Painting Using Experimental Animation

Khoo Yi Hui
School of Art, Design and Media

Asst Prof Ina Conradi Chavez
School of Art, Design and Media

Abstract - Digital technologies have played an increasingly important role in explorations of new image-making methodologies in this multimedia age. Amidst the growing popularity of computer generated images, the traditional medium has however, remained a strong and undying art form because the tactile quality of paint materials cannot easily replaced. The use of computers in artistic creation can often create a barrier between the artist and the digital canvas, such that the resulting art piece loses the personal touch of the creator and becomes seemingly 'emotionless'. The purpose of this paper is to introduce a new form of experimental animation that seeks to inject qualities of fine art painting into abstract computer animation through creative use of current industry standard software - Autodesk Maya and Next Limit RealFlow. The goal is to create moving pictures of a painterly abstraction that can be pushed further to produce aesthetically engaging and immersive experiences.

Keywords: Abstract art; painterly; Maya; RealFlow; experience

1 INTRODUCTION

Over the last few decades, distinctions between abstract and representational forms of art have been increasingly dissolved. Paradoxically, abstract art can be equally representational. It has the ability to represent something, even if only an idea, feeling, or intention. This research project focuses on creating moving images representational of the idea of flow and growth, but at the same time, abstracted in their forms to depict emotions and the invisible, inner states. The theme of flow and growth is chosen as these two qualities are important aspects of nature. The dimension of time is also inherent in the two, which enabled experimentations to cross between static and moving images.

Abstract forms are favoured over representational forms due to their ability to communicate meaning and emotional content. Abstract art can be a reduced form of nature in which the artist simplifies a form till it bears little or no stylistic similarities to the original, or it can be a 'non-representational' form which has no apparent connections to the visible world. Either way, abstraction frees the artist from the need to recreate convincing depictions of external appearances. Many turned to the portrayal of subjective emotions as a result, the Abstract Expressionists being one of them. The dissolution of any identifiable motifs forces the viewer closer to the idea or feeling that the creator wishes to express in his work.

Explorations of different abstract image-making methodologies are mainly done in Next Limit RealFlow and Maya Paint Effects, both powerful programs that can simulate real world appearances on the computer. RealFlow is a fluid and dynamics simulation application capable of creating impressively accurate and realistic fluid simulations now widely used in movies, advertisements, short films and animations. Paint Effects on the other hand, features a powerful and intuitive paint system nested within Autodesk Maya often used to create environments such as jungles and skies. What is perhaps most captivating about this system is that it is a digital tool that can mimic the natural paint media, enabling the user to work spontaneously with a paint brush to create a vast array of 2D and 3D imagery.

The focus of the explorations is on finding unique ways of using both programs to create painterly rather than realistic experimental animations. The term 'painterly' in this context refers to having the characteristics of the traditional paint medium, such as qualities of the colour, brushstrokes, and texture. These painterly characteristics are important in giving the final creations a personal touch.

It must be noted that this project is not attempting to replace the traditional medium nor perform an exact replication of fine art paintings on the computer. Rather, qualities of expressive abstract paintings are used as inspiration and references to help in the exploration of a unique form of painterly experimental animation capable of expressing emotive states.

The paper will describe the methods used to create the different forms of painterly abstract imagery using Paint Effects custom brushes and RealFlow fluid meshes rendered with Maya's Mental Ray. The paper will also touch on how the American Abstract Expressionism movement formed the main context of this study.

2 AIMS / OBJECTIVES

The objective of this project is to explore image making methodologies using experimental animation that aims to fuse qualities of abstract fine art painting with computer animation. Focus is put on inventive use of fluid meshes generated in RealFlow and custom algorithmic brushes created in Maya Paint Effects to produce abstract moving images that can depict emotive states and represent the idea of flow and growth. The spectator will be challenged in their reaction to such art pieces, and also engaged in the immersive experience to form their personal interpretation(s) of the work.

3 LITERATURE REVIEW / BACKGROUND

Abstract art is often misunderstood by the viewing public as being without meaning. When groups of artists started moving away from representational art towards abstraction at around 1910, there was never a desertion of content in their paintings. Instead, they drew upon deeper layers of meaning to constitute the spiritual in their work. The subject and content of this non-representational form of art were found within the inner states of the artist and depicted through the paint medium to trigger an empathic response in the viewer. This power of abstract art in embodying messages and engaging the viewer is of particularly interest to the project.

Abstract Expressionism, particularly the drip paintings by Jackson Pollock formed the main context of this study in fusing fine art painting with computer animation. The Abstract Expressionists developed a form of abstract art that expresses their inner artistic vision and succeeded in connecting with the viewer on a scale that has never been done before.

Fascination with large-scale mode of painting is one important factor that characterized Pollock's mature works. The sheer size of his paintings created different demands on the viewer and changed the role of the spectator during that period of time. The paintings are so huge that the viewer feels as though engulfed by them, and the overpowering size meant that the viewer has to walk along the length of the painting in order to experience its scale and energy, thus 'participating' in the artwork. These are potential factors that can form the immersive experiences that this project seeks.

However, scale alone would not be able to produce aesthetically engaging experiences. Pollock's drip paintings are also celebrated for the controlled and looping skeins of paint that move out and back into the canvas in carefully calculated movements. Elements in the painting seem to be in a constant state of becoming, as though superimposing and swallowing one another up, or dissolving into each other. A constant sense of flux and rhythm is thus produced. There is no impression of beginning or end just like nature. As a result, the final image is highly dynamic and gives a feeling of indefinable space. These qualities of Pollock's paintings relate to the theme of flow and growth of this project, and can be utilized to develop similar experiences of dynamic and immersive space in possible large-scale projected animations.

Fig.1 (Left): Jackson Pollock. Full Fathom Five. 1947; Fig.2 (Right): Jackson Pollock. Lavender Mist: Number I, 1950. 1950

An interesting aspect of Pollock's work is the role of accident in his creations. The element of chance first appealed to the Dadaists who felt that the random configurations offered many new unfathomable possibilities. The Surrealists adopted this concept and created their technique of automatism in which the artist suppresses conscious control of the paintbrush and allows the subconscious mind to take over. Pollock, impressed by the Surrealists' improvisatory techniques, carried automatism to another level. His technique of pouring, dripping, and splashing paint onto the canvas may seem automated without conscious control but in fact, Pollock was able to regulate the flow of the paint with increasing

experience. His paintings are the result of controlled accidents and calculated elements of chance. Similarly, such controlled accidents can often happen in computer animation tests as well. With hundreds of adjustable parameters, the effect of changing the values of some is not always predictable and can sometimes produce some unexpected results.

Possessing many qualities relevant to this project, Pollock's drip paintings thus formed the main context in explorations to combine qualities of abstract painting with computer animation. Animation and render tests were performed with the aim of instilling in them the spontaneity and dynamics seen in Pollock's works, while not forgetting the element of chance that sometimes comes into play as well.

4 METHODOLOGY

With the theme of flow and growth in mind, animation tests were first performed to explore the capabilities of various 3D programs such as Maya Paint Effects, Maya Fluids, and Next Limit RealFlow in generating images that possess these qualities. The animation tests were performed with these questions in mind:

1. How possible can the tested program or feature be utilized in new ways to generate unique and personal creations?
2. How much control does the creator have over the tested attribute or feature?
3. Is it possible to perform a painterly render?

The scope was then narrowed down to Paint Effects liquid preset brushes and fluid sculpting in RealFlow. Using Maya's liquid preset brushes as a starting point, new brushes are created using the feature 'Preset Blending' in Paint Effects, which can blend the shape and shading of existing brushes to varying degree. The custom brushes are then animated using the 'Flow Animation' attributes.

Fig.3&4: Still frames from animation tests of custom Paint Effects brushes

Greater variations were also introduced through adjusting more parameters under the 'Creation' and 'Growth' attributes of the Paint Effects brush.

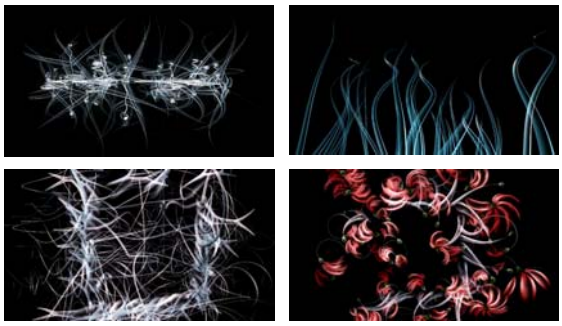


Fig.5-8: Still frames from animation tests of custom Paint Effects brushes

2D painted textures on Paint Effects built-in canvas were also created. The resulting painted images can be used as textures to map onto existing brushes to create new unique looking brushes. The capabilities of each of these brushes are recorded through short animation tests to determine how they can be further used in combination to create more immersive and layered artwork.

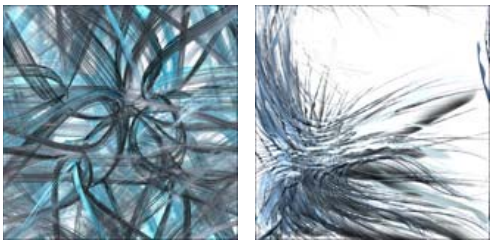


Fig.9&10: Examples of 2D painted textures

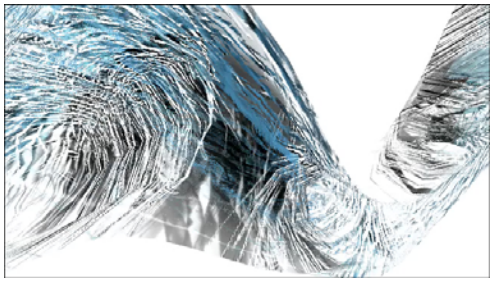


Fig.11: Still frame from animation test of Paint Effects brush with custom painted texture

Animation tests in RealFlow were then carried out, focusing on methods of sculpting and rendering of the fluid meshes. By making use of various daemons such as 'Attractor', 'Gravity', 'Coriolis', and 'Noise field', and adjusting the speed of the particle emitter and its 'Particle parameters', the general shape of the fluid can be controlled. Animating the position and rotation of the particle emitter brings more variations to the movement and dynamics of the simulated particles. Next, a polygonal mesh is built over the particles, the extent of its details controlled through adjusting the

'Polygon size', 'Relaxation', 'Blend factor, and 'Radius' of the mesh. The mesh is then imported into Maya for render using its Mental Ray engine.

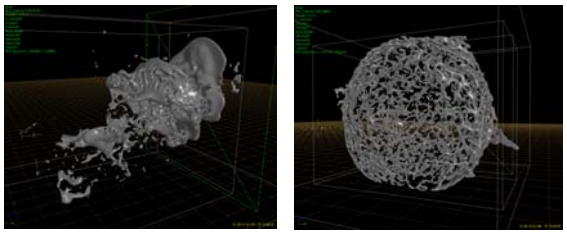


Fig.12&13: Screenshots of fluid meshes sculpted in the RealFlow interface

The method of using the dielectric material shader for the fluid mesh is recommended in the DVD, *RealFlow and Maya Integration* by Digital Tutors, in which it was shown how the dielectric material functions as an effective material often used to render water or water-like fluids. The strength of the dielectric material shader lies in its ability to simulate realistic reflections and refractions similar to what we see in actual water. The resulting slick renders cannot be achieved with the normal material shaders in Maya and thus, experimentations with different ways of using the dielectric material for a paint-like render became the focus.

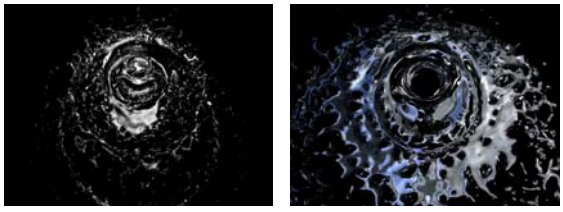
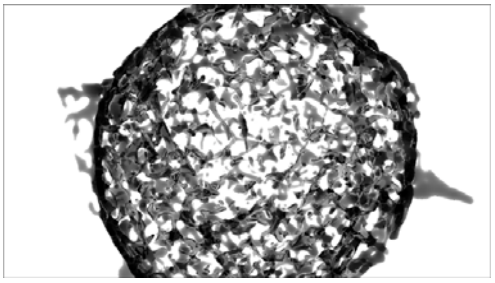


Fig.14&15: Still frames from animation tests for water or fluid-like renders of RealFlow meshes

The dielectric material shader node in fact has only a few main parameters under its shader attributes - 'Colour', 'Index of Reflection', 'Outside Colour' and 'Phong Coefficient'. However, minor tweaks in their values, especially for the 'Index of Reflection', can have huge effect on the final render. Two major colours can be defined for the fluid, 'Colour' which is the general colour of the fluid mesh, and 'Outside Colour' which is the colour of the reflections and refractions in the mesh. The degree of reflectivity depends on the shape of the fluid mesh itself, and also on the value of the 'Index of Reflection', with the value of '1' being the most neutral. The 'Phong Coefficient' controls the degree of shine in the reflections. Render tests were carried out to explore these four main attributes and their different combinations to achieve an effect closest to the painterly quality desired.

Fig.16: Example of renders with high 'Index of Reflection' (value of approximately 1.50)



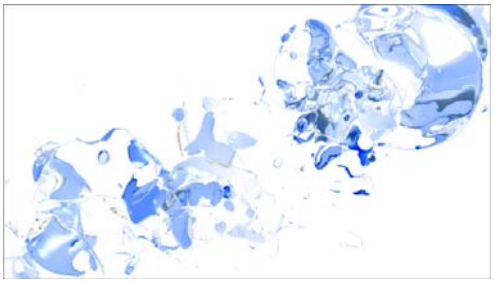


Fig.17&18: Examples of renders with low 'Index of Reflection' (values of approximately 1.05-1.10). Difference in painterly quality is also due to variations in shape of the fluid mesh which affect its reflectivity.

After determining the capabilities of Paint Effects and RealFlow, the next area of exploration was to inject emotive qualities into the abstract forms. Over hundred of still images pertaining to the seven different emotion categories: Happiness, Sadness, Surprise, Anger, Fear, Disgust, and Neutral were created to put the results achieved from previous animation tests to use. Kandinsky's theories about the relationships between colours and emotions were also applied. The resulting still frames rendered in Maya were then further layered in Photoshop to achieve more expressive abstract imagery reminiscent of Pollock's 'all-over' drip paintings and works from the French Art Informel movement that employed a form of unconscious calligraphy to trace out the emotions the artist wishes to express.

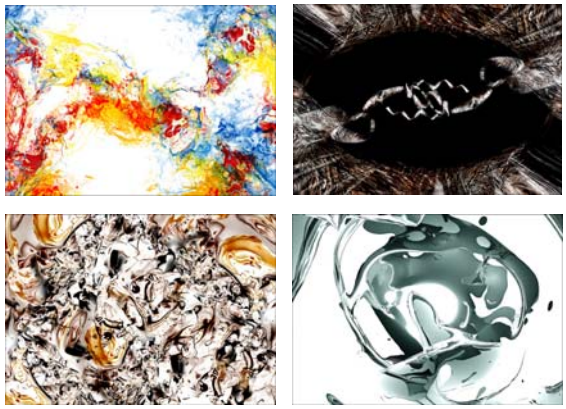


Fig.19-22: Still images depicting the following emotions: Surprise, Fear, Disgust, and Neutral

The composed still images created served as references for further explorations aimed more specifically at creating aesthetically engaging and inspiring experiences for the viewer. They act as a plan and guide for compositing layers of animations in programs like Adobe After Effects so that the different animations moving through time will still relate to each other to achieve the impression of a constant state of becoming and flux as in Pollock's paintings.

5 RESULTS

The use of Maya Paint Effects brushes is preferred when a certain degree of representation quality is still required for the growing forms. The painterly quality achieved with the custom Paint Effects brushes created in this project resembles clusters of drawn lines more than skeins of paint, but which are still able to flow or grow in and out of the screen through adjustments of the 'Flow Animation' brush attributes.

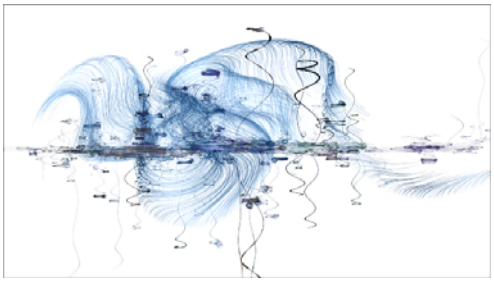


Fig.23: Still frame from animation test of a combination of 2 custom Paint Effects brushes

RealFlow on the other hand excelled in generating dynamic fluid meshes whose shape and level of details can be controlled to express varying levels of motion and energy. The fluid meshes when imported into Maya can be rendered to look like moving streaks of thick paint or Chinese calligraphic ink by putting the 'Index of Reflection' of the dielectric material to low values, preferably between 0.9 to 1.1. It is also found that the painterly appearance works better when both the background and the 'Colour' of the dielectric material are put to white, while the 'Outside Colour' is put to a much darker tone close to black.

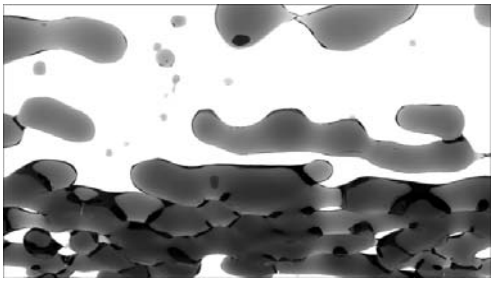


Fig.24: Still frame from animation with appearance of calligraphic ink-like render

Fig.25: Still frame from animation composited in After Effects with appearance of paint-like render

6 DISCUSSION

The findings present new and unique ways of using a combination of RealFlow and Maya's Mental Ray render engine to produce experimental animations with the quality of a painterly abstraction. The explorations with Maya Paint Effects offer a comparison of the different types of painterly renders that can be achieved, one more 'paint-like' while the other more 'sketch-like'. With the layering of multiple animation tests together in After Effects, densely packed but spontaneous animations of interlacing trails of 'paint' can be created. The brushstrokes or growing and flowing forms swirl from edge to edge and expand beyond the borders, generating an emotionally intense and actively charged space. This 'unframed' space created engages the spectator in an immersive and inspiring experience that looks towards what abstract fine-art paintings can similarly bring to the viewer.

The methodology proposed in this paper however, is limited in the colours that can be used. The painterly appearance can be better achieved only with darker tones especially those of the blues and blacks. When more colours are introduced such as yellows and reds, the resulting render tends to appear too much like computer generated imagery as the hue, shade, or chroma of the image's colours does not resemble what we would normally see in the traditional paint medium. Deeper explorations in rendering methods will have to be carried out to incorporate more colours into current animation tests to add greater depth and optical effects to the composited result. Then a truly more immersive and aesthetically engaging experience can be created.

7 CONCLUSIONS

Maya Paint Effects and Next Limit RealFlow are both programs highly capable of creating growing and flowing forms, each excelling in the simulation of realistic environments and liquid flowing effects respectively. With some creative manipulation of the parameters and deviations from the usual method of rendering, unique images can be produced.

Taking inspiration from the Abstract Expressionists, particularly the drip paintings by Jackson Pollock, this project explores the fusion of tactile qualities of the traditional paint medium with computer animation. Attention is given to the way the Paint Effect brushes or RealFlow fluid meshes move in and out of screen to transform felt experiences into expressive visuals similar to those seen in Pollock's works.

Current tests in the creation of unique algorithmic brushes in Paint Effects, expressive fluid sculpting in RealFlow, and the development of painterly rendering methods will help to push on further experimentations in fusing more aspects of fine art painting with computer animation. More specifically, the next area of experimentation can move towards the incorporation of more colours and shades into the resulting renders without sacrificing the painterly quality currently achieved. The addition of colours will enable richer depictions of emotions in the abstract imagery produced. Studies on colour theories and their emotional impact will have to be performed on top of rendering explorations to make full use of colour relationships to trigger an emotional response in the viewer. The question of time will also come into greater play as creating a meaningful moving abstraction involves not only the successive appearance of imagery, but also a masterful control in the revealing of colours and forms at appropriate times to form significant relationships.

Treading a path between controlled accidents and design, this research project attempts to merge abstract forms with representational qualities to transform images into an engaging and inspiring experience that balances between the virtual and the real. The spectator will be challenged in their reactions to such abstract artwork and forming their own personal interpretations of the imagery will be an important outcome of the encounter between the viewer and the work.

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