Common symptoms may include difficulty with short-term memory and word-finding; repetitive questions; a decline in ability to plan, organize, perform complex tasks such as managing finances or household chores; and/or needing help with every day tasks.
- Is he or she able to tolerate and maintain focus for a 90-minute program?
- Can he or she express thoughts and feelings in a conversation?
- Is he or she comfortable in a group setting?
- Does he or she have a care partner with whom to attend the series?
- Are both (of you) available on weekday mornings or afternoons to attend all programs in a series?

As noted by the Phoenix Art Museum: If the answers are yes to all questions, the program is right for the MCI individual and participation with their caregiver.

Sample Size N=18

Out of the 9 AEP group sessions, all nine presiding docents volunteered for the semi-structured interview with the researcher. Of the six spring sessions, 7 dyads volunteered, of which one volunteering dyad did not have an opinion. Of the three summer sessions, 4 dyads volunteered, with one dyad not able to comment. The sample size, was 9 docents and 9 dyads, N=18.

Site Description and Access to AEP

The PAM was selected for this research study as an exemplar AEP. The researcher requested permission from the PAM's Associate Curator for Education and AEP Docent Liaison to observe the AEP for spring and summer sessions 2014.

Research of sessions took place in the PAM exhibit galleries as selected by the presiding docent for each AEP session. The AEP sessions took place in the PAM exhibit galleries as selected by the presiding docent. 3 floor plans and 5 galleries locate the AEP sessions for this study: PAM Main Level Plan, see Figure 2 (p. 34), Image 1, Greenbaum Gallery (p. 32); Ullman/Philip C. Curtis Gallery, Images 2,3,4 (pp. 35-37); Steele Gallery, Image 8 (p. 43); PAM Upper Level, see Figure 3, (p. 38), Contemporary Western Art Gallery, Images 5 and 6, (pp. 39, 40); Phoenix Kids Gallery, Image 7, (p. 38); Mezzanine, see Figure 5 (p. 44), Harnett Modern Art Exhibit Gallery, Images 9 & 10, (p.45).

The Associate Curator for Education and AEP Docent Liaison welcomed all individuals at each visit in the Greenbaum Lobby. A few additional docents attended for additional assistance to the dyads and as part of the program's requirements. White and orange nametags were distributed to the dyads to break the size of the groups into two

divisions of 8 dyads each; each docent proceeded to take their group to the respective art gallery for their presentation. At the completion of spring session, the Associate Curator for Education and the AEP Docent Liaison were interviewed about their viewpoint on museum's infrastructure and art topics as tools for memory enhancement. Both agreed that it was necessary for a museum's size to be in place before being able to host an AEP session. A mid-size museum is a minimum requirement, in order to have variety in the art, gallery selections and to showcase the Museum's diverse collection. Second, circulation and adequate space in galleries, especially while other museum tours and visitors are in progress and enjoying the exhibits is essential in order to avoid congestion, confusion, and disorientation to MCI individuals. See Figures 2, 3, 5, PAM floor plans to note locations of exhibit galleries visited in relation to main entrance Image 1. The interview further addressed whether a wide variety of art and sculptural objects allows docents to continue creating diverse topics of interest for the AEP sessions, and both agreed that they were extremely important issue in hosting an engagement program as the AEP. However, neither had significant comment on elements of design in infrastructure and art were, to their knowledge, a major contributor to memory enhancement.

PAM Location: Greenbaum Lobby. See Figure 1 North Wing.



Image 1. PAM Greenbaum Lobby West wall. See Figure 1 main entrance. This image clearly defines the spaciousness, infrastructure element of massive expanses of glass allowing for natural light and shadow effects onto the stone flooring. Photographed with permission of the Phoenix Art Museum.

Each group of dyads and docents met in the Greenbaum Lobby and gathered around the stone benches as the Assistant Director of Education and the Director of the AEP docents announced the presiding docents and introduced the researcher as an observer of the session from ASU. Dyads were divided into two groups, 8 dyads per group, given either white or orange nametags to maintain groupings. Explanation of where each group regarding restrooms and elevators were announced as located on the outside east wall of the Steele Gallery facing the Rhineberg Gallery. Selections of galleries by the presiding docents considered proximity to the elevators, public restrooms, and individual's capacity

to walk a comfortable distance. Groups followed their respective presiding docent to the exhibit gallery to begin the day's AEP.

PAM Main Floor Plan

PAM's Main Level Floor Plan, see Figure 2, illustrates the following spaces that were interactive with AEP: Ullman/ Philip C. Curtis Gallery, and Steele Gallery, main level north.

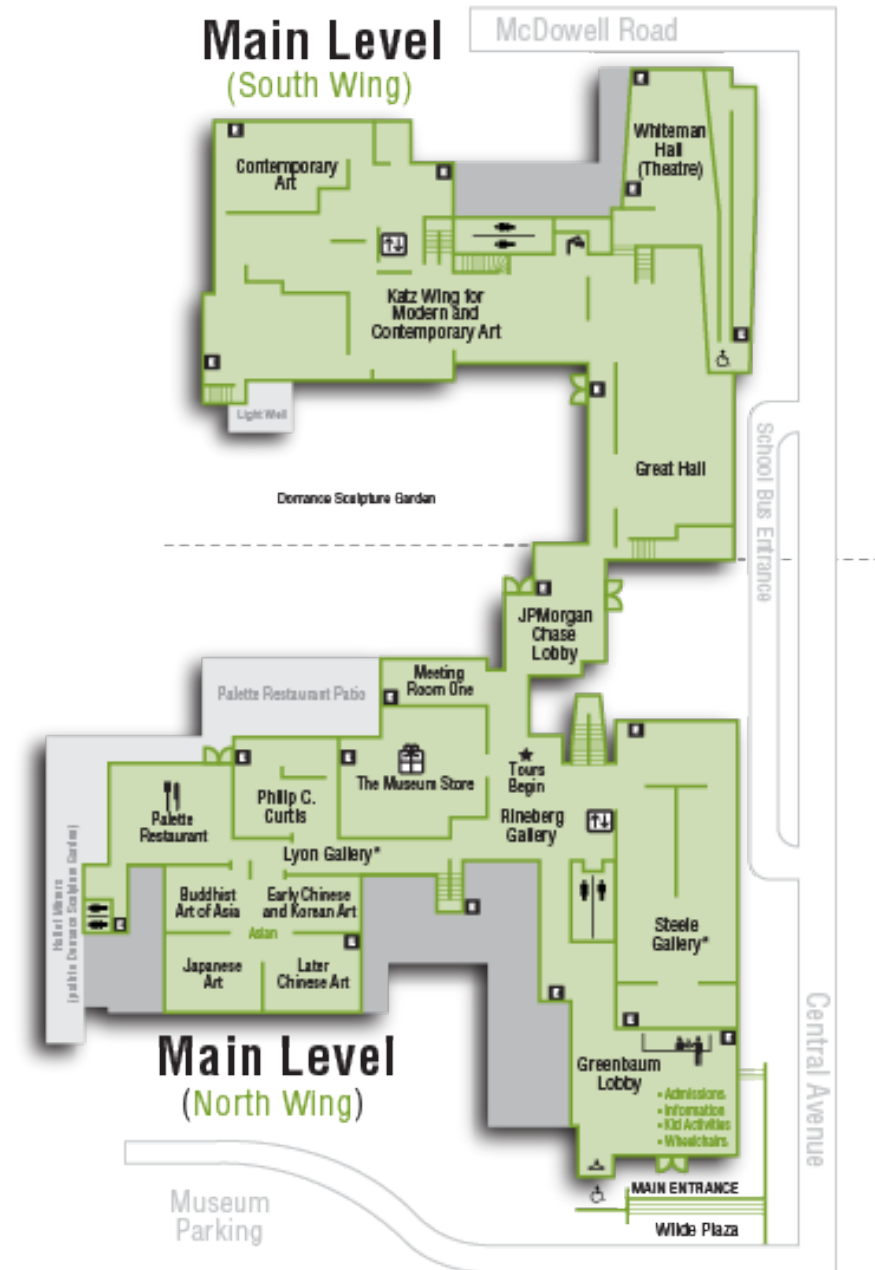


Figure 2. PAM Main Level Floor Plan. Adapted and retrieved from www.phoenixartmuseum.org.

Ullman/ Philip C. Curtis Gallery



Image 2. Ullman/Philip C. Curtis Gallery North Entry Wall. See Figure 1, North Wing for location. PAM Main Floor Plan for gallery location. This image defines significantly the type of infrastructure elements that create this exhibit gallery varied: natural lighting through clerestory windows, artificial light, elements of texture that include carpet, hardwood floors, painted accent wall at entrance. Photographed with permission of the Phoenix Art Museum.

Dyads and docents entered through the main entrance at the north wall location.

Foldable benches were brought in and set in front of the photo to the right of the red structural pilaster perpendicular to the white wall to view the first art piece. Assisting docents, and dyads that were capable of moving the benches then relocated the benches. Each session included a microphone and speaker to ensure that all could hear the presiding docent.



Image 3. “The Fight” by Philip Curtis.

See Image 1. Figure 1. Ullman/Philip C. Curtis Gallery North Wall PAM main level North Wing.

Image Courtesy of the Phoenix Art Museum

Image 3. The first art as presented by the presiding docent discussed by the docent and dyads the predominantly red color, and what this color may mean to each viewer. Dyads and docents exchange ideas about the artist’s theme, meaning of the balcony, the feeling of sunset through the back doors.

Questions by the presiding docent to inspire the audience:

1. Do you think the artwork is unique or different? Why?
2. Do these paintings seem real?

3. Mr. Curtis liked to use color in his artwork. Did you notice the colors? Do you think these paintings tell stories?



Image 4. Ullman/Philip C. Curtis Gallery South Wall. PAM Main Level North Wing. See Figure 1.

The elements of infrastructure on the south wall show use of the former pilaster materials and design reclaimed from the first PAM, and integrated into the expansion (2007). Both artificial and natural light present for art viewing. Ceiling tiles, 2 x 2 tegular, soft white painted walls, wood flooring and carpet create the aesthetic framework for the art. Photographed by permission from PAM.

Figure 3 – PAM Upper Level North Wing

PAM's Upper Level Floor North Plan illustrates the following exhibit spaces that were interactive with AEP: Contemporary Western Gallery, northeast corner; Phoenix Kids Gallery, upper level west side.

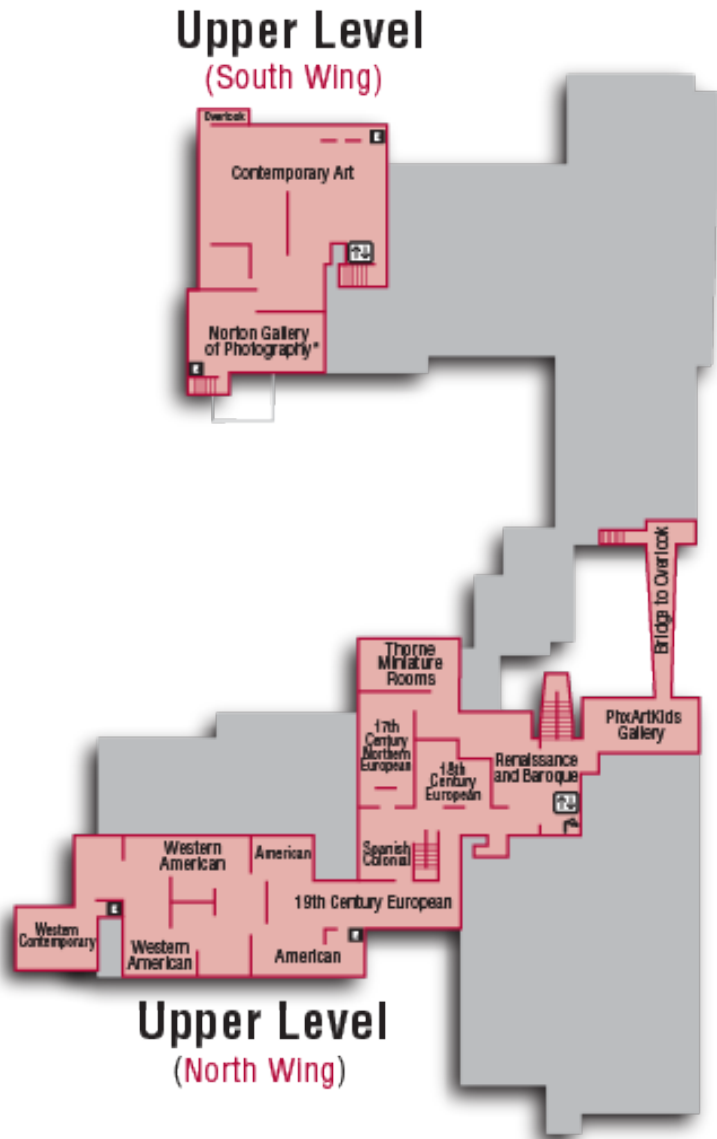


Figure 3. PAM Upper Level Floor Plan, North and South Wing. Western Contemporary Gallery: Northwest Corner Upper Level. Adapted and retrieved from the PAM official brochure and website: www.phoenixartmuseum.org.

Contemporary Western Gallery: Upper Plan PAM. North Wing, Northeast Corner.



Image 5. Contemporary Western Art Gallery. Northeast Corner. North Wing. (See Figure 3). Image clearly defines hard surface infrastructure elements as hardwood flooring, painted dry wall, and tegular ceiling tile. Lighting in the gallery is artificial lighting, there are no windows for natural daylight and was planned accordingly. Photographed with permission of the Phoenix Art Museum.



Image 6. Western Contemporary Art Gallery North Wall

Art title: San Tan Valley

Artist: Howard Post

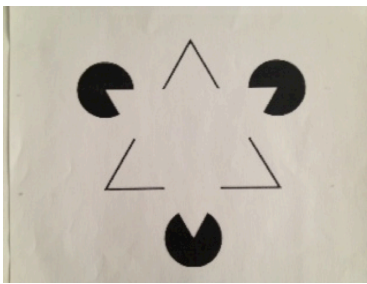
Date: 2010

Image courtesy of the PAM

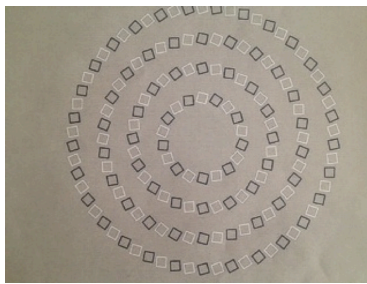
The docent opened her presentation with an “icebreaker” defining elements of design; (see Figure 4), and discussed shape, pattern, line and color. The icebreaker as defined by the AEP is a lead in to start the program that helps dyads feel comfortable with discussion with the docent and others in the group.

After open discussion that lasted approximately 30 minutes, the docent presented the first art subject, naming the artist, the date, and subject matter (Image 6, p. 40). The dyads were asked by the docent if any saw some type of element of design as presented in the icebreaker. The docent proceeded to invite discussion of these elements of art. This led to the audience describing other familiarities of what they perceived suggesting possible time of day based on the light casting shadows, vanishing points of the fence.

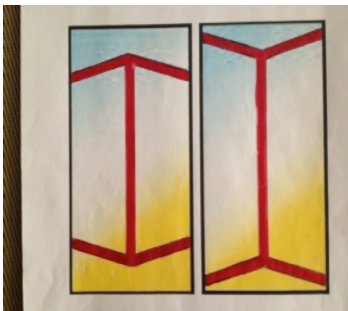
Shape



Pattern



Line



Color

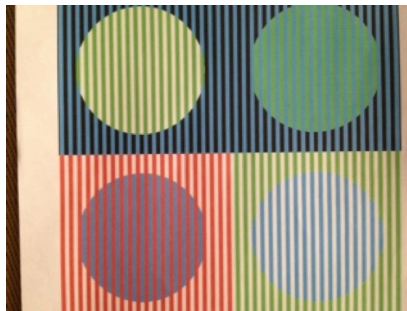


Figure 4: Graphics taken from the Internet by the docent and distributed at the AEP session.

Phoenix Kids Gallery. Upper Plan PAM. North Wing, west.



Image 7. Phoenix Kids Gallery

Elements of Infrastructure: illumination, paint finish on gypsum wallboard, wood floors.
Photo with permission of the Phoenix Art Museum.

Foldable seats were brought in by assisting docents for dyads to sit and view the vignettes. The presiding docent distributed a variety of objects to the dyads as the “icebreaker” and invited discussion as to what vignette they selected for the particular object. There were five vignette locations in the Phoenix Kids Gallery.

AEP Session Steele Gallery. PAM Main Level. Northwest Side.



Image 8, Figure 1: Steele Gallery, Main Level, Northwest view.
Elements of infrastructure shown: finish on wood floors, painted gypsum wallboard, open ceiling grid with suspended lights, casting shadows.
Photo with permission of the Phoenix Art Museum.

AEP Sessions were held in the Steele Gallery. Foldable seats were used at both sessions. On two different occasions, the Steele Gallery's presiding docent discussed art entitled: "Lifelike". These items portrayed objects that were common to everyday life yet were created by the artist from materials that would not appear to be what they are as in the paper bag in the forefront that was made from iron. The dialogue was in this exhibit very enthusiastic from the dyads.

Figure 5 – PAM Mezzanine Level – South Wing

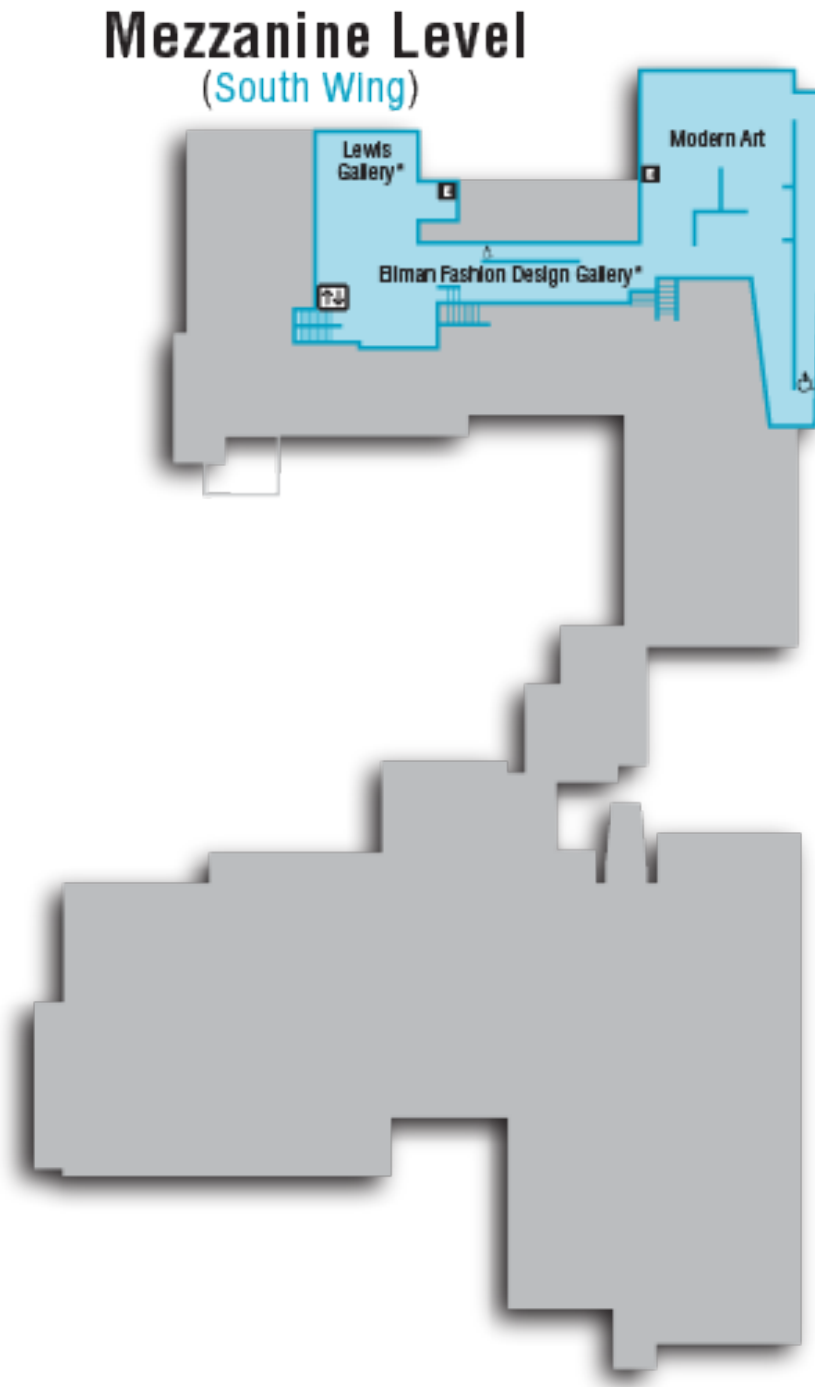


Figure 5. PAM Mezzanine Level Floor Plan. Retrieved from www.phoenixartmuseum.org.

Harnett Modern Art Exhibit Gallery. PAM Mezzanine, Southwest corner.



Image 9.

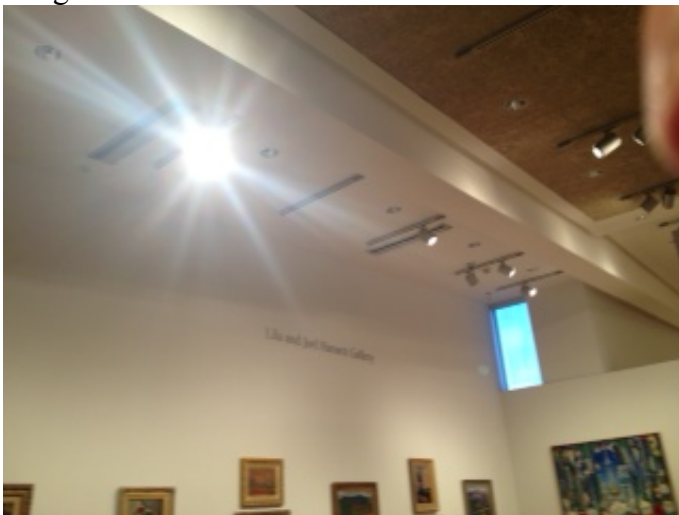
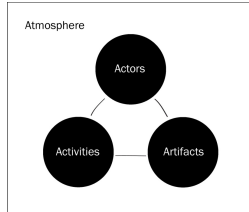


Image 10. See Figure 5 Mezzanine, Modern Art Gallery
Elements of infrastructure shown include painted dry wall, tegular ceiling tile, illumination from natural and artificial lighting, HVAC units (audio).
Photos with permission of the Phoenix Art Museum.

In the AEP session that took place in the Harnett Modern Art Gallery, a mix of natural and artificial light, created two MCI individuals to vocalize that strongly, their opinions about an art that they both said was “drab and muddy”, not just dark.

Data Collection – a(X4) Diagram

As defined by Anderson, Rothstein (2004): “called a (x4), the method is structured around four key factors—actors, activities, artifacts and atmosphere”. For this application, the researcher utilized the a(X4) to enrich the perception of observing docent presentations and dyads engaged in each gallery.



Retrieved from Newcomb (2010, p. 51) showing Rothstein’s (2001) a(x4) conceptual framework.

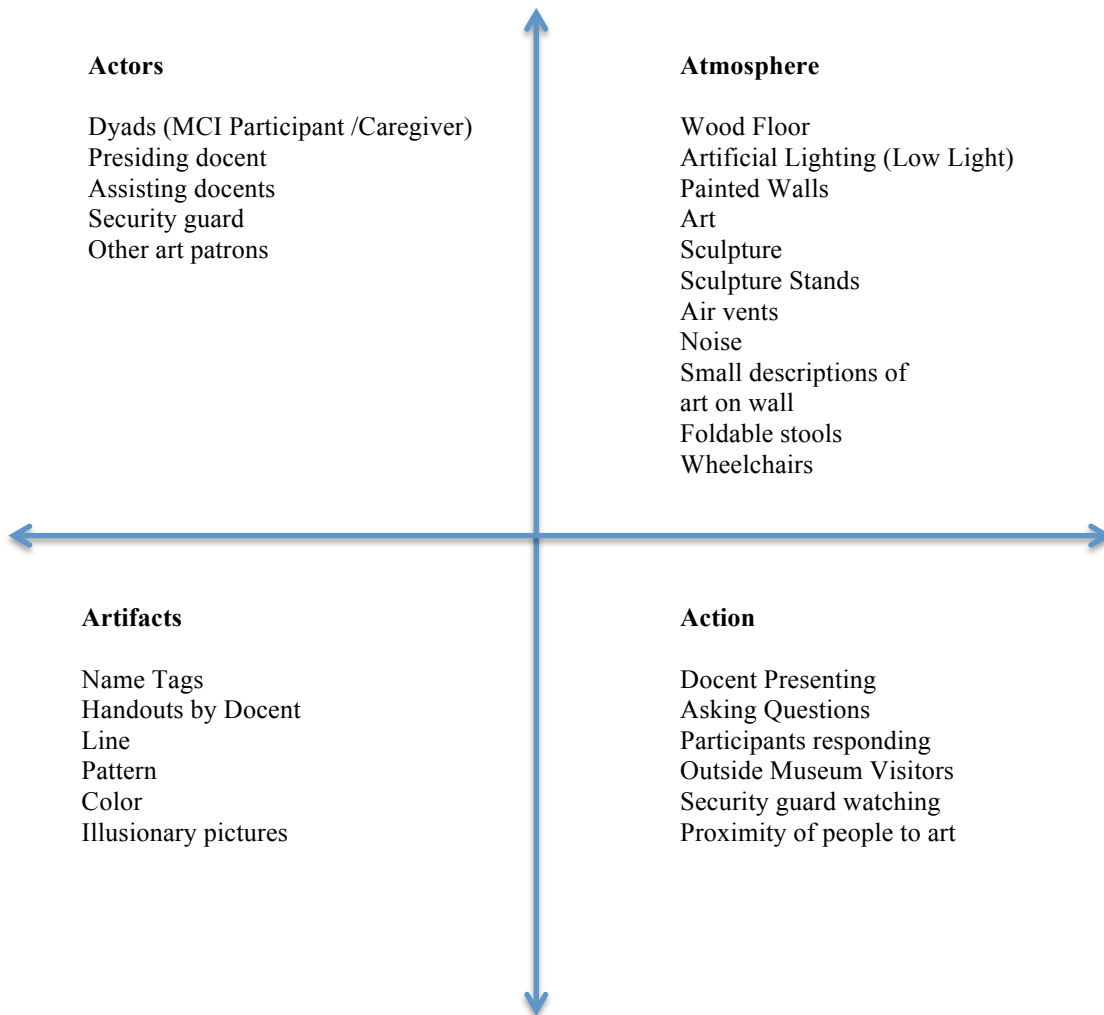


Figure 6. (above. Original a(x4) framework as shown by Rothstein's 2001 conceptual design. (Below: researcher's biaxial a(x4) example of researchers observation in exhibit gallery.

Explanation of a(X4) Divisions

Actors: Although the AEP met on Thursdays, the less busy day in the museum, there was still activity by other art patrons that were visiting the exhibit gallery. The PAM ensures that galleries are covered by security who also come in and out of the exhibit galleries. The presiding docent and dyads of the AEP group were the main actors.

Atmosphere: The researcher observed elements of infrastructure in each gallery that were included in the development of diagrams Figure 7, Figure 8, and Figure 9 (see pp. 51-55). As noted by Newcomb (2011, p. 42) atmosphere is the environment in which the situation takes place incorporating character, function, and features (Rothstein, 2001).

Artifacts: This would include the art as being presented by the presiding docent in addition to any items that the docent may have used or passed out at the beginning of the session during the "icebreaker."

Action: The primary action per gallery was the AEP session with presiding docent. Secondary action is defined as other patrons viewing art; security guards coming as well as security guards.

Interview Questions - Docents Topic Development

The following questions were asked to docents in how they developed their topic presentation and art selections, and exhibit galleries:

- a) How did you develop your topic?
- b) What was your specific personal goal with the topic as selected and the group?
- c) Did you have any thoughts about the room's light level?

d) How do you think art in PAM relates to the built environment?

e) Do you think color in art helps memory stimulation?

Even though the AEP docents follow a specific checklist as provided by PAM to develop their art presentation, the researcher's interview questions allowed a better understanding for significance of design elements as selected by the docent's presentation.

Institutional Review Board

The researcher applied to the Institutional Review Board (IRB) at Arizona State University on November 14, 2013. Notification of approval was granted on January 6, 2014. Modified areas were resubmitted, approved and under the supervisor of faculty member Professor James Shraiky, granted exemption status on March 24, 2014. The research study was exempt from any further advisory committees in meeting at the Phoenix Art Museum with individuals who had Mild Cognitive Impairment. Data collection occurred during the Arts Engagement spring session at the Phoenix Art Museum that included six Thursdays, beginning 2/13/14, skipping one week, and concluding Thursday, 4/24/14. Summer Session included three sessions: Beginning Thursday, 5/29/14, ending Thursday 6/26/14. PAM reduced summer sessions from 6 to 3 due to attendants and docents going out of town.

Conclusion

An experience based design approach was used to prioritize infrastructure design elements and art themes extracted from the transcribed interviews of presiding docent presentations, docent and volunteering dyad interviews and researcher's observations at each AEP session. This research study was conducted at the sight of the Phoenix Art Museum, Phoenix Arizona. The prioritizations of themes from infrastructure and art elements are shown in Chapter IV Results. This approach was utilized to allow observations of items not planned or the unexpected, due to those with MCI (O'Leary, 2010, p. 210) and maintains the level of informality with dyads and docents.

Declaration of Interest

The author on behalf of the Committee Chairman reports no conflicts of interest. The author on behalf of the Committee Chairman alone is responsible for the content and writing of this thesis.

CHAPTER 4

DATA ANALYSIS AND RESULTS

Introduction

This chapter reports on the research data collected from the survey conducted at the AEP sessions at the PAM and analysis thereof. Analysis of the overlapping elements of design from infrastructure and elements of design from art themes present a dialogue of which does not denounce that key elements are not important to the environment, but rather important for the comfort of individuals on a non-clinical environment.

Instruments

Interviews for each presiding docent and volunteering dyads were recorded on an I-phone with permission from the individuals and PAM; the information was then transcribed to a Macbook air computer.

Results from Elements of Infrastructure Derived From Transcribed Sessions, Docents and Dyads Interviews.



Figure 7. The Phoenix Art Museum’s Infrastructure, a bubble diagram denoting secondary and tertiary levels created from elements of design from infrastructure.

Kolko (2011, p. 114) notes “when the number of terms in a concept map exceeds nine or ten, introducing levels or hierarchy may make reading easier. Large concepts maps (more than 50 terms) are almost impenetrable without attention to both semantic and visual hierarchy.

As a means to clarify secondary and tertiary themes, Figure 7 introduces the aspects of infrastructure taken from the observation research, Ax4 maps, presentations and semi-structured interviews with dyads and docents to sponsor a graph. The graph then prioritizes the infrastructure item thought most important to both dyad and docent in order to create overlapping themes.

Figure 8 refers to the Results of Art Themes and Sub Themes Derived From Docent transcribed Arts Engagement Session presentations in addition to researcher’s observations through the a(X4) map and transcribed interviews.

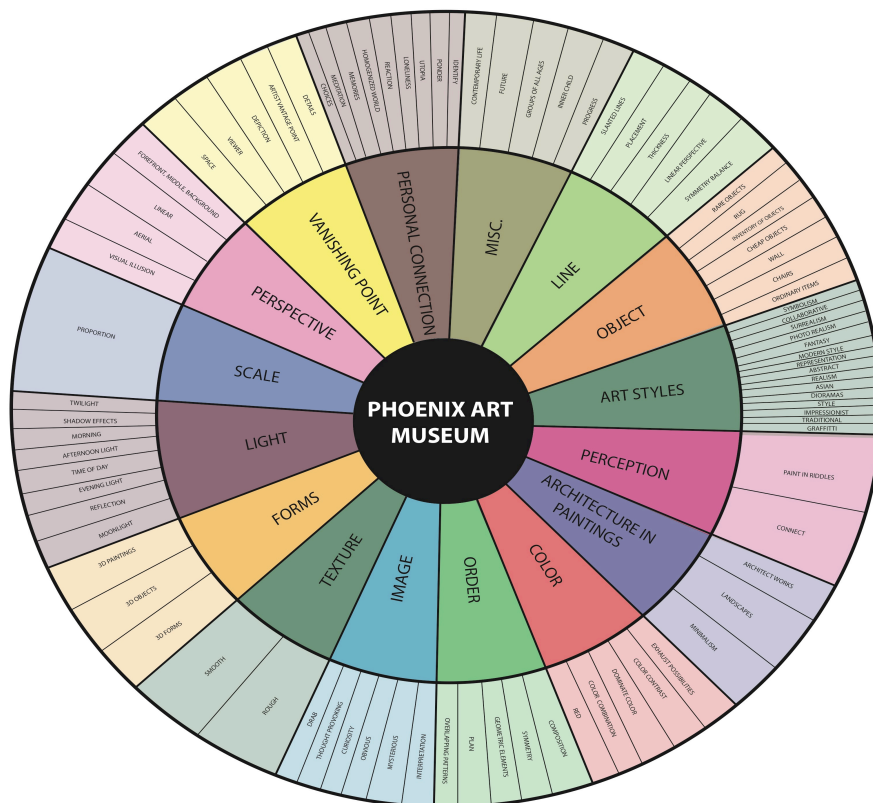


Figure 8.

Kolko (2011, p. 114) notes “when the number of terms in a concept map exceeds nine or ten, introducing levels or hierarchy may make reading easier. Large concepts maps (more than 50 terms) are almost impenetrable without attention to both semantic and visual hierarchy. As noted the same in Figure 7, a different style of concept map was used in order to better clarify the difference between elements of design from infrastructure and elements of design from art themes.

Theme and Subthemes Taken from Docent Presentations on Art (part of Figure 8).

THEME	SUB-THEME
Color	<ul style="list-style-type: none"> Color Combinations Color Contrast Exhaust possibilities of color Dominate Color Red – color of passion / danger / sunset
Line	<ul style="list-style-type: none"> Placement of Line Thickness of Line Linear Perspective Slanted Lines Symmetry Balance
Perspective	<ul style="list-style-type: none"> Linear Perspective Aerial Perspective Visual Illusion Forefront, Middle, Background
Vanishing Point	<ul style="list-style-type: none"> Artist Vantage Point Viewer Space Detail Depiction
Scale	<ul style="list-style-type: none"> Proportion

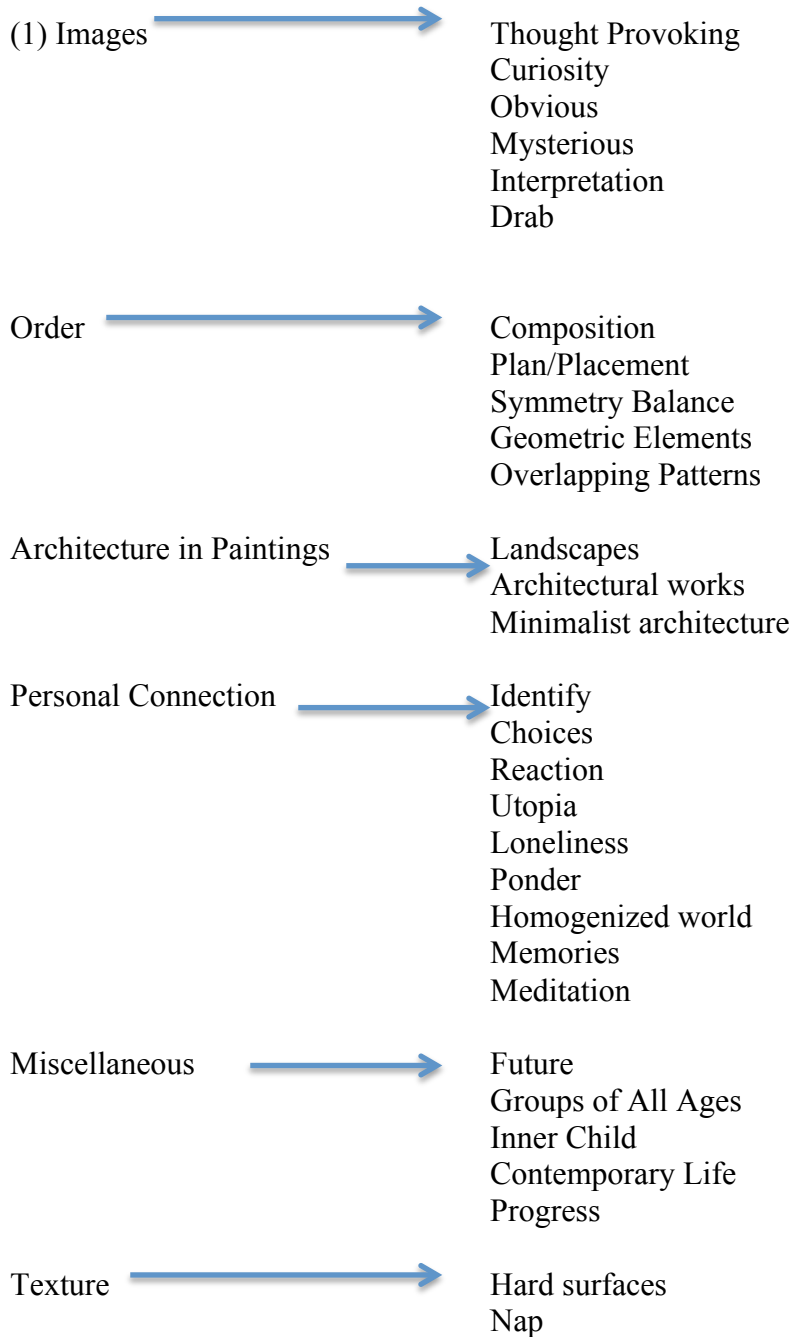
Forms → 3D Objects
3D Painting
3 D Forms

Object → Inventory of object
Chairs
Wall
Rug
Cheap Objects
Rare Objects
Ordinary items

Light → Light effects shadow
Morning
Reflection
Afternoon Light
Evening Light
Twilight
Moonlight
Time of Day

Art Styles → Surrealism
Modern Style
Realism
Style
Abstract
Collaborative
Symbolism
Photo Realism
Fantasy
Representational
Graffiti
Dioramas
Asian
Traditional
Impressionist

Perception → Paint in Riddles
Connect



Sample Total: N=18

Out of 9 AEP sessions, 9 presiding docents gave interviews, 11 total dyads from a grand total of 72 dyads volunteered to participate in the researcher's interview, of which 2 dyads that volunteered, did not have an opinion, therefore the count for dyad participation was 9 total. The volunteering dyads from the one group of 8 dyads were 1/8 or 12.5% of the total set of dyads for 9 sessions.

Volunteering Dyads per session were as follows:

Note: S=Session, SS=Summer Session

S1=1, S2=2 with one dyad having no opinion), S3=1, S4=1, S5=1, S6=2 with one dyad having no opinion), SS1=1,SS2=1, SS3=1.

Results of Transcribed Sessions

Audience discussions by dyads expressed strongest focus on elements of color, object/shape, lighting and perception from art that was presented. Discussion also emphasized people's preferences of art styles as a frame of reference to perception: contemporary modern, landscapes, or traditional. The group discussions focused on how lighting was used in the art pieces, as in time of day.

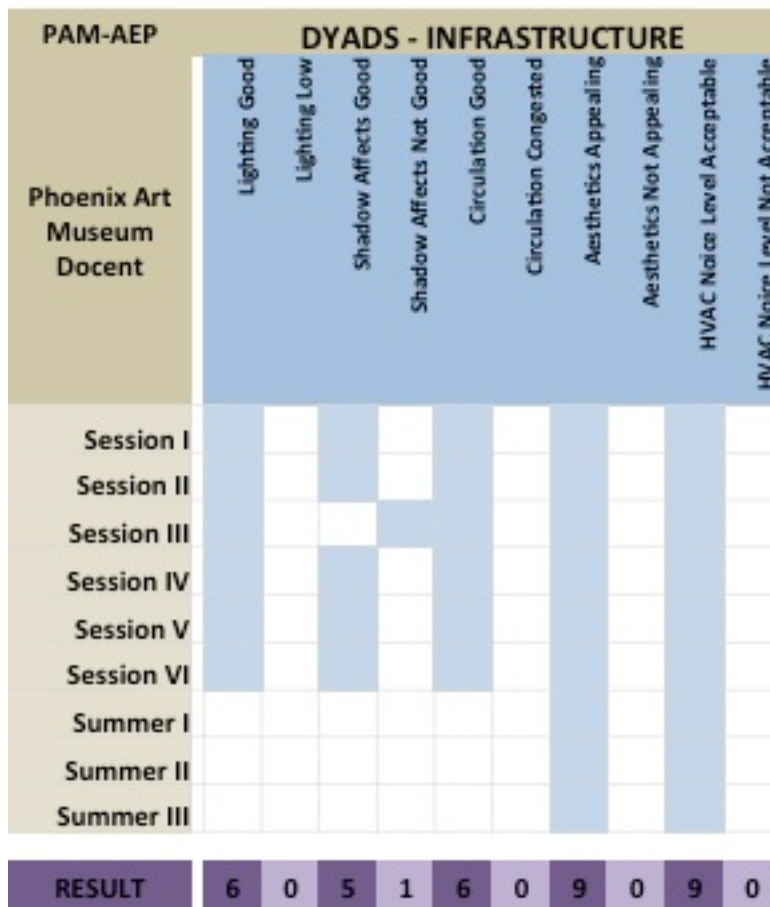
Results of Dyads Interviews

Dyads that volunteered to discuss art themes and elements of infrastructure showed most interest in discussing art from the docent's presentation and not elements of infrastructure. Dyads interviewed were complimentary to the museum's environment, yet did not answer all questions asked by the researcher. There were dyads that focused on the art session, and appeared unaware to the gallery environment. There were two MCI participants who made basic comments on the museum's infrastructure. Their

background may have prompted interest as one was an architect, and one was a school instructor for mechanical drawing.

Results of Overlapping Themes

Dyad Graph – Elements of Design – Infrastructure



N=9

Figure 9. Volunteering dyads tallied results of items from infrastructure.

Session 1: Ullman/Philip C. Curtis Gallery

The volunteering dyad commented on that lighting was good, the shadow affects good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session II: Contemporary Western Gallery

Of the two volunteering dyads, one had no comment about the questions being asked. The second dyad commented on lighting was good, the shadow affects good, circulation good, aesthetics appealing, HVAC and audibility acceptable.

Session III: Phoenix Kids Gallery

The one volunteering dyad commented on nothing regarding lighting, the shadow affects not good, circulation good, aesthetics appealing, HVAC and audibility acceptable.

Session IV: Steele Gallery

The volunteering dyad commented on the lighting was good, the shadow affects good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session V: Steele Gallery

The volunteering dyad commented on the lighting was good, the shadow affects good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session VI: Ullman/Philip C. Curtis Gallery

Of the two volunteering dyads, one dyad had no comment. The one volunteering dyad commented on the lighting was good, the shadow affects good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Summer I: Buddhist Gallery

The volunteering dyad only comment on the aesthetics as being good and the HVAC/noise level acceptable.

Summer II: Harnett Modern Art Gallery

The volunteering Dyad only comment on the aesthetics as being good and the HVAC/noise level acceptable.

Summer III: Contemporary Western Gallery

The volunteering Dyad commented on the aesthetics as being good and the HVAC/noise level acceptable.

Dyad Talley for Infrastructure in the following galleries:

Session I: Ullman/Philip C. Curtis

6 out of 9 agreed that lighting was overall good.

Session II: Contemporary Western Gallery

0 out of 0 did not have a problem with the lighting.

Session III: Phoenix Kids Gallery

5 out of 9 felt the shadow affects were acceptable. 55% felt shadow affects were good.

Session IV: Steele Gallery

1 out of 9 did not think the shadow affects were acceptable. 1.1% thought lighting was bad in that particular gallery

Session V: Steele Gallery

6 out of 9 felt that circulation was good, resulting in approximately 66% noting circulation as good.

Session VI: Uhlman/Philip C. Curtis Gallery

0 out of 0 did not think there was a problem with the aesthetics. 0

Summer I: Buddhist Gallery

9 out of 9 agreed that sound was good. 100% agreed sound was good.

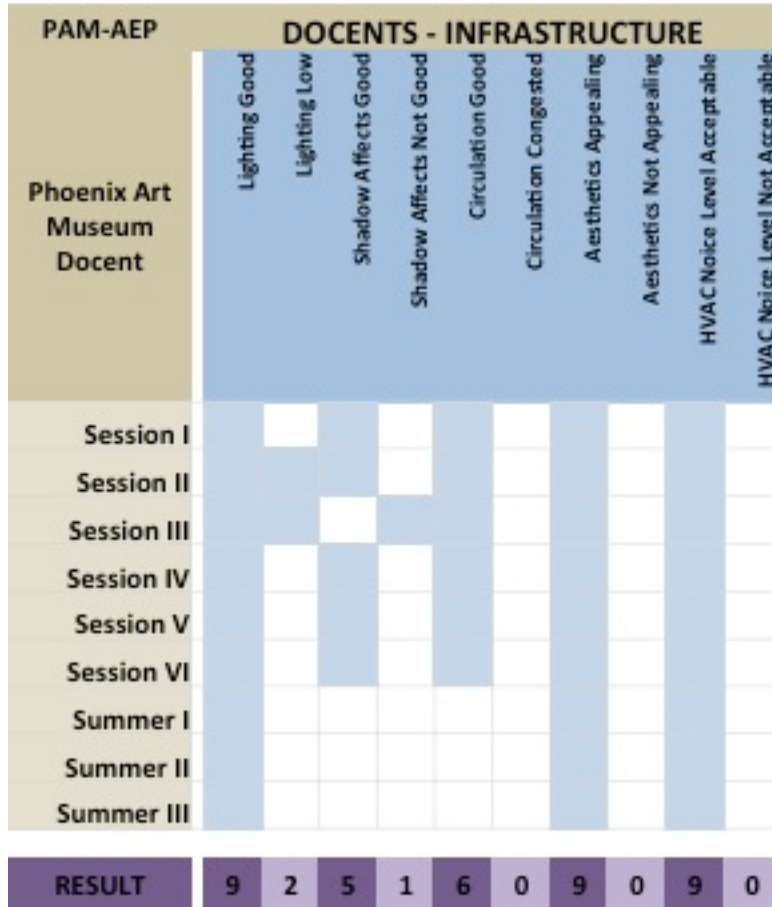
Summer II: Ullman/Philip C. Curtis

0 out of 0 did not comment on sound being bad or bothersome.

Summer III: Contemporary Western

0 out of 0 did not comment on sound being bad or bothersome.

Docent Graph – Elements of Design -Infrastructure



N=9

Figure 10. Volunteering docents tallied results of items from infrastructure.

Session 1: Ullman/Philip C. Curtis Gallery

The presiding docent commented on the lighting was good, the shadow affects good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session II: Contemporary Western Gallery

The presiding docent commented on lighting was good, yet low in certain areas, the shadow affects good, circulation good, aesthetics appealing, HVAC and audibility acceptable.

Session III: Phoenix Kids Gallery

The presiding docent commented on lighting was good, yet low in certain areas, the shadow affects were not good, circulation good, aesthetics appealing, HVAC and audibility acceptable.

Session IV: Steele Gallery

The presiding docent commented on lighting was good, shadow affects were good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session V: Steele Gallery

The presiding docent commented that the lighting was good, shadow affects were good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Session VI: Ullman/Philip C. Curtis Gallery

The presiding docent commented that the lighting was good, the shadow affects were good, circulation was good, aesthetics were appealing, HVAC and audibility acceptable.

Summer I: Buddhist Gallery

The presiding docent commented that the lighting was good, aesthetics were acceptable and HVAC audibility as good.

Summer II: Harnett Modern Art Gallery

The presiding docent commented that the lighting was good, aesthetics were acceptable, and HVAC audibility as good.

Summer III: Contemporary Western Gallery

The presiding docent commented that the lighting was good, aesthetics were acceptable, and HVAC audibility was good.

Docent Talley for Infrastructure in the following galleries

Session I: Ullman/Curtis Gallery

9 out of 9 agreed that lighting was overall good.

Session II: Contemporary Western Gallery

2 out of 9 thought there was some problem with lighting.

Session III: Phoenix Kids Gallery

0 out of 0 did not have a problem with the lighting. 0 did not have a lighting issue

Session IV: Steele Gallery

5 out of 9 felt the shadow affects were acceptable.

Session V: Steele Gallery

1 out of 9 did not think the shadow affects were acceptable.

Session VI: Ullman/Curtis Gallery

6 out of 9 voted on the circulation as being good.

Summer I: Buddhist Gallery

9 out of 9 liked the aesthetics.

Summer II: Harnett Modern Art Gallery

9 out of 9 did not comment on sound being bad or bothersome. 100%

Summer III: Contemporary Western Gallery

9 out of 9 agreed that sound was good. 100% agreed sound was good.

Overlapping Elements of Design – Infrastructure Between Docents/Dyads

Due to the small sample size, the researcher set the mid mark of acceptance at 5 or higher having the most importance to dyad and docent. These items are highlighted under Figure 11.

INFRASTRUCTURE THEMES

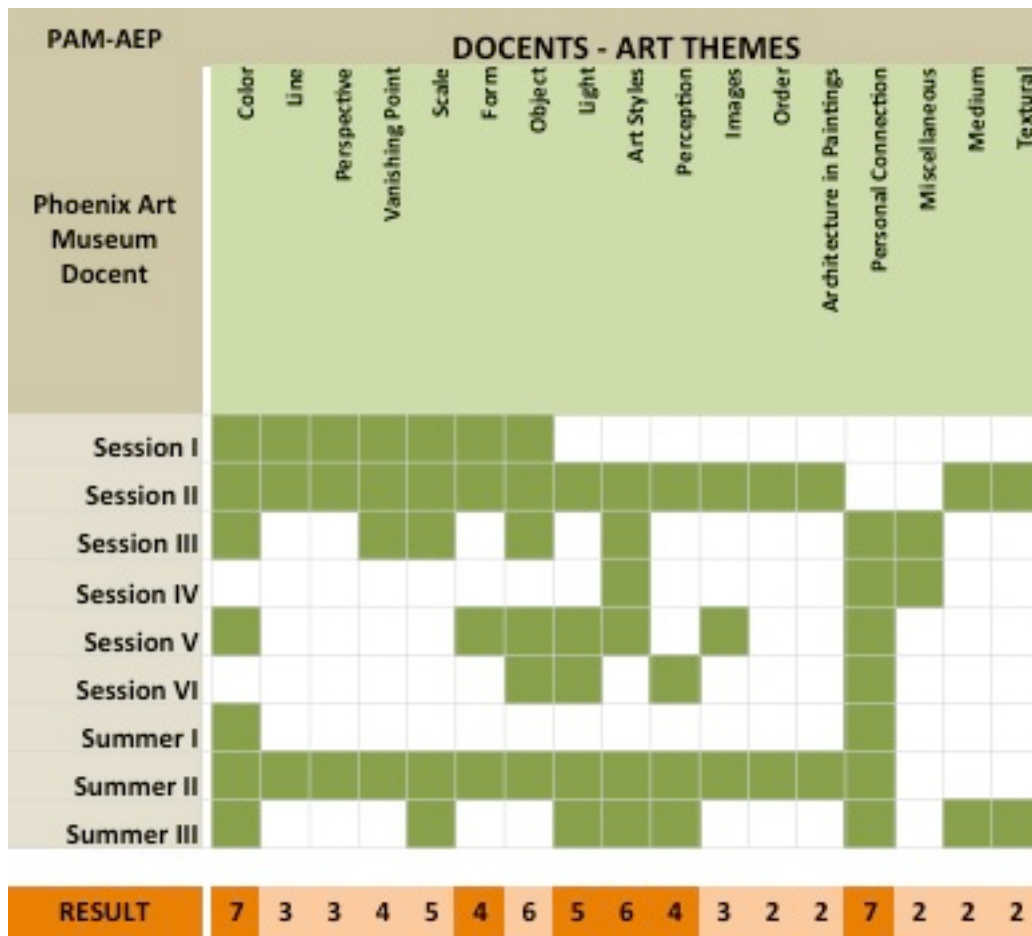
	DOCENTS /DYADS	
LIGHTING GOOD	5	5
LIGHTING LOW		
SHADOW AFFECTS NOT GOOD		
CIRCULATION GOOD	6	7
CIRCULATION CONGESTED		
AESTHETICS APPEALING	9	7
AESTHEICS NOT APPEALING		
HVAC NOISE LEVEL ACCEPTABLE	9	7

Figure 11: showing the results of elements of infrastructure most important to both Docent and Dyads.

Result: Overlapping Themes:

Overlapping Art Themes: good lighting, good circulation, appealing aesthetics acceptable noise level show that to both dyads and docents these elements were 50% or greater to both participants. Aesthetics and good noise level were 100% important to Dyads and 90% to dyads.

Docent Graph Elements of Art Themes



N=9

Figure. 12. Volunteering docents tallied results of items from infrastructure.

Graph Reading-Docent Elements of Art Themes

Session 1: Ullman/Philip C. Curtis Gallery

The presiding docent commented on color, line perspective, vanishing point, scale, form, object.

Session II: Contemporary Western Gallery

The presiding docent commented on color, line perspective, vanishing point, scale, form, object, light, art style, perception, images, order, architecture in paintings, medium, textural.

Session III: Phoenix Kids Gallery

The presiding docent commented on color, vanishing point, scale, object, art style, personal connection, and miscellaneous elements.

Session IV: Steele Gallery

The presiding docent commented on art style, personal connection, miscellaneous.

Session V: Steele Gallery

The presiding docent commented on color, form, object, art styles, images, perception, personal connection.

Session VI: Steele Gallery

The presiding docent commented on object, light, perception, personal connection.

Summer I: Buddhist Gallery

The presiding docent commented on color, personal connection.

Summer II: Harnett Modern Art Gallery

The presiding docent commented on color, line, perspective, vanishing point, scale, form, object, light, art styles, perception, images, order, architecture in paintings, personal connection.

Summer III: Contemporary Western Gallery

The presiding docent commented on color, scale, light, art styles, perception, medium, textural.

Docent Talley for art theme elements in the following galleries:

7 out of 9 agreed that color was an important art theme element.

3 out of 9 agreed that line was an important art theme element.

3 out of 9 agreed that agreed that perspective was an important art theme element.

4 out of 9 agreed that vanishing point was an important art theme element.

6 out of 9 agreed that object was an important art theme element.

5 out of 9 agreed that light was an important art theme element.

6 out of 9 agreed that art style was an important art theme element.

4 out of 9 agreed that perception was an important art theme element.

3 out of 9 agreed that image was an important art theme element.

2 out of 9 agreed that order was an important art theme element.

2 out of 9 agreed that architecture in paintings was an important art theme element.

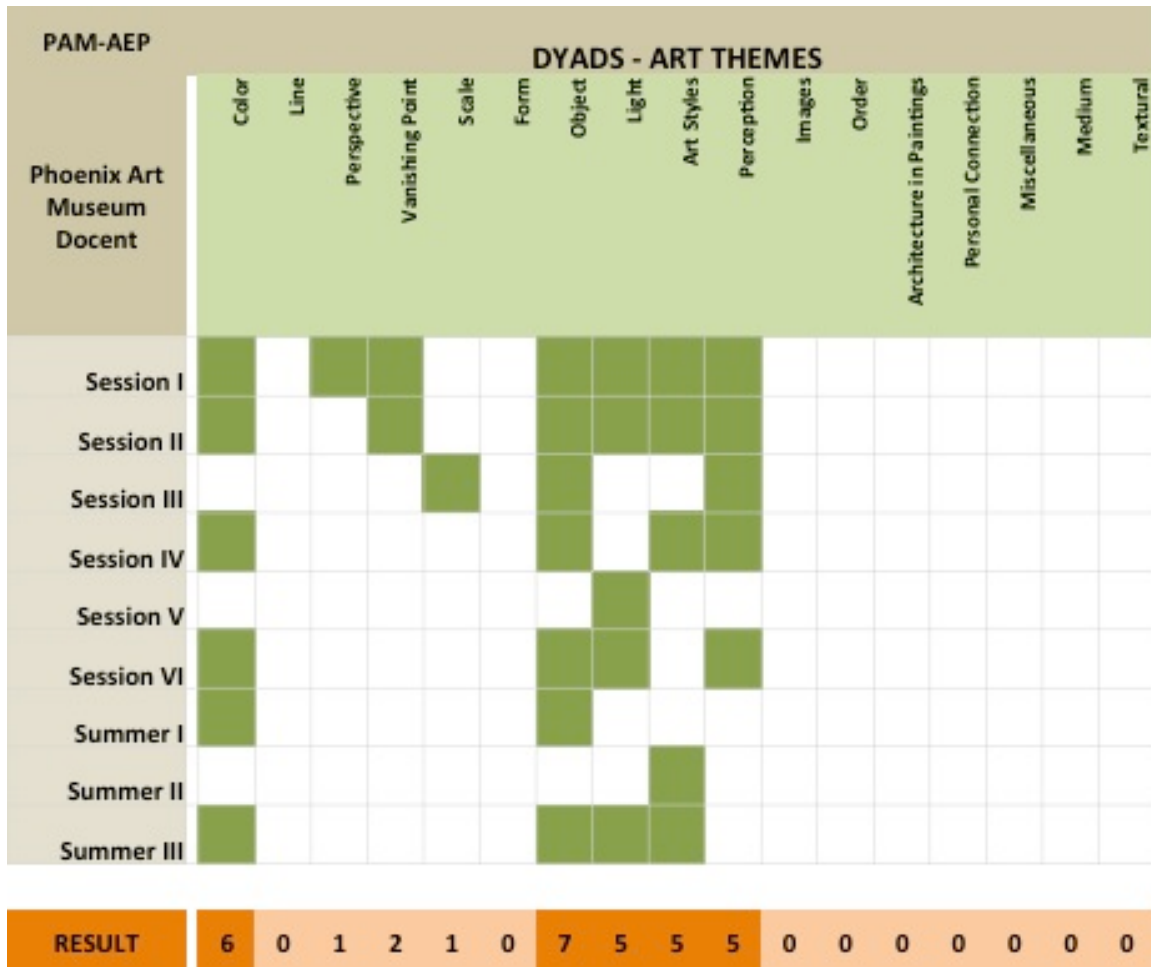
7 out of 9 agreed that personal connection was an important art theme element.

2 out of 9 agreed that there were other miscellaneous items important to art theme elements.

2 out of 9 agreed that medium was an important art theme element.

2 out of 9 agreed that texture was an important art theme element.

Dyad Graph Element of Art Themes



N=12

Figures 13.

Graph Reading-Dyad Elements of Art Themes

Session 1: Ullman/Philip C. Curtis Gallery

The dyad commented on color, perspective, vanishing point, object, light, art styles, Perception.

Session II: Contemporary Western Gallery

The dyad commented on color, vanishing point, object, light, art style, perception

Session III: Phoenix Kids Gallery

The dyad commented on color, object, perception

Session IV: Steele Gallery

The dyad commented on scale, object, art style, perception

Session V: Steele Gallery

The dyad commented on light.

Session VI: Ullman/Philip C. Curtis

The dyad commented on color, object, light and perception.

Summer I: Buddhist Gallery

The dyad commented on color, object.

Summer II: Harnett Modern Art Gallery

The dyad commented on art style.

Summer III: Contemporary Western Art Gallery

The dyad commented on object, style, art styles

Dyad Talley for Art Theme Elements

6 out of 9 agreed that color was an important art theme element.

0 out of 0 agreed that line was an important art theme element. line.

1 out of 9 agreed that perspective was an important art theme element.

2 out of 9 agreed that vanishing point was an important art theme element.

1 out of 9 agreed that scale was an important art theme element.

0 out of 0 agreed that form was not an important art theme element.

7 out of 9 agreed that object was an important art theme element.

5 out of 9 agreed that light was an important art theme element.

5 out of 9 agreed that art style was an important art theme element.

5 out of 9 agreed that perception was an important art theme element.

0 out of 0 agreed that image was not an important art theme element.

0 out of 0 agreed that order was not an important art theme element.

0 out of 0 agreed that architecture in paintings was not an important art theme element.

0 out of 0 agreed that personal connection was not an important art theme element.

0 out of 0 agreed that miscellaneous items were not an important art theme element.

0 out of 0 agreed that medium was not an important art theme element.

0 out of 0 agreed that texture was not an important art theme element.

Overlapping Art Theme Elements Most Important to Docents and Dyads

Due to the small sample size, the researcher set the mid mark of acceptance at 5 or higher having the most importance to dyad and docent. These items are highlighted under Figure 14.

ART THEMES	DOCENTS	DYADS
COLOR	7	6
LINE	3	0
PERSPECTIVE	3	1
VANISHING POINT	4	3
SCALE	5	1
FORM	4	1
OBJECT	6	7
LIGHT	5	7
ART STYLES	6	5
PERCEPTION	5	5
IMAGES	3	0
ORDER	2	0

ARCHITECTURAL PAINTINGS	2	0
PERSONAL CONNECTION	7	0
MISCELLANEOUS	2	0
MEDIUM	2	0
TEXTURAL	2	0

Figure 14.

Result: Overlapping Themes:

Overlapping Art Themes: Color, Object, Light, Art Styles show that to both dyads and docents these elements were 50% or greater to both participants.

Discussion of Overlapping Design Elements -See Figures 11 & 14.



Light

Element of Art Themes: 7 of 9 docents and 6 of 9 dyads determined that color was an important element of design. **Elements of design-Infrastructure:** 5 of 9 docents and 5 of 9 dyads determined that light was acceptable in the exhibit galleries. The element of light from infrastructure was considered significant to each group. According to Shikder (2012, p. 282), light has been identified as significant to the environment and promotes well-being in physical and mental health. The importance of proper lighting is especially important to behavior in individuals with memory impairment and those with loss of vision. Perez (2006) notes that there is a great reduction of light available to the retina in individuals coping with senile meiosis and crystalline yellowing. There may be only a third of the light available to the retina of a 60 year old versus a 20 year old from disease impact on vision.

Both groups addressed the location of lighting in art as casting shadows. The topic opened group discussion about light, shadow and time of day.



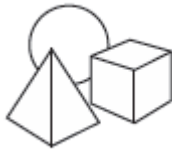
Color

Art Themes: 5 of 9 docents and 7 of 9 dyads determined that light was an important element of design. Color may encourage reminiscence. Such processing in the mind undergoes multiple areas of analysis to determine which color, shape, size, location, etc. and reach perception and memory as integrated units (Parra, et al., 2011, p.1057).

In Interview 12, The AEP docent used the following description to an AEP session in describing color:

Artists use what is known as a color wheel, where the top color is red; right is yellow and left is blue. It is the arrangement of colors, so we have the greens and blues together, we have the reds together, and so we have primary colors, you probably already know this, red, yellow and blue and everything in between is a mixture, but there is a concept where opposite colors on the color wheel are complimentary colors. They are complimentary colors, so when we put yellow with purple, it makes those two colors look brighter than if you put purple with another purple or blue.

Color as with light was important within the overlapping art themes by the docents and dyads. Neither group responded to color as elements of infrastructure. This may be due in part that the environment itself is very neutral, grays, beiges, and white is the overall palate and this may go unrecognized as color.



Object/Shape

Art Themes: 6 of 9 docents and 7 of 9 dyads determined that object/shape was an important element of design. Object/Shape is primary for the brain to reason and be able to differentiate objects. Color and surface detailing play a secondary role. Shape provides a powerful means by which long-term visual memory is indexed and is much more identifiable than is color. (Delvenne, & Kevin, et al. 2008, p. 1024). Object/shape as an overlapping theme result was detected in art, such as fences, houses, mountains, and clouds. Neither group acknowledged elements of infrastructure for object/shape.



Art Style/Perception

Art Themes: 6 of 9 docents and 5 of 9 dyads determined that art style was an important element of design. 5 of 9 docents and 5 of 9 dyads determined that perception was an important element of design. The groups listing included contemporary art, traditional as significant art styles, and perception as means to “connect” with the art through paint color. The topic of art styles gave way to reminiscing by some dyads. Art styles were discussed as likes of traditional style painting, and abstract especially with respect to focus on elements of design of which they either appreciated or did not like.



Aesthetics/Texture

Elements of design-Infrastructure: 9 of 9 docents and 7 of 9 dyads determined that aesthetics was acceptable in the exhibit galleries. Both groups did not state any specifics on why the experience of the PAM's built environment was so pleasing to them, it was given high marks for it being a really nice museum and space. Halpern (2007, p. 62) noted that:

A study of art appreciation can help us understand whether aesthetic appraisal is as affected by the disease as are cognitive abilities and also may inform caretakers about the probable value of art exposure and therapy in dementia, specifically early stage Alzheimer's disease (AD).



Circulation

Elements of design-Infrastructure: 6 of 9 docents and 7 of 9 dyads determined that circulation was acceptable in the exhibit galleries. Circulation and accessibility as discussed by Elottol, et al. (2011, p.20) is the encounter between the demands and design of the physical environment and a group or person's ability to gain capacity or accessibility. Exhibit space and galleries that were utilized for group sessions, were away from other exhibits and not intrusive to other museum visitors. As an overlapping theme, both docents and dyads agreed that the spatial layout for the sessions were

comfortable and accessible. This is a significant factor to maintain focus, on the art presentation and also ensure that the group feels secure.



Sound

Elements of design-Infrastructure: 9 of 9 docents and 7 of 9 dyads determined that light was acceptable in the exhibit galleries. The PAM did not appear to present hearing problems for dyads and docent's. The survey results showed as acceptable to each. Hard surface materials from infrastructure and sound waves reverberating can be challenging both to the presenter and the audience. Sound used as background adds an air of ambiance, as did the fountain inside the lobby.

Definitions of Art Element Themes

Docents presenting element of design in art themes appeared to be of interest to dyads. These definitions include:

Line

A line is one-dimensional and can vary in width, direction, and length. Lines often define the edges of a form. Lines can be horizontal, vertical, or diagonal, straight or curved, thick or thin. They lead your eye around the composition and can communicate information through their character and direction.

Shape

Shapes have two dimensions—height and width and are usually defined by lines. Forms exist in three dimensions, with height, width, and depth.

Space in a work of art refers to a feeling of depth or three dimensions. It can also refer to the artist's use of the area within the picture plane.

Color

Light reflected off objects. Color has three main characteristics: hue (red, green, blue, etc.), value (how light or dark it is), and intensity (how bright or dull it is).

Colors can be described as warm (red, yellow) or cool (blue, gray), depending on which end of the color spectrum they fall. Retrieved from:

www.getty.edu/education/teachers/building_lessons/formal_analysis.html.

Texture

The surface quality of an object that we sense through touch. All objects have a physical texture. Artists can also convey texture visually in two dimensions. In a two-dimensional work of art, texture gives a visual sense of how an object depicted would feel in real life if touched: hard, soft, rough, smooth, hairy, leathery, sharp, etc.

Perspective and Vanishing Point

Linear perspective is a mathematical system for projecting the three-dimensional world onto a two-dimensional surface, such as paper or canvas. In brief, this type of perspective begins with a *horizon line*, which defines the farthest distance of the [background](#) and a central *vanishing point*. To this vanishing point, orthogonal may be drawn from the bottom of the picture plane, which defines the [foreground](#) of the space. The orthogonal, vanishing point, and horizon line establish the space in which the artist may arrange figures, objects, or architecture such that they appear to exist in three dimensions. These elements of linear perspective link the science of three-dimensional geometry with the art of illusionistic representation. Retrieved from: <http://www.artic.edu/aic/education/sciarttech/2d1.html>.

Results of Hypothesis I & II

Hypothesis I: Design elements from the museum's infrastructure and elements from art themes enhance memory recall. Survey results conclude Hypothesis I null.

Hypothesis II stated that design guidelines created from the observations of dyads and docents at the AEP session enhance memory recall once placed in other environments. As Hypothesis I was not validated, Hypothesis II was also null.

Conclusion

The overlapping themes of elements of design in infrastructure and art themes were defined with actual photographs of the PAM's infrastructure. The results of tallied overlapping themes revealed that light, sound, aesthetics, and circulation ranked highest as elements of infrastructure. Color, objects, perception, art styles, and light ranked highest in overlapping themes from elements of art. Results of semi-structured interviews with dyads and docents did not conclude these elements enhance memory recall; a consensus that to the docents and dyads interviewed, these items provide a comfortable and pleasing environment.

This study requires future research. As Huckans, et al., (2013, p. 62) acknowledged nothing is ever more crucial than an environment that specifically speaks to MCI individuals.

CHAPTER 5

DISCUSSION

Introduction

A cure for Alzheimer's disease (AD) remains elusive 106 years after its discovery by Aloysius Alzheimer, the German psychiatrist and doctor of neuropathology. To date there is no cure. Non-clinical research combined with clinical research to enhance memory in MCI individuals is critical with the massive numbers of aging individuals prone to memory impairment.

This study was a non-clinical approach to determine elements of design in the museums infrastructure and art theme elements at the PAM's AEP that may enhance memory; if applied to other environments memory would also be enhanced. Findings did not support either hypothesis. Key observations in the survey findings showed that light, shape, sound, circulation, and color were ranked high in the overlapping themes by dyads and docents. These were also significant design elements in the planning of the PAM's major addition in 2007. The researcher interviewed Mr. Mark Ryan, AIA who was the Phoenix liaison between the New York architects and the PAM. Mr. Ryan referenced the importance of shape, form, space, and lighting as key in the planning of the museum addition.

Studies of elements in design are broad; this study could have been more specific to educate the sample group by introducing how lighting provides the opportunity to be informed about one's surroundings, that aesthetics affords pleasure from touch or visual contact and audial sounds of pleasure as water falls add to the ambiance of the experience past and present. This approach may have prompted heightened conversation leading to memory enhancement rather than no mention at all, since the term "memory" was requested

as being left out of any conversations with the dyads by the PAM of which the research respected.

Although the hypotheses were null, this study opens doors for further research. As stated at the beginning of this research study, elements of design in infrastructure and art theme elements are a new concept to insight memory enhancement

Limitations of Sample Base and Volunteer Interviews

Dyads, who volunteered for interviews after the AEP sessions, were a small sample size N=9. Docent sample N=9. The total sample size was N=18. As a volunteer based interview, the sessions approximated one dyad per each of the 9 sessions. A volunteer basis for dyad participation did not increase the sample base. Dyad participation with a dedicated amount of time (rather than 5-10 minutes) together with a presentation and discussion in defining infrastructure and elements may have provided a stronger response level. Dyads generally held the same opinion about those questions asked within the brief interview in that everything was very pleasing to them. There are theories that play into the dyads response levels and volunteer acceptance to participate:

1. Dyads were not sure in how to discuss elements of infrastructure, even though the researcher discussed in laymen's terms.
2. Dyads enjoyed everything about the PAM, and did not have any additional comments nor wanted to discuss issues they did find negative.
3. The AEP 2 hour time frame session left the dyads tired; after the session, most of them wanted to go home and were not really focused on the questions, as being tired, even though the interview time for the design elements was 5-10 minutes.

4. With reference to Chapter II, PAM asks a series of questions to AEP applicants to determine if they were of MCI stage. Certain individuals may have been beyond the level of the MCI stage.
5. Funding for admission into the AEP sessions are provided by an anonymous donor. Dyads may have considered it impolite to answer the questions negatively.
6. As people interpret things differently, it may have been hard for the dyads to really comprehend the most simplistic of questions. The dyads may have worried about giving the “right” answer.

An approach for future studies would be to prepare a group discussion about elements of infrastructure, as docents provided for the art presentations. A stronger response level may be brought about in order to give a clearer and more specific understanding of the built environment.

This study followed an experienced based approach that allows observations of items not planned or the unexpected (O’Leary, 2010, p. 210). This approach allowed the level of informality with dyads and docents to be maintained. A qualitative approach may have brought a more definition to elements as a whole with regard to a selected and interviewed group and giving more background to what elements of design are, rather than the semi-structured interview displayed in such a few minutes.

Future Studies

Research is ongoing to improve mental wellbeing through art. The Department of Health’s Report of the Review of Arts and Health Working Group (2007) showed that there are measurable benefits to good practice and involvement with the arts in gallery spaces that offer a “unique forum” and even therapeutic setting for communicating

difficult thoughts and feelings for elderly individuals and those with dementia. This is a strong defense for a non-clinical approach in society's need to better address the expanding age of the elderly population. Alzheimer's and caring for the elderly in Western society has been scrutinized by media coverage especially as the world faces an increasing and aging population (Reuters, 2013, p. 20).

Certain museums have considered memory and reminiscence in the training of healthcare professionals who care for people with dementia and other cognitive disorders. It is argued that when people interact with museums and their collections, the objects, material, physical and intrinsic properties trigger a variety of emotional and sensory responses, cognitive associations, memories and projections (Camic, et al. 2013, p. 67).

Of major concern is the fast movement of the disease through its seven stages to AD as noted by the Alzheimer's organization, and eventually compromises both mental and physical health. With millions of BB advancing as the aging populace, national and global concern must seek avenues to prolong memory loss while a cure is under way.

While exhaustive measures to seek a clinical cure to MCI and dementia related disease, there may be opportunities in borrowing from other academic studies. For example, synthesizing the creative processes in the formulation of infant's mental growth to the loss of memory in MCI individual may enlighten new direction on object communication techniques. Even though the mind has been vastly explored, memory and types of memory are still not understood under affliction by dementia related diseases. Rhoads (2009) was quoted: "One pioneering endeavor involves working with the healthcare industry to institute collaborative experiences.

It was the intent of this study to show design elements and what they may provide for memory enhancement, of significance in future studies is the element of natural light. Literature that amalgamates natural light for the embitterment of memory enhancement through its affects on memory impairment is minimal. In contrast, there are significant findings in what natural light provides for physical and psychological well being to individuals. There are empirical studies noting the importance of natural daylight in our environment. There is a host of empirical studies regarding quality lighting for application in hospitals and senior living facilities. The healing power of natural light has been well documented in such cases as the work of the world renowned Dr. Roger Ulrich, PhD, who established in the healthcare field “evidence-based design”. Just as research has shown that natural lighting is about a “healing” factor, the emergence of more empirical literature on how light can enhance memory, is of vital concern for the aging populous.

In their research by Kim, & Seo (2012 p. 326), Museums require a stable light level suitable for exhibits as well as visitors safety and enjoyment of the art. Their experiments with daylight stimulation method may be an opportunity for research to expand beyond fluorescent lamps with “full spectrum” portraying natural white light, and include these scientific findings.

This study introduces new insight and raises awareness in questions pertaining to natural lighting:

1. How can clinical and non-clinical research include design applications of natural light to enhance memory in impaired individuals?
2. Do memory impaired individuals visualize more clearly with natural sunlight?

The WELL Building Standard provides an opportunity where museums can combine elements of infrastructure with health building standards such as light. These standards were developed from scientific, medical research and literature on environmental health and behavioral issues. By compiling leading practices in building design and management and referencing existing standards and best practice guidelines set by governmental and professional organizations, these standards establish limits and clarify requirements.

The Well Building Standard for Light provides guidelines designed to minimize disruption to the body's circadian system and provide visual acuity. It also is designed with lighting systems to increase alertness and enhance occupant experience.

As lighting is a key source, so too, is the cost. Age can affect how a space should be illuminated. It also affects performance on color in an aging eye due to glaucoma or other diseases.

The healing power of natural light has been well documented in such cases as the work of the world renowned Dr. Roger Ulrich, PhD, who established in the healthcare field "evidence-based design". Scientific rigor showed that hospital rooms with a window create a healing benefit to patients, and in certain instances showed that patients who had a view of landscape required fewer analgesic drugs and recovered faster than patients that had a view of a brick wall and not of nature. According to Torrington (2006), the provision of a natural view can have a measurable beneficial effect, although there has been little information specific to research on the value of a view to people with dementia.

Combining the best of both worlds with public health sectors and museums as partners promotes a “win win” situation by working together with healthcare authorities, funding organizations, and local galleries to coordinate knowledge and expertise (Camic & Hatterjee, 2008, p. 68) and is the step needed to deal with the millions who face MCI now, and more to come.

MCI individuals participating in the AEP agreed that lighting was a key element in this study. The museum’s infrastructure utilizes a combination of artificial and natural light to reach color quality; appropriate spotlighting for exhibits as well as ensures safety in visual needs for circulation. For those individuals with memory impairment, insufficient lighting can create a feeling of disorientation. Poor illumination changes color perception and can produce disorientation. According to Parra, et al., (2011), when there is a disruption or lack of clarity in what is viewed, there are multiple mental affects. In their research by Kim, Seo (2012), Museums require a stable light level suitable for exhibits as well as visitors safety and enjoyment of the art. Their experiments with daylight stimulation method may be an opportunity for research to expand beyond fluorescent lamps with “full spectrum” portraying natural white light, and include these scientific findings.

As museums develop partnerships with local healthcare authorities such as the PAM and BAI of Phoenix, the opportunity to coordinate each resource knowledge and expertise signifies a progressive step for those millions that may face the dark horizon of memory impairment. The museum environment has already helped with the first step to initialize a non-clinical approach to improving self-esteem and communication in a most pleasing environment.

Conclusion

The AEP is successful for many reasons; to the PAM and AEP credit are the docents that deliver the art presentations. In one interview it was pointed out to me that art is their mechanism to the dyads that drives all the themes, the interest, the involvement and communication in working with the environment. This is a particularly poignant thought provoking statement that further drives additional research studies in elements of design.

An historical justification (Kavanaugh, 2000) suggests that museums providing learning through cognitive facilitation, as arrived through the museum's space, is an advantage but not considered a resolution in prolonging the onset of the disease.

There are many questions that remain unanswered as to how memory is destroyed through this disease. Memory impairment for certain individuals may reduce recall because of the inability to visually process information. Such processing in the mind undergoes multiple areas of analysis to determine color, shape, size, location, etc. and reach perception and memory as integrated units (Kandel et al., 2011). Diminished vision also changes color perception in the elderly; that may be tempered with the higher levels of light, in addition to the proper "color" of light. Vision has been analyzed by Stokes (2014) where he notes that vision represents shape, color, size, motion, and location properties.

According to the literature reviewed, research is often driven by cost factors with regard to healthcare and needs for quality environmental living. There are many sources available to improve our environment, and especially for the needs of the memory impaired.

Future studies would include the art of reminiscence. Hsieh (2010, p. 4831) states that

although reminiscence is viewed as separate to cognitive stimulation, structured groups are key because of the interaction that stimulates cognitive thinking. How reminiscence is retrieved has many determinants, yet along with further studies that incorporate elements of design together will impart valuable information.

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APPENDIX A

ARIZONA STATE UNIVERSITY'S OFFICE OF INTEGRITY AND
ASSURANCE EXEMPTION APPROVAL



EXEMPTION GRANTED

James Shraiky
The Design School
480/965-8965
jshraiky@asu.edu

Dear James Shraiky:

On 1/6/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Mild Cognitive Impairment in Baby boomers: A Study of Design Elements Precipitating Memory Recall in the Museums Built Environment
Investigator:	James Shraiky
IRB ID:	STUDY00000311
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none">• IRB Consent Short Form.pdf, Category: Consent Form;• HRP-503A.pdf, Category: IRB Protocol;• HRP-503A.docx, Category: IRB Protocol;• Semi-structure interview form, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);• Recruitment Script-.pdf, Category: Recruitment Materials;• Recruitment Script-.pdf, Category: Screening forms;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 1/6/2014.

APPENDIX B

ARIZONA STATE UNIVERSITY'S OFFICE OF INTEGRITY AND
ASSURANCE MODIFIED B EXEMPTION APPROVAL

APPENDIX C

ARIZONA STATE UNIVERSITY'S OFFICE OF INTEGRITY AND ASSURANCE

SHORT TERM CONSENT

Short Consent Template

STUDY TITLE:

Exploring the relationship between design elements and memory
recall in the museum's built environment

Dear Patron of the Phoenix Art Museum's Arts Engagement Program:

I am a graduate student at Arizona State University under the direction of Professor James Shraiky.

I am inviting you to participate in an interview. I will ask you about your experience in the art museum and viewing art exhibits, and finally your experience upon leaving the art museum. Your participation in this study is strictly voluntary. You do not have to participate. You can still be a part of the Phoenix Art Museum's Arts Engagement Program without talking to me.

I would like to audio record this interview. The interview will not be recorded if you do not want me to record it. Please let me know if you do not want the interview to be recorded; you also can change your mind after the interview starts, just let me know.

You must be 60 years or older. What you say may be used in reports, presentations, or publications, but I will not use your name.

If you have any questions concerning the research study, please contact the research team at: Carol Hill at chill50@me.com and James Shraiky@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

APPENDIX C

ARIZONA STATE UNIVERSITY'S OFFICE OF INTEGRITY AND
ASSURANCE SHORT TERM CONSENT CONT'D.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Carol Hill
Carol Hill

APPENDIX D

PAM'S DOCENT PRESENTATION FORMAT

General Reminders:

Selecting Artworks:

- Choose an appropriate gallery for this audience (see map)
- Choose a location in the gallery with ample space for gallery stools and wheelchairs, and keep in mind proximity of high traffic areas, noise, etc.
- Select artworks that are large, brightly colored (when possible), and full of visual information
- Select artworks that reinforce your topic or theme and that can be considered from multiple angles/perspectives

Day of:

- Introduce day’s agenda, topic/theme, timeframe, gallery locations, and Museum rules (when applicable)
- Use names, ask questions, allow time for pauses and passing around visual aids, and for observation
- Avoid lecturing! Maximize opportunities for interaction and conversation

Tour Information

Docent:

Date of Tour:

Gallery:Western Discovery

Tour Title: Perspective In Art

Icebreaker:

Description:

See attachment

Rationale

Why did you choose this icebreaker for this specific group)? Check all that apply:

- Introduce the tour’s topic, theme, or focus**
-
- Socialize/create conversations as a group or between dyads**

What do you hope to achieve through this activity

How does the icebreaker connect/relate to the tour topic/theme?

Main points: *What are the main ideas you want to convey in this activity?*

Visual aids:

Questions:

Transition:

Artwork 1

Title:

Artist:

Date:

Main points:

Questions: *What questions or discussion points will you use?*

Visual aids: *What visual aids, if any, will you use?*

Transition: *How will you transition to the next artwork?*

Artwork 2

Title:

Artist:

Date:

Main points: *What are the main ideas you will convey with this artwork?*

- *What types of personal connections can be made (for you, the dyads, etc.)?*
- *What other possible topics/perspectives could you explore with this artwork?*

Questions: *What questions or discussion points will you use?*

Visual aids: *What visual aids, if any, will you use?*

None

Transition: *How will you transition to the next artwork?*

Artwork 3

Title:

Artist:

Date:

Main points: *What are the main ideas you will convey with this artwork?*

Style of Realism

Scale

Proportion

- *What relevant information (artist biography, history, process, materials, etc.) can you use to relate to your topic/theme?*
- *What types of personal connections can be made (for you, the dyads, etc.)?*
- *What other possible topics/perspectives could you explore with this artwork?*

Questions: *What questions or discussion points will you use?*

Visual aids: *What visual aids, if any, will you use?*

None

Post-tour activity (when applicable)

Title:

Choose one: In-gallery activity **Hands-on activity**

Goal/purpose: *Why did you choose this activity?*

Why did you choose this activity for this specific group?

What do you hope to achieve through this activity?

For in-gallery activity: *What visual aids, if any, will you use?*

For hands-on activity: *What materials do you need for this activity?*

Steps: *What steps are necessary to implement this activity? What do dyads and docents do?*

Wrap-up

How did this activity relate to the day's tour?

What larger ideas can the participants take away from this activity and today's tour?

Handout Materials

Please include relevant quotes here (for inclusion on handout):

Please include other references (links, poems, resources, etc.) here for inclusion on handout:

APPENDIX E

DOCENT PRESENTATION - PARTIAL TRANSCRIPT

Docent: Well, today, my topic today is perspective. Perspective is a very scientific definition for you. Perspective is a mathematical system for portraying 3-D objects on a 2-D surface.

They make us see something that maybe really isn't there, so that's what we're going that something is 3-D.

Ok, so, here we go, I think we are ready to talk about perspective, and so what I am going to start off with is a little exercise, so I am going to show you, I have four pictures, and I am going to ask you a question about each picture and we are going to start off with "lines". (Passes out Figure of Line). And lines are a basic element, you know I think I forgot to mention, the math concepts we are talking about are geometry, and so lines are a basic element in artwork and also a basic element in geometry.

We're going to talk about shapes, ok. Shape (passes out figure of shape) is an outline, how many triangles; a triangle has three points, we all know triangles, how many triangles are in this picture. Just give you a minute. How many triangles are in this picture? Raise your hand if you think there are two triangles, ok how about one triangle? How about zero triangles right? You aren't buying this story of a triangle, but do you see an illusion of the triangle?

Audience: yes.

Docent: So what happens with shapes and lines, our brain looks at this and goes "I see corners", and the brain fills in the blanks for you so it makes you think it is a triangle.

The next one has to do with color and we know that color is very important in paintings. (passes out circles with multi colors). How many different shades of blue do you see in this picture? How many different shades of blue do you see in this picture?

(Docent refers to exhibit gallery light level). OK, so now I am going to ask you, kind of hard to see in the dark isn't it? It's kind of dark in here. (Audience agrees).

All right, how many see four different shades of blue? Ok, I see one person votes for four? How about three different shades of blue? Ok somebody voted for three. How about two different shades of blue? (some raise their hands).

Guess what? There is only one shade of blue in this picture, and again, it's kind of hard, especially for those of you who are in the dark, but...what's the concept here? We're going to go into a little bit of information on color. You can change the way a color looks, by the color you put next to it. It's just that some colors affect other colors differently.

Here is our last picture. (passes of objects creating circles), it's kind of hard to see under the lights, (third referral to low light level), but take one and hold the paper horizontally, hold the paper like this, ok? Ok, does everybody have one? How many circles are there on this picture? Well, the majority of you are right, there are four circles, but any idea on what's happening, what is this saying, that sometimes we get tricked?

OK, this picture is made up of a pattern and a pattern is a repeat of colors, or shapes or lines, and then when our eyes look at a pattern, we just want to follow the pattern, and that's what's happening with this one, sometimes it's hard because we are still trying to pick out circles, but the want to follow the pattern, and then it goes into a spiral. When I look at yours from far away, it is very much uniform, a uniform pattern. Especially when I am under the light too, you can see it is really clear, right? There is 4.

Participant: But I got eight because I was counting in between each one as well .

Docent: Ok, so now, just by that comment, what we have learned is, the farther away, you see something different than when you are up close, because when you are up close, you see a lot of details, but farther away, you know the details get smaller, and actually I think a lot has to do with the light, maybe, I'm not sure.(referring to the darkness of the room).

Ok, we've talked about 4 different pictures, lines, shapes, colors, and patterns, all basic elements in artwork and geometry. We talked about a couple of concepts, so now what we are going to do is apply some of those things we learned by looking at some paintings and see how the artists created perspective for us. You know, when you break perspective down, it is really all about trying to put distance or depth within a painting. That's what makes things look real to us.

APPENDIX F

DOCENT INTERVIEW - PARTIAL TRANSCRIPT

Partial listing of dyad comments during arts engagement session of viewing art elements presentation:

Docent asks what individuals thought of the art that had just been presented:

1. **Participant:** Very warm.
2. **Docent:** Very Warm! Excellent, alright! Anything else?
3. **Participant:** Remote.
4. **Docent:** Remote? Yes, very good. So we've got remote, quiet, warm. All really We are all just looking at a painting and we all came up with different words to describe this painting, and that's because your eyes are sending images t your brain, but your brain is thinking about all of your past experiences to come up with the comments that you came up with and actually, the warm colors (from Participant I), that's a perfect comment, because actually, what time of day do you think this is?
5. How many vote for sunrise? How many vote for sunset? Ok, alright, so what's happening is when you look at this painting you kind of see this deep orange here, then a lighter orange, it could be sunrise, it could be sunset, but here is what is happening. Your brain is like a computer. It's processing all of this in your past experiences. It's asking, ok, what kind of day is this. Ok, so I am going to look at the colors, I see dark orange here, I see light orange here. The other day I was sitting out on my patio, having a gin and tonic, and about 6 o'clock the sun was coming down, you know, I'm going to vote for sunset.
6. **Participant:** Did you mention the shadows too? Did you notice the shadows?
7. **Docent :** Shadows? Ok, that's an excellent observation is shadows. Ok, it took me what, 10 seconds to 15 seconds to go thru that, your brain is going, is processing all this information in like a millionth of a second, so that you can automatically go, "I think it is sunset." Right? And so color is a perfect example of how the artist gets you to visualize something that is real, because the sunset is real. OK so, tell me about, where do you see any patterns in this picture?

Participant: I think it moves on.

8. **Docent :** Exactly you have no idea where that fence is stopping. So again, the artist was trying to get you to visualize that there is more distance, because there is no end to that fence, and one thing you can do with lines is, it's called the "vanishing point." And so, I want you when you go home today, to on the freeway, just look down the road. Ok so when you see two parallel lines and look down the lines, it looks like those parallel lines are actually coming together, yes, and that is called a "vanishing point", and that is what an artist uses to make you think of distance, and this is actually a perfect example here of the line

here, then you have the line here, and its wider at this point, and narrow, and that's like a vanishing point, and you will see that.

You have this vanishing point, so when you go home today, you look down the road, and you will see the lines, and it will be really easy with the freeway, because you will see the lines, ok, so someone earlier mentioned about another technique that artists use to do with things that are closer to us and have more detail than things that are farther away. So for instance, it also has to do with proportion, and you see horses down here, do you see anything in the distance that looks a lot smaller than it really is?

APPENDIX G

DYAD INTERVIEW- PARTIAL TRANSCRIPT

1. **Researcher:** I was asking how you both enjoyed the exhibit and the gallery. And dyad I was telling me how you liked the space, does it make you feel comfortable?
2. **Dyad Partner:** Yes, this is my third time through and I am still enjoying it.
3. **Researcher:** And you were liking this space because you were speaking architecturally, you liked the space.
4. **Dyad Partner:** Yes, it is very well done. From a construction standpoint, that the people are down here so, normally you would have something like in the house, for this building it works out well, and it is very well done. Actually, they made a nice job.
5. **Researcher:** So, do you think the hard floor is comfortable?
6. **Dyad Partner:** Yes, there is concrete under here, and so they always put this down, but this is good wood, but it is different. It's just the way you can do with wood. Well, wood gives a little, so it's more comfortable than walking around on cement.
7. **Researcher:** That is a good point. I appreciate your input.
8. **Dyad Partner:** Well, there is probably concrete under here, in how they built this place. Now one thing you might want to comment: you see this wood up here (referring to the painting that looks like plywood), that's the bottom. On the other side of that would be a smooth top, I don't know how they put it up there.
9. **Dyad caregiver:** That's a painting.
10. **Dyad Partner:** That's an actual painting? Ok, well, I made a mistake, because it looks like wood.
11. **Researcher:** Yes, it does look like wood.
12. **Dyad Partner:** Yes, they got me on that one, because it looks exactly like the bottom of, so anyway.
13. **Researcher:** In fact my first time thru I thought that was a piece of plywood too.
14. **Dyad Partner:** It's the first time I've seen this type of art.

Second Interview:

1. Researcher: In this presentation today, what did you like about the art, and how did you feel about this room as part of the presentation?
2. Participant I: Uh, I liked the way she explained what the meaning of each of the pictures was, surrealism.

Are you familiar with Philip Curtis? I was not familiar with him.
3. Stakeholder I: Just the name, I mean I'm not...he looked like a very nice man.
4. Researcher: Yeah, I had not been back in this room. What did you feel when you were in this room as far as her presenting the information and all?
5. Participant I: I liked the way she presented it,
6. Stakeholder I: (undetectable...maybe you could do something with that)
7. Participant I: Then, she through out people's comments, and then you get all kinds of different views of what the artist was like.
8. Researcher: You do. And how about the room itself, did the light...
9. Stakeholder I: Oh, I think they have done more than(undetectable).
Participant I: You could spend a lot of time here, probably better to get the DVD (referring to the art that was discussed) first. (laughs).