

Experiential Design of Space in Virtual Environment: Cubism as an Art Application

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Abstract. *This paper presents an experiential design concept as one of the approaches to design a good storytelling in VEs. We tested this concept and related it within cubism art to understand spaces based on its original form particularly the shapes, planes and volumes. This experiment revealed elements of expression and abstractions through layers of intrinsic knowledge within the VEs that were extremely difficult to understand when viewed in their original forms. New spaces were also discovered within the VEs thus suggesting evidence on the stories within the art form. This paper also suggested that VEs provide a better understanding of spaces and abstract spaces, scale through different depth of illusions and spatial representation.*

Keywords: *Experiential design; virtual environment; space design; navigation.*

Introduction

Virtual reality (VR) has been utilized in many applications of design for the last fifteen years. In the area of art and architecture, researchers and VR practitioners demonstrate or to some extent suggest new ways and insights from our common sense experience (Cavazza et al., 2004) in visualizing these art forms. Osmose(TM) (1995), a work by Char Davies (Grau, 2003) discovered new rules of Physics when visualized VR in art and design. While there are many approaches of developing art and architecture in virtual environments (VEs), concepts to strengthen storytelling (Bridges and Charitos, 1997) within this environment are still limited. Conventional static two dimensional (2D) art and architectural drawings restricted chances to draw general primitive attention

in the way audience understands, navigate information spaces naturally (Waterworth et al., 2003), and interprets and perceives information. In contrast, VEs provide sensory experience of being in a computer generated, veridical perception of simulated spaces, intrinsic knowledge (Bridges and Charitos, 1997) and realism of interactivity within the simulated spaces. Virtual environment (VE) progressively used as a device of communication and presentation of design intensions by architects and artist (Schnabel, 2003). However, the concept to strengthen storytelling in VE that accommodate Human-Computer Interaction (HCI) design to actively interact in real-time seldom employed in the process of design. In this paper, we tested this concept and compared it within cubism art to understand spaces based on its original form particularly the shapes, planes and volumes.

In the context of cubism art, many artists expressed their ideas through multi-perspective images. Vallance and Calder (2001) define a multi-perspective image as multiple views of a single scene from different perspectives. In 1907, Picasso and Braque employed an analytic system in painting rejecting the traditional techniques of perspective, foreshortening, modeling, and chiaroscuro and refuting time-honored theories of art as the imitation of nature, and they built up three-dimensional (3D) images on the canvas using fragmented solids and volume (Oxford University, 2005) thus resulted as a form of abstract artwork. In most cases, such work the multiple points of view are only clearly available to the artist (either in reality or in their imagination) and their number is finite although they may become numerous (Biggs, 2003). In VE, the limitations can easily be dismissed unfolding of new spaces allowing more information to be placed around a certain topic in a non-sequential but spatial arrangement (Aguilera, 2006) accord to experience centered design.

In the context of art and design, Polaine (2005) defined experiential design not only helping creators to be artists but provides a lot of materials for audience to participate in, so that they become artist themselves and create as stuff to explore and learn about art expression. Wright et al. (2006) suggested that the objectives of experiential approach are for VE designers to understand the experience of users and facilitate communication and exploration of design ideas as a dialogical process.

In this paper, our experiment adopted the concept suggested by Waterworth, Lund and Modjeska (2003) on the use of experiential design in a shared information space as below:

1. The capacity to understand abstract information to act in PE resides in bodily experiences.
2. The social interaction and navigation of information spaces made possible due to sharing the same primitives of understanding information.
3. The application of designing mobile or wearable computing content.

Four masterpieces of cubism art were selected in this experiment that include 'Woman Playing the Mandolin' (Pablo Picasso, 1909), 'Harbor in Normandy' (George Braque, 1909), 'La Tour Eiffel' (Robert Delaunay, 1937) and 'Violin and Pitcher' (George Braque, 1910). The artists basically used shapes to depict real bodies or objects, and composed in a larger and an open space. The intention was to reveal elements of expression and abstraction through layers of intrinsic knowledge within the VEs that were extremely difficult to understand when viewed in their original forms.

Design issues

Two-dimensional (2D) static image produced by traditional graphic method limits visual understanding it can only express the quality of a space at one point in time and from one point of view. Three major problems were indentified to better understand the construction of cubism art in VE:

- Design process: traditional design practice outside-in (need – design – solution) and experiential design practice inside-out (experience – design – need)
- Focus: traditional design focused on the product not audience / user, meanwhile, experiential design focuses on users of the product, giving the edge input for improvement by user's experience, hence becoming designer themselves.
- Evaluation: traditional design is self-referential, in the sense that it judges its own performance by usage of product. Experiential design is all about understanding the user and how they act, react and use the product.

From our observation, experience centered VE design explored component of VR such as focus, emotion, space/form and orientation, enabling to attain the objective of this study. Synergy of these components helps to cut through the complexity of user-centered design with clear explanations and vivid illustrations that focus on ideas rather than tools or technique. We define the following within our study

scope:

- Focus: sensual thread of experience concerning sensory engagement with surrounding. Provide focus on sense of place and/or sense of skill set and or role-play.
- Emotion: human feelings (e.g. joy, disappointment and desperation) and subjective emotions (e.g. fulfilment, satisfaction and fun) centralize to user role of response & behaviour.
- Space/form: Embodies of compositional structure fabric scale, shape, location and distance (Fazidin, 2003) unfolds a type of experience which inter-relating sense of surrounding
- Orientation: a spatio-temporal thread unfolds the capability to engage position, motion, direction and control in exchanging of recognized comfort zones and boundaries between time and space.

Cubism construction in a virtual environment

Our goal was to clarify the underlying relationship between the spaces and information of abstract art within VE. Art investigations on the concept of space in cubism art were developed as a spatial deconstruction violating the unified space of simple perspective to show each object from its canonical viewpoint, regardless of the relation to other objects. Compositional of space was stretched, twisted, cut, articulated, inverted, gridded, minimalized, blocked, textured, splashed, lashed, exploded and imploded, appear as the abstract arts. Spatial composition in cubism posed questions on perceptual, optical and conceptual relating to the physical nature of space as defined in science. It was evident that in a non-representational work cubism arts addressed question through experimentation with visual space, optical perceptions of canvas and constructions that distort and reconfigure space. Cubism revolution struggled to break away from visual representation and efforts made to capture the sense of space that artist was experiencing. Cubism artists also used deep shade

Figure 1
Sample of Cubism painting
and its description.

and bold juxtaposition of the compositional masses increased the complexity of abstraction within the overall composition.

We experimented the concept used in cubism art using virtual reality technology to give a better understanding of spaces and its relationship in the environment that allow users interaction through multiple sensorial modalities. Explorations of higher dimension within the virtual spaces provide a means for interaction within multi-perspective space and offer a new artistic expression. Interactivity in VE also offers a platform for experimenting and changing our pre-conceptions by which new insights and perceptions gained into our role as both perceiver and definer, and revealed the interaction understanding between idea and creation. However the issue pertaining aesthetic value and ideation of cubism in flat surface, as a result of translation (from 2D to 3D) was subjective for arguments.

Cubism skeptics in this alternative form of expression may not have the interest in such genre or automatic momentary shift particularly making a mental note of something or contemplating either past or future events. To push the limits of interactivity or immersion in VE, artist needs to have the knowledge (skills) to use mathematics encapsulated programming or engaged advance wearable computing in order to program the technology to their advantage. In our concept, we able to identify the components of VR, navigation and interaction which embodied into VE aiding artist or user to experience and understand the abstract cubism depictions (Figure 1 and Figure 2).





Figure 2
Transformation of the Cubism painting into semiotic 3D environment.

Navigation design

In this project the navigation was designed considering the user's experience using the navigation devices. This is considering that inappropriate navigation device can make movement in VE much difficult than the physical world that leads to frustrations and disincentives to user. The selection of navigational devices was considered with the storytelling in the cubism art. A simple choice of using mouse allowed 3D navigation in the VE to be experienced at 360° degree of motion. In our test application, we suggested a few landmarks to aid the overall navigation differentiated in the form of form of object, audio, color and shape (i.e. to some extent similar to physical world) (Figure 3).



Figure 4
Gallery like presentation of the Cubism painting acts as a hyperlink to its 3D environment.

method, it tackled general interaction techniques and devices useful in merging with virtual showcase. Since interaction in VE is not the same as in the real world, therefore it is important that the graphical user interface (GUI) does not make it more difficult that often causes confusion and misinterpretations. Our experiment however focused on a mouse-interaction with story dependent approach (i.e. guided interaction options) (Figure 4).



Conclusion

This project has shown that cubism art that was difficult in its original form managed to reveal the intrinsic knowledge via VE. With the right selection of VR device, such spatial information can simulate depth, differentiate spaces and provide a good storytelling. The use of landmarks represented in the form of different objects, audio, colors and shapes (i.e. to some extent similar to physical world) have eased the overall navigation within the virtual environment. The involvement of designing spatial entities, which accommodate human activities like navigation, interaction and communication, became a necessity in this VE design. The construct of 'existential space' for abstract art form could be used as a starting point to identify the constituting elements and conceptualize the structural levels that the physical environment consists of. Other contributions to the success of the experience may also depend on the level of active participation of the users and the selection of devices. This research has opened an opportunity for designers to find new scientific discoveries concerning the physical structure of space as compared to

Figure 3
Central navigation level like main menu in a webpage.

Interaction design

In this project, it was clear that VE enhanced the sensory experience by the use of interaction to control the virtual world as an active navigator and observer. Interaction technique integrated into digital stories differentiated between story-dependent and story-independent. The story-dependant approach focused on developing techniques and tools that adapted in the story. As for story-independent

virtual space. Despite the limitations, this study has met the objective of identifying the concept of experiential design as one of the approaches to design a good storytelling in VEs.

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