Research and analysis on the development of 2D-3D animation fusion based on the development of technology fusion

Kongyijie Li[1], Hyunsuk Kim[2,*]

[1]Film and Interaction Design, Hongik University, Seoul, Korea
[2]Visual Communication Design, Hongik University, Seoul, Korea

E-mail:kylekim@gmail.com

Abstract. An emerging technology that has emerged in recent years with the development of computer software and hardware technology. The 3D animation software first establishes a virtual world in the computer, the designer establishes a model and a scene in this virtual 3D world according to the shape and size of the object to be represented, then sets the trajectory of the model, the movement of the virtual camera and other animation parameters according to the requirements, and finally assigns specific materials to the model and lights it according to the requirements. Once all this is done, the computer can automatically calculate and generate the final image. The way in which 3D animation technology simulates real objects makes it a useful tool. Due to its accuracy, realism and infinite manipulability, it is now used in many fields such as medicine, education, military and entertainment. This new technology has been welcomed by many clients as a refreshing change in the production of film and television commercials. 3D animation can be used in advertising and film and TV series for special effects (e.g. explosions, smoke, rain, light effects, etc.), stunts (crashes, deformations, unreal scenes or characters, etc.), advertising product displays, title flyers, etc.本The text is based on the development of new technology integration on the development of 2D 3D animation, and has a new planning direction and guide for the future development.

Keywords:2D; 3D; Technology integration; Integration of styles;

1   Introduction

Just as animation artists Raoul Barre and Bill Nolan invented and refined the 'ruler' and 'background panning' techniques in 2D animation in 1914, and Disney later experimented with and invented the 'multi-plane camera technique', which shifted multiple layers of backgrounds at different speeds to create 2D images with deep spatial movement, animation practitioners have been exploring and thinking about what tools they can use to help them in their creative process [1]. As early as 1991 when three-dimensional technology just emerged, Pixar studios for Disney's animation film "beauty and the beast" produced a ballroom bridge of three-dimensional space movement and two-

dimensional painting fusion creation, so visually bold interaction makes the film become the first was nominated for the Oscar for best film animation film. Compared to 2D animation, 3D animation, as a branch of computer art, is a relatively new and independent art form based on the development of animation art and computer hardware and software technology [2]. Early on, it was mainly used in the military field. It was only in the late 1970s, with the advent of the PC, that computer graphics gradually expanded into areas such as graphic design, clothing design and architectural decoration. In the 1980s, with the further development of computer hardware and software, the application of computer graphics processing technology has been developed to an unprecedented extent, and computer art as an independent discipline really opened up on the road of rapid development [3].

2   The technical integration of 2D and 3D animation for creative development

2.1   Early creative concept and technical realization through post-compositing

After the mid-term composite as material, the final cut by the editor, by the producer and director to review the content of the screen, and put forward rework comments back to the mid-term process, until the screen is completely locked, means that the content of the pre and mid-term completely finished. Start the formal post-production work.

Sometimes in order to catch up with the budget, in the case of the same length of time, part of the picture can be carried out in the follow-up process, the revised footage and then replaced at any time. Experimental animation and independent animation are no longer new terms today, and "experimental animation's exploration of moving image ontology has become increasingly influential throughout the moving image medium [4]. Animation is a still young art form that needs to be further explored by experimental animation". What is pioneering or avant-garde today may become mainstream in the next era [5]. Animation artists have been exploring the fusion of two-dimensional and three-dimensional forms of animation since the early twentieth century and the birth of three-dimensional animation, especially in the field of experimental animation.

This programme focuses on character animation learning and training on the Maya software platform. The first part of the course will comprehensively focus on the basic knowledge and basic animation theory that animators should have, and the middle part of the course will combine the traditional courses of storyboard, animation sketching, animation performance, laws of motion, laws of animation and other traditional courses that have been learnt in the first part of the course with the gradual and professional training of character movement. This part of the course will be based on the basic laws of motion throughout, including: basic motion (physical movement), basic character control (walking, running, jumping, etc.), character movement design (complex emotional expression), character performance skills (character character expression, emotional expression), facial expression animation, mouth animation, multiple character mixed performance, and so on. The latter course focuses on simulation-based character

animation and game animation in film and TV special effects movies, involving the acquisition, modification and application of motion capture data (including characters and polypods). Finally, the graduation design course will require students to complete their graduation works with employment standards. Students can feel the production requirements and working atmosphere of the industry beforehand in this stage, which is a practice for students who are about to graduate. This course is not only for the animator position in professional film and television animation companies, but also for the simulation animation in film and television special effects films, game animation in game development, etc. Qualified students can have a wider employment space.

2.2   Analysis of the elements of a seamlessly integrated stylised creation of 2D and 3D animation

2.2.1 Harmony of space and perspective.

If the combination of the spatial characteristics of 2D painting and 3D rendering is to be ensured, the elements of the synthesis of the two forms of animation need to be analysed in two ways:

(1) is the visual correction of the use of footage, this type of treatment is mostly used when the content of a character or subject is integrated into a two-dimensional scene or space in a three-dimensional production [6]. Because of the two-dimensional painting, although there will also be creators use the real lens shot content as a perspective reference, but basically will be based on the plot of two-dimensional animation, content or special needs and intentionally to change the perspective relationship, but in the production process of three-dimensional animation, the creator is always facing the data real camera, for three environmental perspective of the scene, combined with two-dimensional hand-drawn content should be for the picture For example, in the transitional animation of the game "GUILTY GEAR Xrd -SIGN-" (aka: Guilty Gear Xrd), the camera mapping technology (Camera Mapping) is used for the mapping projection note 34, which maps the 2D drawn background behind the character, but also places some 3D In addition to mapping the 2D background behind the character, some 3D content is placed in the foreground of the camera, creating a spatial difference between the front and back, so that the near wide-angle camera framing gives a very natural visual effect in the combination of 2D and 3D [7].

(2) is the fusion of perspective and spatial relationships, this type of processing is mostly used to place 2D drawn content into 3D space, the fusion of perspective relationships is often adjusted through post-production compositing and requires attention to the relative displacement of the front, middle and rear mirrors of the shot, this approach requires the creator to have a corresponding awareness of space and perspective, especially for non-panning motion shots, with the help of In the first and middle stages of the production of 3D digital content or scenes and footage, simple models are substituted for character placeholders, and Previz preview footage is exported to 2D painters as a reference for transfer or 3D assisted drawing, which is then accurately combined with 3D rendered content in post-production software [8].

In compositing as a means of creation one needs to bear in mind the qualities of the 3D animation production mode, the most explicit of which is the 3D spatial

characteristics of the XYZ axis, such a production method allows the creator to face such a 3D space throughout the production process, then we need to think about how and when the XY points and lines of the 2D plane are integrated into the XYZ world under the spatial dimensional characteristics [9].

2.3   An effective way to achieve seamless integration of hand-drawing into stylised 3D animation

When 2D and 3D animation seek a stylised fusion, it should not be a copy of traditional art forms, as Rudolf Arnheim said about art creation: "The visual image is never a mechanical copy of sensual material, but a creative grasp of reality, and the image it grasps is a richly imaginative, creative and perceptive image of beauty" [10]. As a result, we need to fully consider the characteristics of the various 2D drawing methods applied to the 3D medium while doing stylised design combinations, and consider the aesthetic commonalities between the two methods before looking for bridges that can be linked.

Three-dimensional animation, also known as 3D animation, is not subject to the limitations of time, space, location, conditions and objects, and uses various forms of expression to show complex and abstract programme contents, scientific principles and abstract concepts in a concentrated, simplified, graphic and vivid form.

The way 3D animation technology simulates real objects makes it a useful tool. Because of its accuracy, realism and operability, it is widely used in medicine, education, military, entertainment and many other fields. When it comes to the production of film and television commercials, this new technology is able to give a refreshing look and feel, which makes it popular among many clients. 3D animation can be used in advertisements and special effects production of films and TV dramas (such as explosions, smoke, rain, light effects, etc.), stunts (crashes, deformations, illusory scenes or roles, etc.), advertisements and product displays, opening credits, flying characters and so on.

Domestic 3D animation masterpieces include "Qin Shi Ming Yue", "Star Academy III Pandora's Secret World", "Toy House", "The Return of the Great Sage", "Warrior Lan", "Painted River and Lake", "The Descent of Nezha's Devil Boy" and so on.

This major is mainly for the film and television special effects production industry to train three-dimensional special effects production, post-production synthesis talents. Mainly learn to use Maya, 3ds Max and other high-end 3D animation tools, Nuke and other post-synthesis tools, Boujou/Match Move/SynthEyes 3D tracking compositing tools, RealFlow advanced fluid system, Mental Ray/RenderMan advanced rendering system, etc. to carry out professional film and television special effects and post-synthesis training and learning. Training and learning. Systematic learning includes: 3D modelling, lighting materials, advanced rendering, animation, particle effects, rigid body effects, fluid effects, fabric simulation, hair simulation, pyrotechnics and building collapse, a variety of natural landscape effects simulation (explosions, collapse, smoke, stars, halo, waves, hurricanes, waterfalls, dust, etc.), clustering technology, post-film toning, keying compositing, anamorphic effects, time warping, live images and 3D scene tracking and compositing, and post-production of film. Tracking and compositing with 3D scenes, holographic simulation rendering, MEL scripting language. Employment direction for professional film and television special effects production

companies, film and television advertising production companies, film and television animation production companies, film and television post-production companies, television production companies and so on.

2.3.1 Two-dimensional 'painterly' representation of stylistic materials.

As in the case of traditional painting, which has a much longer history, the materials or tools used for its creation have a direct impact on its artistic expression or conceptual changes, and the resulting work is clearly oriented by the materials and can even be the defining principle of a new type of painting. However, 3D animation uses graphic computing hardware devices and rendering programs as tools and media that are far more complex and intelligent than the material basis of materials and tools relied upon in previous art forms.

Compared with the two-dimensional way of drawing, three-dimensional software rendering CG image production is the biggest difference is quasi-isolation: painting is through the hands, eyes and brain of the painter to simulate the final presentation of the object painted, while CG needs to simulate the entire process in order to get the image, such a fundamental difference is caused by the painter in the observation of the object and move the brush, do not care about the process of presentation but only need to think about the results, but the use of computer creators to generate CG need to create this physical environment or set the corresponding parameters out of thin air, and make the renderer simulation calculate the results. The objective and the subjective are interwoven and mutually validated from start to finish in the process of redrawing. In order to compress the space in which the human eye observes the real world into the image of the brush, the objective object, the creator's subjectivity and the work follow a process of dimensional compression from three to two dimensions. The way 3D CG art is created is by observing the objective and calculating its reduction, and adding a subjective re-creation to the objective result.

When it comes to creating illustrations, I believe the first reaction of many students will be delicate watercolours or pencil and light colours, or flat geometric shapes and lively colours of digital illustrations. Whether it's traditional materials or digital illustration, most illustration techniques are based on two-dimensional painting techniques.

3   Conclusion

As the viewer watches, more focused on the content itself, the high degree of integration without leaving traces can make the process not pay attention to exactly what techniques have been used for animation, while getting the surprise of a multi-dimensional visual combination that is the proper reflection of the combined feedback.

Regardless of the form of expression and the means of production, the creation of animation should be based closely on the hypothetical qualities of animation, rather than straying from the characteristics of the art of animation itself and the aesthetics of the various forms of creation. When creating and rendering images using 3D software, the aim is not to tell the viewer how realistic the materials are or that the light in the image is infinitely closer to a real-life environment. This process is like the dialectic

between rational and perceptual understanding in dialectics. We need to have a comprehensive rational understanding of the nature of the real world before we can truly understand the laws of movement, the physicality of the characters, etc., so that we can comfortably present and express them in a unique way and thus be able to process them sensually.

Painting, in the artistic sense, is the act of adding colour to a surface as a support, such as paper, canvas, wood, glass, lacquer or concrete. In artistic terms, the meaning of painting also includes the use of this artistic act together with drawing, composition and other aesthetic methods to achieve the expression of the concepts and meanings that the practitioner wishes to express. Qi Baishi is quoted as saying about painting, "The beauty lies between likeness and unlikeness; too much likeness flatters the vulgar, while unlikeness deceives the world" to bridge the gap between truth and falsity, and to illustrate the refinement and creativity that should go into the creation of an animation fusion. For all non-interactive video art, including animation, the presentation of all content is choreographed and 'staged' by the creator, and the viewer is constantly receiving information on the screen and has no control over what is shown.

References

1. Bao Liyu. Emotional attraction, technological myth and cultural symbiosis: the construction of Chinese animation's "mythical universe" within the trend of fusion[J]. DOI: 10.13556/j.cnki.dncb.cn35-1274/j.2023.02.020.
2. Zhang B. The integration and application of VR technology and 3D animation design [J]. Artist,2022(11):41-43.
3. Chen Shuqin. The "five education integration" strategy in information technology project-based learning: the example of the "Retrace the Long March" animation project[J]. China Information Technology Education, 2022(12):64-66.
4. Deng Yubiao. The integration and application of VR technology and 3D animation design in digital ecological environment[J]. Environmental Engineering,2022,40(04):283.
5. Song Hongxiao, Xu Jianqiang, Han Guangbing. The integration of physics classroom teaching with mobile phone animation technology: an example of Meiklesun interference experiment[J]. Physics Experiments,2022,42(04):41-46. DOI: 10.19655/ j.cnki. 1005-4642. 2022. 04.008.
6. Yu Jinyuan. Guided by market demand and integration with new media technology: A study on the design and performance of Chinese animation art in the new media era [J]. Media, 2022(07):100.
7. Liu Yang. The fusion of Flash digital animation technology and folk traditional expression [J]. Electronic Technology,2022,51(03):260-261.
8. Ma Li, Fan Yun. Research on the artistic integration and technical realization of diverse interaction in animation art [J]. Journal of Beijing Printing Institute,2022,30(01):92-94. DOI: 10.19461/j.cnki.1004-8626.2022.01.006.
9. MOHANMOD R. Study on the integration and application of VR technology and three-dimensional animation design [J]. Chinese and foreign enterprise culture,2021(12):132-133.
10. KEVIN M. Analysis of the integration and application of VR technology and three-dimensional animation design [J]. Tomorrow's fashion,2021(24):116-118.