

Multi-sensory experiences in museums

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ABSTRACT

In museums, creators and designers intend to pay increasing attention to the experience of visitors than only the exhibits. Museum installations could be also considered measures to address better experience. Through the multilayered journey of museum visiting, multi-sensory experience is a special researching perspective and has been practiced for a long time. Overall this paper reviewed literature on the multi-sensory experiences in museums. To start with, the paper explained the characters that human senses play in museum visiting and introduced certain applications of each senses with examples. Technologies which can benefit the utilization of multi-sensory experience design were discussed afterwards. Finally critique opinions of multi-sensory experiences are analyzed to give suggestions for future work in this field.

Author Keywords

Museum; review; multi-sensory; experience design

INTRODUCTION

Multi-sensory experience has been existing in museums for centuries in simple forms. It has become ever more the focus of people's attention because of the growing varied needs of visitors and supportive technologies. "Additionally enveloping the visitor in the sounds, smells, sights, textures, and even tastes of a place or event, which is called sensory immersion, can give information in ways that objects and text displays alone sometimes cannot." [8]

However, it is inevitable to consider whether there is the need of introducing multi-sensory experiences into museums or not since museums owned different kinds of exhibits. The way to visit a museum is influenced greatly by what is inside the museum. For example, the most common way to visit a historical museum is to walk into exhibit rooms, look at artifacts or models, read notes, listening to the audio guides, read maps of the museum, watch short introduction videos and try out simply constructed installations, etc. During this journey it is clear to see that vision and hearing have always been the dominant senses. Our senses of touch, taste and smell, which are described as secondary or lower senses, are not used very frequently. That is because most historical museums aim to give statement of fact by presenting real evidence. Sometime those "evidence" could be vulnerable to visitor's touch so they have to be strictly protected. Similarity art galleries seldom take multi-sensory experiences as their first concern

due to the precious and unique exhibits. What's more we have to take the atmosphere inside these kind of museums into consideration because historical and art exhibitions are relatively more serious occasions that requires more respect from people while touching exhibits or making noise have no help for this matter. So it is crucial to think about the goal of a museum to decide how rich the sensory experiences will be. In this case, historical and art museums are the first kind: Museums which purely centered on presenting artifacts. The other kind is called experience-based museums whose goal is to create a memorable visiting experience for people, such as science or nature museums, special themed museums, art installation museums. This kind of museums do not always include artifacts, or, if included, they are frequently secondary to the experience goal. Therefore they are more applied with multi-sensory installations or design thoughts.

The traditional senses usually refer to sight, hearing, taste, smell and touch. But in general we also have senses of temperature, pain, balance, which are called non-traditional senses [10]. In this paper, researches are more focused on the five traditional senses.

FIVE SENSES

Sight

Above all five traditional senses, there is no doubt that vision is the dominant one during museum visiting and countless examples have proved it. However sight has its limits. It is believed that people are highly selective in what they look at and read. The other four senses can help visitors both enjoying themselves in museums and understand a subject matter. Because using all the senses can help visitors connect to each other and surroundings. An early renaissance sculptor Lorenzo Ghiberti believed that "sculptor was inaccessible to sight and needed to be touched to be understood, since through sight one could only perceive the surface and could not truly experience the sculpture." [8]

Touch

There is a quite famous saying in Britain: "Seeing is believing." But the rest part of it is important as well: "but feeling is the truth." However touch is usually considered less utilized in museums. Visitors are usually forbidden to touch anything in museums because of the protection of exhibits from damage. "To enforce this rule, simple ropes and sensors that beep when people come too close to exhibits are widely used." [1] Some curators choose to

change the floor levels or place exhibits behind glass. These measures gradually have made people believe touch is not supposed to be in museums.

On the contrary to present museums, in the 16th and early 17th centuries, museums often allowed visitors to touch artifacts. Because “touch was considered to be an essential means of acquiring knowledge.”[8] Furthermore, touch was often used to supplement vision because it is evenly essential that visual impressions being proved and verified by physical touches. Actual tactile can bring people a feeling of assurance and trust.

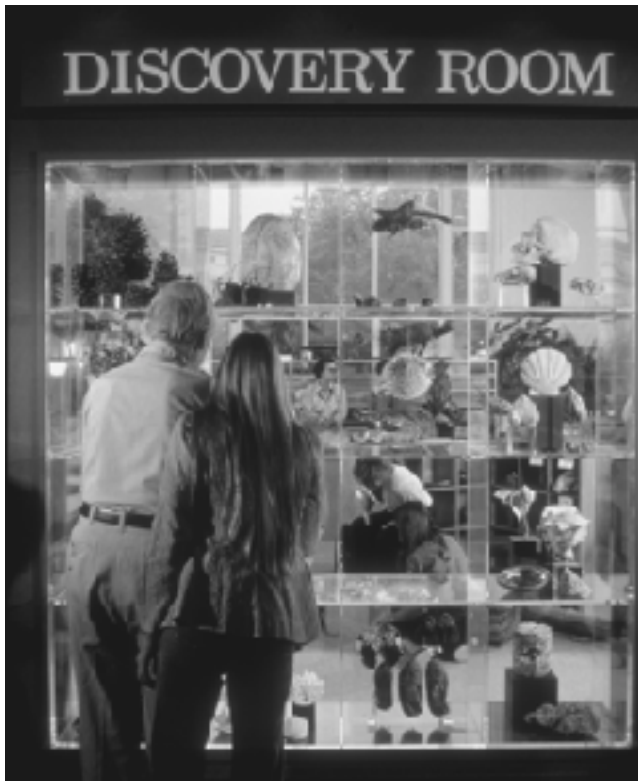


Image 1: The discovery room in the Smithsonian Museum of Natural History(http://www.exhibitfiles.org/the_discovery_room).

Some ways to introduce touch into museums experience were mentioned in researches. One is to build “discovery rooms” where small groups can interact with object directly. In 1974, the concept of “discovery room” was first designed and built in the Smithsonian Museum of Natural History. People can feel free to touch samples that were specially chosen to show typical features of exhibits but not too valuable or vulnerable. For examples, skulls, fossils, plants, and other cultural artifacts can be held in visitors’ hands being observed.(Image 1). Another example is the Heritage in Hospitals. During this project, curators took some exhibits to the hospital to test the positive or negative influences on the patients’ well-being after they touched the exhibits[8].

Besides touch, bodily sensations are also good ways to “feel” the journey in museums. Human body is a much richer source of sensations than just surface touch. “The bodily sensations of gravity, balance, pain and space can provide people a new self-awareness, which has the power to deeply affect experience of things.”[1] Some art exhibitions based on biofeedback relies on bodily sensations as well.

Smells

Curators seems tend to ignore the use of smell sometimes. However it is a sense good at triggering memories. We could use it cleverly to boost the experience of visitors and draw their attention. Additionally, odors have much stronger effects than visual stimuli. It is something people can immediately notice when getting in touch with. For instance if someone walks into a restaurant, it is normal that the smell of food will be first noticed and the decorations would come next.

The museum of food and drink (MOFAD) lab in New York is a good example of showing how to use and control odor.



Image 2: A visitor is smelling food flavor with the smell synthesizer[11].

The theme is “Flavor: Making it and faking it”. Through a multi-sensory journey of the science, cultural history and politics of manufacturing flavor. Using a simple button, people can smell the scent of a certain food passing through a smell synthesizer and a nozzle.(Image 2). By smelling objects, visitors can easily build a stronger memory of the exhibition. It takes less time to smell than reading texts or imagining what a special spice exactly would be.

The Van Gogh museum which is dedicated to the works of Vincent van Gogh and his contemporaries in Amsterdam in the Netherlands also applies the sense of smell at the end of the visiting route. Since all the art works are extreme valuable that visitors even cannot take photos of them, museum curators found a way to let people have close contact with Vincent Van Gogh’s masterpieces. This small part of exhibition is titled “Feeling Van Gogh op gevoel: experience with all your senses.” Visitors can smell the scent of the well-known painting “The sunflowers” by



Image 3: “Feeling Van Gogh op gevoel” in The Museum of Van Gogh.

opening the yellow wooden box(Image 3). This can help them imagine how Van Gogh felt when he painted the work.

The sense of smell is seldom used might result from some challenges. Obviously, it is not easy to completely control odors or stabled well indoor. What’s more, “people could easily get used to an odor when they are exposed to it for a long time.”[6]

Taste

Because of the intimacy problem, taste is also difficult to apply to museum exhibitions. But curators managed to deal it with themed cafes and restaurants.

In the National Museum of the American Indian in Washington, D.C., the on site restaurant Mitstam Native Foods Cafe does an excellent job of using sense of taste to enhance visitors’ experience. To the dishes which represent different cultures of the museum topic, the food there are nearly all made of organic and widely-ranged ingredients. It is also very appealing to visitors that the restaurant leaves some notes on the tables to tell some stories of “food facts” about the topic. This way of immersing visitors in a educating and delighting environment is absolutely easier and more relaxing for them to acquire knowledge than just observing objects and long texts inside exhibition rooms. After all, in my opinion, just like studying a language, it is better to understand a field when learners are surrounded by it and experience it themselves but not just looking at the textbooks or screens. “The menu is designed to be consistent with the mission of the museum, which is to educate visitors about Native American life and culture. The selections are as authentic as possible down to their authentic ingredients.” Said the general manager of the Cafe Larry Ponzi[9].

Some museums also tried other attempts to involve taste in museums. One is to display some special recipes or cooking books related to the main theme of museums in gift shops.

There was a very unique recipe being sold in the museum of San Quentin Prison. It is from some of the inmates who are sentenced death penalty and about their requirements for the last dinner. Sounds very scary and cruel but it for sure gives visitors some experience they have never had. Another example would be the Museum of Catering and Commerce in Budapest, which sells some recipes for pastry cooking.

Hearing

In contrast to taste and smell, sound in museum exhibits is quite easy to incorporate and has been popular for years. “Sound is an extremely important and evocative sense: it can be descriptive, informative, and powerful.”[2]It is an interpretive tool that often utilized for information communicating to the audience. In the meantime it simultaneously has the effect of entertaining people. Besides that, different from other four senses, sound also informs us of objects and events outside of our field of view.

To better analyze the use of sound in museums, a distinction between types of sounds was made by Nikos Bubaris in 2014, drawing from film sound design field: “Diegetic” and “non-diegetic” sounds. “ ‘diegetic’ refers to the world of the story presented and the term 'non-diegetic' refers to sonic information that is outside the world and the actions of the story presented.”[2]

“1. “Diegetic” sound

Sound whose source is visible on the screen or whose source is implied to be present by the action of the film:

- Voices of characters
- Sounds made by objects in the story
- Music represented as coming from instruments in the story

2. “Non-diegetic” sound

Sound whose source is neither visible on the screen nor has been implied to be present in the action:

- Narrator’s commentary
- Sound effects which is added for the dramatic effect
- Mood music
- Non-diegetic sound is represented as coming from the a source outside story space.”[5]

According to this criteria, audio-guides primarily belongs to non-diegetic sound, ambient audio is often diegetic, though music is often non-diegetic. And in topic content is often diegetic, though a narrator's voice is most often non-diegetic.

An example of using ambient audio in museums is the the Children's Museum of Indianapolis. It is well known for their use of sound in their Dino-sphere: their world exhibit(<https://www.expedia.co.in/Childrens-Museum-Of-Indianapolis-Indianapolis.d6062511.Attraction>).



Image 4: “Dinosphere” in The Children's Museum of Indianapolis

is involved with “hearing dinosaur calls,” “thundering footsteps,” and “ambient animal sounds”. This use is clearly a typical kind of soundscapes. Similar designs have been more and more commonly used in museums, as well as some specific demonstrations of concepts.(Image 4)

The use of sound has been growing in the art field too. Over the past fifty years, sound has been increasingly incorporated into art museum exhibitions. For example in 2013, New York's Museum of Modern Art (MoMA) opened its first major exhibition of sound art, entitled “*Soundings: A Contemporary Score*”[2].

When introducing sound in museums, control appears to be a serious problem due to museum is an inherently acoustic space. The walls could lead to echoes and every material matters to the effect of sounds. Result from this, an interactive exhibit designer Andrea Weartherhead put forward ten suggestions to some of the most common acoustic problems in museums[2].

TECHNOLOGY IN MUSEUMS

In recent history museums have introduced advanced technologies to exhibitions. This allows them to not only “provide more information but also to engage visitors of varying learning styles and provide a more customized museum experience.”[8]

Some very common exhibit technology can include videos on screen, projected videos, audio guides(usually played by smart phones now), interactive games, 4D-effect cinemas, touched screens and hands-on learning opportunities of various kinds[4].

In last few years, virtual reality and augmented reality have become a focus of attention and they play a very important part in sensory experience as well. One big advantage of virtual reality is people can see and play with objects which they could not have access to. Meanwhile, some valuable

exhibits can also be observed by a larger group of people at the same time, without any boundaries. Visitors can feel the charm of collections without influencing others’ experience while museums get to protect the real exhibits from any harm. Another benefit would be the possibility to show some exhibits which are not actually inside the museums, for example when they are out for an exhibition or lent to

Thus, where there are some exhibits are delicate for setting out, or they are not actually inside museums, it is a perfect opportunity to incorporate virtual reality to the multi-sensory experience. Curators can use either online tours, like some websites specially developed for such experiences, or virtual reality devices. Creating a virtual experience can also give people a view of somewhere they can hardly travel to, such as a grassland from ancient times or inside views of Egyptian Pharaohs' graves.



Image 5: L.I.V.E. Centre design concept

(<http://fortune.com/2015/06/18/ar-vr-theme-park-china/>).

Landmark Entertainment Group is famous for its designs to improve Universal Studios amusement park attractions. Technologies like 5D cinemas, virtual reality and augmented reality have help boost the business of the park and attracted millions of visitors every year. Recently this group has started a new concept for its L.I.V.E. Center. It is a mixed reality project which will finally be built in China by 2020(Image 5). Visitors nowadays are already quite familiar with technologies like three dimensional movies, panoramic sound, special effects, etc. In order to bring visitors’ experience to a whole new level, it is inevitable for this kind of companies to work on latest and most popular technologies.

Other technologies like 3d printing, which has been presented someone before, is a very good way to make replicas of real exhibits. This type of multi sensory experience is similar to the discovery room. People can

know the details of the exhibits and even take them home as souvenirs.

CRITIQUE OF MULTI-SENSORY EXPERIENCES

In the paper ‘Sensory History and Multi-sensory Museum Exhibits’, the author mentioned some issues in multi sensory experience design.

- Shows rather than educational experiences

“While museum visitors appear to enjoy the interactive parts of the exhibits, these elements may not actually further the educational goals of the museum.”[8]

A multi-sensory experience usually is designed for both visitors’ enjoyment and some educating purposes. However recent years it has been a focus of attention that the most people are gradually more interested in the former part of the multi-sensory experience than the latter. Instead of learning from museums, visitors started to simply having fun in exhibition rooms. This apparently has gone far way from the original goals of a museum. More significantly, some interactive devices which were designed for entertaining people are even not closely connected to the subject or exhibits. In this case curators should pay attention that a multi-sensory experience should at least has some help for explaining the subject whatsoever.

- “Some visitors may not want to use the interactions
The interactive devices should be labeled appropriately so that their purpose may be understood whether visitors choose to use them or not.”[8]

There is an attempt of incorporating multi-sensory experience into exhibition display in the Boston Museum of Science. This exhibition called the New England Habitats, provides some replicas of exhibits for visitors with a landscape recreation. Visitors can get to know the details of animals and plants representing different part of habitats. But what was designed badly is the smell experience. The curators forgot to label all the scents, which consist various kinds. This directly led to the confusion of smells, since the differences among them are very little. For example "visitors have pointed out they could not well distinguish between the scents of the Maine coast and those of the Green Mountains of Vermont. « Thus the multi-sensory experience design of exhibits should have a clear purpose and be labeled for visitors’ understanding.

- Media overload

“It is a bad idea to try to accommodate every possible learning style, difference, interest and experience level, as too many ideas in the exhibition will be overwhelming.”[8]

Nowadays the popularity of multi-sensory experience has caused many impressive interactive devices designed to fulfill the visitors from various backgrounds. It is clear that

people could have more chances to experience what they are interested in. But a media-overwhelming trip, which combines too many elements or ideas could not help enrich the experience. Visitors should have choices to pick their favorite themes, senses to focus, technologies and ways of interaction, but not difficulties of choosing what they want to enjoy. Therefore media overload is what designers should also pay attention to.

- The majority of interactive elements appear to be intended for specific groups

“In many museums, the majority of interactive elements appear to be intended for specific groups.”[8]

In many museums, the majority of interactive elements appear to be intended for specific groups. For example the interactive designs involving touch in museums have been most frequently aimed at children and visually impaired visitors. However, all of us, blind or otherwise, experience and understand the world through touch. It is understandable that children’s instinct of curiosity and touching resulted in museums’ preferences for designing touch experience centers especially for them. “But museum visitors of all ages expect to be actively involved with the exhibits, to learn informally and to be entertained simultaneously.”[3]

CONCLUSION

Overall, this paper first discussed the necessity of considering multi-sensory experience design in museums according to the goal of them. Then the utilization of five traditional senses in museums were reviewed and analyzed. Vision is the dominant sense in museums. But to better understand the texture, material and shape of exhibits, the sense of touch is also inevitable to concern about. Sound has been introduced into museums for a long time. However it is crucial to manage the control of sounds inside the exhibition space. The two most intimate senses, taste and smell, are also difficult to present but can benefit the visiting experience significantly since they can help visitors have a deeper impression of exhibits and has a much stronger sensational impact.

Afterwards newest technologies related to multi-sensory experience were explained in detail for the implementations of future design projects. Finally the paper reviewed several critique suggestions by scholars and curators to give further advice to future development.

From the author’s point of view, further research is needed to discuss how to combine multiple together in museums to give visitors more immersive experience and if there are more other non-traditional senses we can explore in the future.

APPENDIX[2]

• Ten suggestions to some of the most common acoustic problems in museum given by Andrea Weatherhead.

1. Avoid hard-surfaced, highly reflective materials – i.e., stone, glass, metal, and concrete. They reduce control over where sound travels.

2. High ceilings, especially those treated with absorbent materials, are better than low ones. Avoid domed ceilings which can focus sound in unwanted “hot spots.”

3. Bass sound waves are long and difficult to control: consider using bass shakers which replace bass audio with physical vibrations, tricking visitors into believing they are hearing those frequencies rather than merely feeling them.

4. In areas with multiple sound sources, provide ways to deliver sound close to a visitor's ears. Competing sound sources need to be far enough apart that one is at least 10 decibels (dB) louder than the other.

5. Use circuitous routes between spaces to achieve acoustic isolation without the need for doors and ceilings.

6. Budget enough money and space for acoustic treatments; commercial sound- absorbing panels can run \$10 to \$40 per square foot. Cheaper materials exist, but you will need to budget time and labor for mounting them. Remember that absorption materials take up valuable space on floor plans, making walls, ceilings, and ducts thicker.

7. Consider carpeting areas of greatest sound intensity.

8. Ensure that spaces are free of excessive mechanical noise (e.g., do not locate exposed air units in the gallery).

9. When planning audio with video, you may want to use focused sound devices. A video monitor's integral speakers are usually designed to cover as wide an area as possible.

10. Take special care with location and orientation of mini-theaters; sound bleed out the rear can interfere with adjacent exhibits. Doors are not needed if speakers and materials are chosen and placed wisely.” (Weatherhead, 2004 p.7)

Due to the fact that a museum is a physical space filled with air, it is an inherently acoustic space. Even if sound is not produced by the objects within a museum, sound is still

present within its walls. The museum is not a visual place but an audiovisual environment, even the work is not as quiet as we might expect. This is the nature of sound in the museum[2].

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