EMBEDDING VISUAL EFFECTS IN 3D ANIMATED ENVIRONMENT DESIGN FOR SHORT MOVIE

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ABSTRACT

Visual effects are commonly referred to as Visual F/X or VFX, which comprise the various computerized processes by which images are created and/or manipulated outside the context of a live action video. Visual effects involve the integration of live action footage and computer-generated imagery to create virtual environments, which appear like 3-dimensional realistic space, but would be costly to produce as models and/or simply impossible to capture on film. Visual effects, using computer-generated imagery (CGI), have become increasingly popular in big-budget movie making, but also have recently been accessible to the amateur filmmakers with the introduction of affordable animation and compositing software. This study will observe and evaluate the digital process of composing images and the post-production techniques for integrating 3D animated character in different 3D environment within cell animation technique. The 3D characters are rendered in green screen to merge with 3D environments design. This technique is accomplished through the 3D animation and motion graphics software. Finally, this paper will discuss the overall production efficiency in terms of the production pipeline, psychographic research and creativity involved in visual exploration. This study will also touch on the effect of how the audience is impacted by the aforementioned integrated processes.

Keywords: Visual Effects, 3D Animation, Digital compositing, Psychographic research on 3D short movie

INTRODUCTION

Historically motion picture exist in early 1800s. Brinkmann (2008:5) stated that *motion picture photography came about in late 1800s and the desire to be able to continue this sort of image combination brought about the development of specialized hardware to expedite the process. Optical printers were built which could selectively combine multiple pieces of film and optical compositing was born*. Since then, the technique evolved, *early examples of optical compositing can be found in the 1933 film King Kong* (reported by Brinkmann, 2008:6).

Visual Effects (Vfx) plays important roles in enhancing the *sense of motion* (termed by Krasner, 2008:2) in most of the movie industry. Visual effects involved two techniques between live action and cell animation that are merged in digital composition, normally in post production. Successful movie such as Avatar by James Cameroon at first was involved in *advance technology far enough to commit the vast resources required – reputedly near the $300 million mark – to bring it to the screen* (Evans, 2010:40).

The main constraints in producing good movies include the budget, technology and human resources. It is a bit risky to invest on production for stunning movies but with low impact to audience due to the effect of its turnover. Evans (2010:40) stated about the successful of Avatar, *after earning $71 million on its opening weekend in late December, James Cameron's Avatar had grossed over $1 billion by early January, making it the most successful films ever*.

VISUAL EFFECTS AND ANIMATION DEFINITION AND PROCESS

Visual effects (VFx) are closely related to animation where motion designers tend to combine technique, animation and VFx through digital compositing. *Visual effects (commonly shortened to Visual F/X or VFX) are the processes by which imagery is created and/or manipulated outside the context of a live action shoot. Visual effects involve the integration of live-action footage and generated imagery to create environments which look realistic, but would be dangerous, costly, or simply impossible to capture on film* (Wikipaedia, 2012). In application of visual effects to the scene will also involve cost and time. Designers have to perform two important task; rotoscoping and tracking in digital compositing process.

Rotoscoping, or masking, is the basis of compositing. It is the process of drawing a mask around an element in a frame or sequence of frames. Tracking is the process of matching a foreground-element's motion to that of the background. (Wikibooks, 2011)

The visual effects can also be applied through cell animation. This is due to the definition of animation which stated as *the rapid display of a sequence of images of 2-D or 3-D artwork or model positions to create an illusion of movement. The effect is an optical illusion of motion due to the phenomenon of persistence of vision, and can be created and demonstrated in several ways.*(Wikipedia, 26 March 2012)

THE IMPACT OF VISUAL EFFECTS IN 3D MOVIE

The way of seeing images needs to be justified in order to give people an opportunity *to stop and think about the specifics of how the brain perceives what our eye see* (Brinkmann, 2008:15). Visual effects can enhance the audience understanding on each scene displayed on the screen due to its ability to bring it to life. Hanson (2006) in his slide presentation stated that *FX Animation Brings Life, Believability to Static Scene.*

Normally visual effects combined live action and cell animation to enhance or simulate the real scene. Hu (2010) stated that *successful visual effects often depend on the careful manipulation and seamless integration of elements with live action background environments.* However due to the advancement of the technology VFx can be applied in animation through *2D and 3D computer graphic tools that involved painting, image warping, digital compositing, image processing, modeling, animation and rendering* (Hu, 2010)

OBJECTIVES

This study intends to observe part of the process in applying visual effects in part of the scene a short 3D movie. It also intends to analyze the roles of environment design in relation to the character involved. By observing and analyzing both items will help us to identify the effective and fastest way to produce the final rendered images, hence will speed up part of our production process. The final outcome from the process will give a great impact on the audience especially in viewing quality images on the screen.

RESEARCH QUESTIONS

1. Are the visual effects on the scene sufficient to support the environment design and the character to display its role?
2. What are the effective approaches in reducing the process of applying visual effects in the scene?

METHODOLOGY

In this study, psychographic research is used to identify and measure the audience perception on the impact of visual effects on the character and the whole scene. Edris, & Meidan (1998:24) stated that, "*literature of consumer research over last 20 years is identifying the relative importance of a number of psychographic dimension that might best explain the variation in a given aspect of consumer behavior (e.g. product user status, brand loyalty patterns, brand choice behaviors, TV viewing habits and so forth)*". The intention is to observe and identify visual effects among the audience. Is it sufficient to support the environmental design and the character displayed?

Two hundred (200) students who have undergone three (3) courses; Motion Graphic, 3D Animation and Digital Illustration and Art and Creative Technology are involved in this study. They are asked to give responses on three main areas on psychographic variables (Activities, Interest, Opinions (AIOs) (Edris & Meidan, 1998) in an online survey in surveymonkey.com.

The images of the environments and the character involved in the intended scene are included in the instrument. The roles of the character are explained clearly in the instrument reflecting the roles of the character. Both images of the environments and the character are then analyzed using descriptive analysis. Cross tabulation are also used to observe the association of the environment and the character. It will also observe the roles between two characters.

RESEARCH DESIGN

The instrument is designed based on Edris & Meidan (1998). One of nine key areas in psychographic variables, i.e. Activities, Interest, Opinions (AIOs) is used as main variables to gain data on audience perception on character design and images on visual effects (still and moving images).
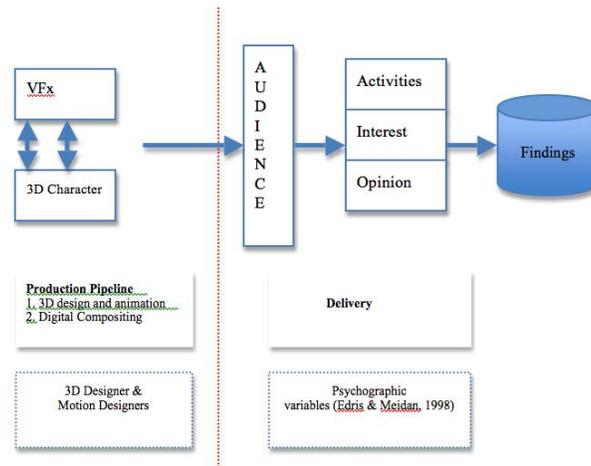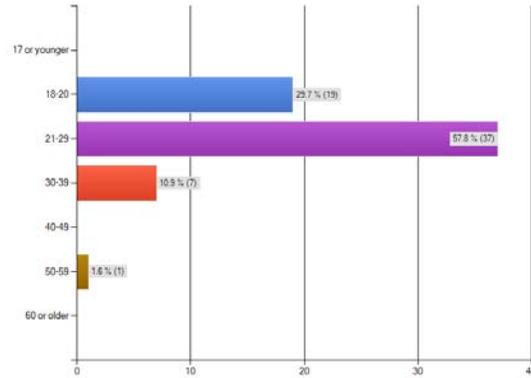

FINDINGS AND DISCUSSION

Demographic

Chart 1 show the distribution of respondents (in percentage). Most of the respondents are from the age group of 21–29 years old (57.8%, n=37), followed by age group of 18–20 years (29.7%, n=19) and age group 30-39 years (10.9%, n=7). Only 1.6% (n=1) falls in the 50-59 years age group.

Chart 1. Distribution of Respondents according to Age.

Audience Activities and Interest

Table 1 shows movie preferred by the respondents. Most of the respondents preferred Motion Pictures with visual effects (59.4%, n=38) followed by full 3D animation movie (26.6%, n=17) and Film (14.1%, n=9).

Table 1. Movie preference

Movie preference	%	n
3D animation movie (full 3D animated)	26.6%	17
Motion Picture (with Visual Effects (VFx)	59.4%	38
Film	14.1%	9
Total		64
skipped question		1

Most of the respondent likes fantasy movie (34.4%, n=22) followed by adventurous movie (29.7%, n=19). They seems not to like thriller and true story (12.5%, n=8) followed by history movie (6.3%, n=4) and science fiction (4.7%, n=3).

Table 2. Theme of the movie the audience like most.

Theme of the movie	%	n
History	6.3%	4
Thriller	12.5%	8

Adventurous	29.7%	19
Fantasy	34.4%	22
True Story	12.5%	8
Science Fiction	4.7%	3
Total		64
skipped question		1

Amongst the respondents, who are to produce movie, their interest focuses on visual effect (VFx) (21.9%, n=14) followed by character design (18.8%, n=12), script writing (15.6%, n=10) and environment design (14.1%, n=9).

Chart 2. Areas of Interest among respondents to produce the movie.
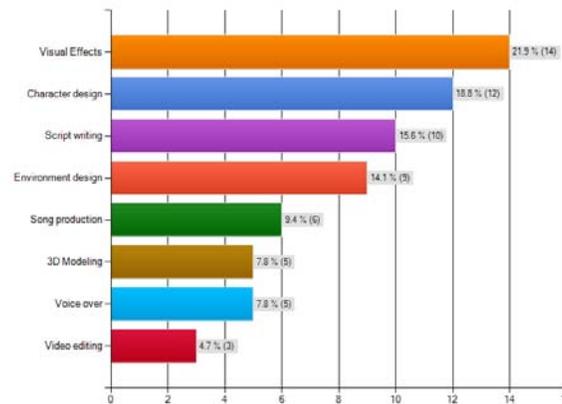
1. **RQ1:** Are the visual effects on the scene sufficient to support the environment design and the character to display its role?

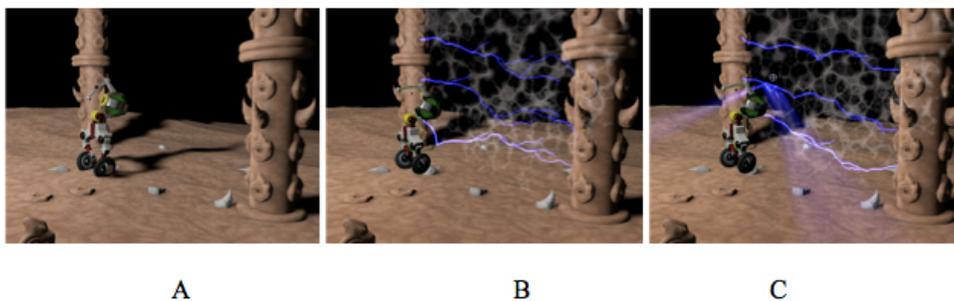Image 1. Visual Effects in Environment Design

A   B   C

Table 3. Impact of images on the audience

	%	N
Image A	1.5%	1
Image B	13.8%	9
Image C	84.6%	55
	100.00%	65

Table 3 shows the feedback from the respondents on the impact of visual effects (VFx) on environment A, B and C. Most of the respondents selected environment C (84.6%, n=55) that contains maximum visual effect on them compared environment B (13.8%, n=9) and environment A (1.5%, n=1).

Table 4. Reason on impact of VFx to environment A, B and C

Reason	Which of the images above that you think will give impact to the audience				
	A	B	C	%	N
1. Element of creativity	0	3	14	26.2%	17
2.Make the scene more interesting	1	2	20	35.4%	23
3. To increase my understanding on the story	0	1	4	7.7%	5
4. Simulate the hidden situation that we can't see in a real world	0	3	17	30.8%	20
answered question					65

Table 5 shows the reason of choosing Visual Effects in the movie that suit the respondent's interest. Most of the respondents who are interested with Motion Picture with visual effects give the following reasons:

1. Element of creativity,
2. Make the scene more interesting and
3. Simulate the hidden situation that we can't see in a real world as a reason of choosing Visual Effects in the movie.

However, at the same time most of the respondents did not care about their

understanding on the story in most of the movie.

Table 5. The reason of choosing Visual Effects in the movie that suit the respondent's interest.

| Reason of choosing Vfx | Select the movie that suit your interest | | | | |
	3D animation movie (full 3D animated)	Motion Picture (with Visual Effects (VFx)	Film	%	n
1. Element of creativity	3	12	2	26.6%	17
2. Make the scene more interesting	7	11	5	35.9%	23
3. To increase my understanding on the story	0	4	1	7.8%	5
4. Simulate the hidden situation that we can't see in a real world	7	11	1	29.7%	19
Total					64

Image 2. Character Design
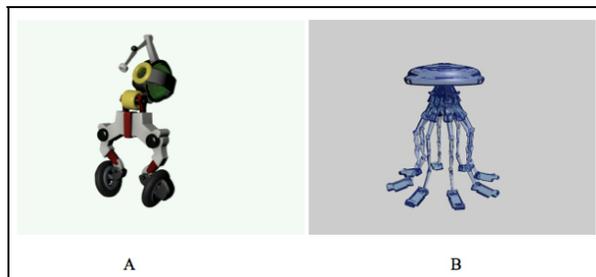
Chart 3 shows the distribution of percentage on expression of the character based on image 1. Most of the respondents agreed that both character displays confident (37.1%, n=23) followed by nervous (22.6%, n=14), bravery (17.7%, n=11), prevailing (16.1%, n=10), terrifying (4.8%, n=3) and tragic (16%, n=1)
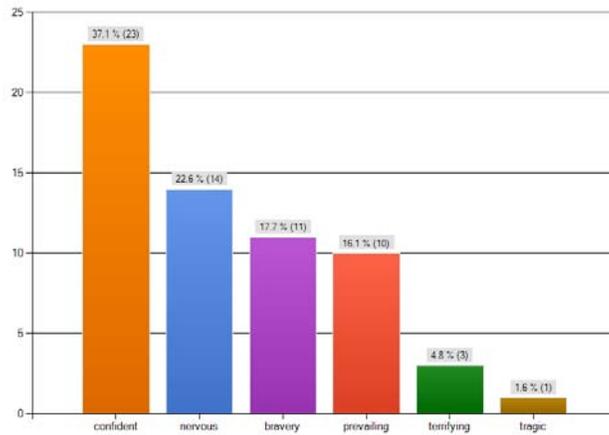
Chart 3. Character expression on image 1

Table 6 shows the impact of environment (image 1) to the character (A and B) Character A and B (image 2) have great impact on environment C (n=35) which have maximize the VFx in the scene.

Table 6. Impact of Environment (image 1) to the character (A and B)

| Character (Image 2)/Environment | Which of the images above that you think will give impact to the audience | | | | |
	A	B	C	%	N
Character A	0	3	20	35.4%	23
Character B	1	6	35	64.6%	42
Total					65

Conclusion RQ1: Does the visual effects in the scene is sufficient to support the environment design and the character to display its role?

1. The findings show that the scene with visual effects can give impact to the audience.

2. The findings show that motion picture with visual effects seems to have more attention from the respondents especially in applying visual effects.

3. The findings show that both character A and B (image 2) seems to be suitable with environment   C.

4. The findings shows that the environment with maximum visual effects can give a great impact to the characters in terms of its expression.

RQ2: **What is the effective approach in reducing the process of applying visual effect in the scene?**

Image 3. Environment Design 1

Table 7. Percentage and frequency of the mood for Image 3.

Mood	%	n
Dream	35.4%	23
Cold desert	20.0%	13
Inside the water	21.5%	14
Haunted city	16.9%	11
Graveyard	6.2%	4
answered question		65

Table 7 shows the distribution and frequency from the respondents on their response to the mood on Image 3. Most of the respondents agreed that Image 3 shows Dream (35.4%, n=23) followed by Cold Desert (20.0%, n=13), Inside the water (21.5%, n=14), Haunted city (16.9%, n=11) and graveyard (6.2%,n=4).
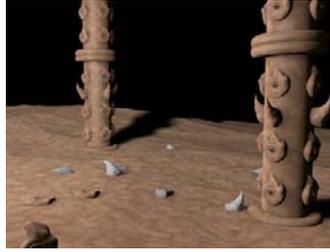
Image 4. Environment 2

Table 8. Distribution of Percentage and Frequency of audience's feeling on Image 4

Audience's Feeling	%	n
Fantasy	40.0%	26
Thriller	4.6%	3
Adventurous	35.4%	23
Scary	10.8%	7
Futuristic	9.2%	6
answered question		65

Table 8 shows the audience's feeling on Image 4. Most of the respondents feel that image 4 is suitable for fantasy (40.0%, n=26) and are likely to be Adventurous (35.4%, n= 23).

Image 5. Three Environments with different setting of Visual Effects

Table 9. Impact of images on the audience

	%	N
Image A	1.5%	1
Image B	13.8%	9

Image C	84.6%	55
	100.00%	65

Table 9 shows the feedback from the respondents on the impact of visual effects (VFx) on environment A, B and C to them. Most of the respondents chose environment C (84.6%, n=55) that contains maximum visual effect can give impact to them compared environment B (13.8%, n=9) and environment A (1.5%, n=1).
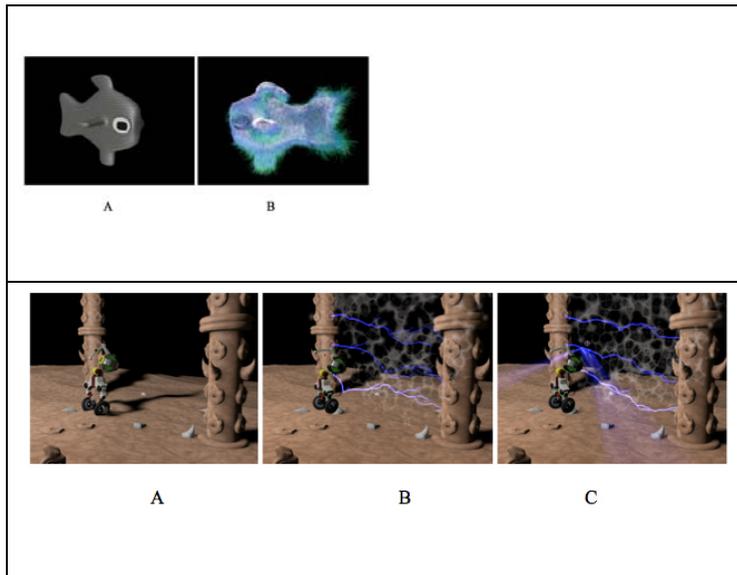
Image 6. Environment and Characters

Table 10. Cross tabulation between the environment design and two characters which with different characteristic.

Audience feeling on the environment design	Which of the images above that you think will give impact to the audience				
	A	B	C	%	n
Fantasy	1	4	21	40.0%	26
Thriller	0	0	3	4.6%	3
Adventurous	0	3	20	35.4%	23

Scary	0	1	6	10.8%	7
Futuristic	0	1	5	9.2%	6
Total					65

Table 10 shows the cross tabulation between the environment design and two characters which with different characteristic. Most of the respondents agreed that both characters are suitable in environment C with maximum visual effect. Most of the respondents also agreed that their feeling on environment C, both characters are suitable in Fantasy (n=21) and Adventurous (n=20).

Conclusion RQ2: **What are the effective approaches in reducing the process of applying visual effect in the scene?**

1. The findings shows that image 1 with visual effect which are produce from particle from emitter and volumetric light have influenced the audience on the mood that shows Dream and likely to shows Cold Desert and Inside the Water.

2. The findings show that the scene with visual effects can give impact to the audience.

3. This findings show that both characters A and B are suitable in Fantasy and Adventurous in environment C with maximum visual effect. This situation shows that either simple character or complicated character (hairy) is suitable with both fantasy and adventurous. It can also put both characters in either environment to be two different characters that have different roles.

CONCLUSION AND RECOMMENDATION

Most of the findings gain from psychographic variables Activities, Interest, Opinions (AIOs) shows extensively a collection of audience's activities, interest and opinions on their interest that focuses on specific areas in 3D animation and Motion pictures. Their opinion on the characters and environment design in part of the scene are also shown explicitly through their responses.

In terms of production process this study which focuses on cell animation specifically on character design and environment design which will then apply the visual effects to the scene. The whole process involves modeling, rendering in Cinema 4D R12 and digital compositing in Adobe After Effects CS5. The visual effects are also done in Cinema 4D by applying particles and volumetric lighting to the scene.

The data gains from psychographic variables (AIOs) are use as an indicator to observe the production process. Response from the audience plays an important role in its

contribution to the production process focuses in this study.

The findings in activities and interest on a whole reflect the imagination of the designers due to their response on the items according to the character design. Most respondent preferred to watch motion picture with visual effects especially on Fantasy, Adventurous movie and full 3D Movie. The areas of interest among respondents to produce the movie which focuses on Visual effects design. Most of the respondents who like Fantasy and Adventurous movie tend to be influenced by their movie preference.

Visual Effects designers should consider three important factors prior to their design process:

Activities and Interest

1. Character design should be supported by environment design in terms of its mood and expression and visual effect will be used to enhance it to build the audience understanding.

Opinion

2. Maximum visual effects will give impact to the audience. This scenario can be supported by as minimum by two different characters in one scene. By applying this visual effect will strengthen the roles and expression of the characters and highlight the mood of the environment.

3. Two visual effects in two process in production (rendering in 3D) and post production (rendering after compositing) will increase the time frame due to designers need to render two times, however the outcome of the scene will be able to give impact to the audience. In our findings stated that

> "The findings shows that image 1 with visual effect which are produce from particle from emitter and volumetric light have influenced the audience on the mood that shows Dream and likely to shows Cold Desert and Inside the Water".

The used of particles and volumetric light will increase the rendering time, however if we render it separately we might be able to reduce the rendering time.

4. The characteristic of the characters doesn't really affect the environment design, so character designer can simplified the character however it should have a clear expression.

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