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From Broken Visions to Expanded Abstractions

Max Hattler

ABSTRACT

In recent years, film and animation for cinematic release have embraced stereoscopic vision and the three-dimensional depth it creates for the viewer. The maturation of consumer-level virtual reality (VR) technology simultaneously spurred a wave of media productions set within 3D space, ranging from computer games to pornographic videos, to Academy Award-nominated animated VR short film Pearl. All of these works rely on stereoscopic fusion through stereopsis, that is, the perception of depth produced by the brain from left and right images with the amount of binocular parallax that corresponds to our eyes. They aim to emulate normal human vision. Within more experimental practices however, a fully rendered 3D space might not always be desirable. In my own abstract animation work, I tend to favour 2D flatness and the relative obfuscation of spatial relations it affords, as this underlines the visual abstraction I am pursuing. Not being able to immediately understand what is in front and what is behind can strengthen the desired effects. In 2015, Jeffrey Shaw challenged me to create a stereoscopic work for Animamix Biennale 2015-16, which he co-curated. This prompted me to question how stereoscopy, rather than hyper-defining space within three dimensions, might itself be used to achieve a confusion of spatial perception. And in turn, how abstract and experimental moving image practices can benefit from stereoscopy to open up new visual and narrative opportunities, if used in ways that break with, or go beyond stereoscopic fusion. Noteworthy works which exemplify a range of non-traditional, expanded approaches to binocular vision will be discussed below, followed by a brief introduction of the stereoscopic animation loop Ⅲ=Ⅲ which I created for Animamix Biennale. The techniques employed in these works might serve as a toolkit for artists interested in exploring a more experimental, expanded engagement with stereoscopy.

Keywords: stereoscopic vision, binocular, abstract animation, experimental, VR

Ⅰ. Introduction: Breaking the Hegemony of Stereoscopic Realism

In recent years, film and animation for cinematic release have more or less fully embraced stereoscopic vision and the three-dimensional depth it creates for the viewer. The maturation of consumer-level virtual reality (VR) technology simultaneously spurred a wave of media productions set within three-dimensional space, ranging from computer games to Google Cardboard porn videos, to Academy Award-nominated animated VR short film Pearl (Osborne 2016). All of these works rely on stereoscopic fusion through stereopsis, that is, the perception of depth produced by the brain from left and right images with the amount of binocular parallax that corresponds to our eyes. They aim to emulate, as closely and comfortably as possible, normal human vision.

Within more experimental filmmaking practices however, a fully rendered three-dimensional space might not always be desirable. In my own moving image work, I tend to favour 2D flatness and the relative obfuscation of spatial relations it affords, as this underlines the visual abstraction I am pursuing. Not being able to immediately understand what is in front and what is behind can strengthen the desired effects (Hattler 2016b:34). In 2015, Jeffrey Shaw challenged me to create a stereoscopic work for Animamix Biennale 2015-16. This prompted me to question how stereoscopy, rat her than hyper-defining space within three dimensions, might itself be used to achieve a confusion of spatial perception. And in turn, how abstract and experimental moving image

practices might benefit from stereoscopy to open up "new opportunities for radical abstractions, poetics, disruptions" (Williams2015) if used in ways that break with, or go beyond stereoscopic fusion.

A few noteworthy works which exemplify a range of non-traditional, expanded approaches to binocular vision will be discussed below, followed by a brief introduction of the stereoscopic animation loop III=III (Hattler 2016a) I created for Animamix Biennale 2015-16[1]. The techniques employed in these works might serve as a toolkit for artists interested in exploring a more experimental, expanded engagement with stereoscopy.

Ⅱ. Binocular Rivalry

Binocular rivalry is the phenomenon of visual perception in which perception alternates between different images presented to each eye (Blake and Logothetis 2002). When the difference between the images presented to left and right eye is so large that they cannot be fused into a singular image, the viewer experiences an unstable, volatile composite image. Gregory Garvey's Homage to the Square: Stereoscopic Suprematist Composition II (2005) is a print containing different sized grey squares positioned side by side. When viewed with a stereoscope, the squares are fused into a single image of nested squares. Due to the degree of

1) POST PiXEL. Animamix Biennale 2015-16 was co-curated by Jeffrey Shaw and Ivy Lin, and held at Run Run Shaw Creative Media Centre, Hong Kong, 22 March – 17 April 2016

binocular rivalry however, the resulting image is not three-dimensional. Instead, “(t)he squares appear to slowly slide over or behind the other as the brain’s visual apparatus strives to maintain a single coherent view that exists ‘only in the mind’s eye.’” (Garvey 2005)

In Memo Akten’s virtual reality artwork Fight (2017a) the use of a VR headset intensifies the effect of binocular rivalry when compared to 3D glasses, as each eye is completely forced into its respective view. Akten’s meditative exercise in visual perception probes the limits of binocular rivalry as it takes the viewer through different chapters which start out in a stereoscopically fused, three-dimensional space. Partly through the viewer’s own head movements, the space then folds into two increasingly opposed directions. As stereopsis is denied, a forever-shifting image presents itself, making the viewer acutely aware of their own image processing mechanism.

“Presented with rival signals, the conscious mind ‘sees’ an unstable, irregular, animated patchwork of the two images; with swipes and transitions. The nature of these irregularities and instabilities depend on the viewer’s physiology.” (Akten 2017b)

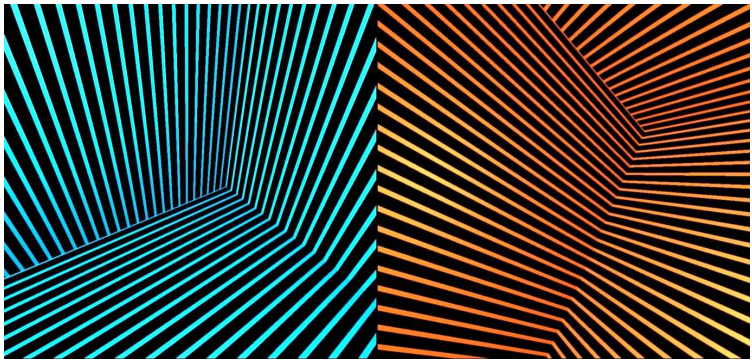

Figure 1. Memo Akten (2017) *Fight*

The experience of extreme binocular rivalry can be dislocating and highly uncomfortable. However, when combined with elements which allow for stereoscopic fusion, it can be used to generate particular visual effects unique to stereoscopic vision. In the 1970s, Salvador Dali created a series of stereo pairs of paintings which explore these effects. Discussing Dali's works, Michael Scroggins (n.d.) points out the effect of lustre. By using different colours for certain elements in the left and right paintings of an otherwise stereoscopically fused image, the corresponding parts appear to glow with a luminous velvety sheen, or lustre. This can be observed in works such as Dali's Hand Drawing Back the Golden Fleece in the Form of a Cloud to Show Gala the Dawn, Completely Nude, Very, Very Far Away Behind the Sun (1977) or Dali from the Back Painting Gala from the Back Eternalized by Six Virtual Corneas Provisionally Reflected in Six Real Mirrors (1972-73, unfinished). Other paintings from Dali's series such as Athens Is Burning! The School of Athens and the Fire in the Borgo (1979-1980) display both stereoscopic fusion and

extreme binocular rivalry. In Athens, large parts of the left and right paintings are completely different, making it impossible to see a coherent image, while some sections display elements of stereoscopic fusion, which anchor the viewer into the image space.

Ⅲ. Camera-Based Binocular Poetics

The Pulfrich effect, named after German physicist Carl Pulfrich who first described the phenomenon in 1922, is a psychophysical percept wherein three-dimensional depth is perceived in two-dimensional lateral motion, if the vision of one eye of the viewer is slowed down through a dark filter such as one-eyed sunglasses. This creates a relative difference in signal timings between the two eyes, which leads to the perception of three-dimensional depth. Following this direction, Japanese experimental filmmaker Kazuhiro Goshima created a series of stereoscopic works which play with the time difference between left and right eye in imaginative ways to create three-dimensional space from two-dimensional source material. Goshima's short film Shadowland (2013), shot with a fixed 2D camera, depicts a two-dimensional city at night, in which only the shadows, created from the time-difference parallax of moving car headlights, take on a three-dimensional form.

"The essential factor of 3D vision is binocular parallax. I derive parallax from the slight time lag between the movies projected onto the right and left eyes. There are no digital special effects. I show the same movies to each eye but there is slight time lag (1-5 frames)." (Goshima

2014)

The outcome of this simple transformation is highly effective and surprising, as the ephemeral by-products of urban traffic are poetically reimagined as sculptural characters three-dimensionally emerging from the cinema screen.

Figure 2. Kazuhiro Goshima (2013) Shadowland

Blake Williams also takes advantage of left-right time difference to create three-dimensional parallax in sections of his film Red Capriccio (2014). The film's main focus, however, lies elsewhere. Made entirely from found two-dimensional video footage, and created specifically for anaglyphic 3D glasses, the film plays with, and intensifies, the colour-specific binocular rivalry built into the anaglyphic process. Through colour correction and solarisation of the separated red and cyan stereo channels, Red Capriccio creates intense eye-asynchronous flicker effects and duotone lustre.

"The image, distilled through the Anaglyph filters-one bloodshot and the other frigid-grants each eye its moment; one fills in the blanks for the other, the two share

together but then finally fight for exclusivity, blinding the other before being blinded right back." (Williams 2015)

Ⅳ. Paradoxical Digital Spaces

Vibeke Sorensen's film Maya (1993a) is an early example of digital moving image work which features 'impossible' stereoscopic spaces. This abstract animation of organic shapes produced at the San Diego Supercomputer Center's Advanced Scientific Visualization Laboratory exploits mirroring and reflection within the three-dimensional image space to create spatial ambiguities and confusions.

"In one scene stereoscopic images are projected onto flat discs making up a small sculpture. Each disc is a circular window to another 3-D space. The result is a perceptual paradox: you see the edges of the disks in a sculpture made up of flat surfaces. But when you look at each separate, 'flat' disc, you see windows to spaces that extend far beyond the space of the sculpture. The two spaces contradict each other, but the mind holds them together." (Sorensen 1993b)

Three-dimensional wipes and dissolves further confuse spatial relations of near and far, and stereoscopically irregular flickering textures create subtle binocular rivalry effects. Sorensen also made use of the computer's ability to adjust the interaxial separation between left and right eyes: "By using interaxial separation to scale up or down objects and scenes, I was able to better understand the structure and continuity of space and to have very fine

control over the abstract visual elements that I used to compose Maya." (Sorensen 1999:45)

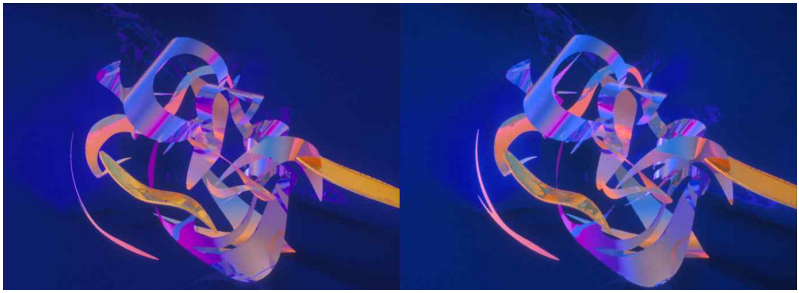

Figure 3. Vibeke Sorensen (1993) Maya

In Sebastian Buerkner's The Chimera of M. (2013) three-dimensional space appears malleable and disjointed, otherworldly yet strangely familiar. Ephemeral elements such as shadows, floating specks of light, and reflections are spatially foregrounded. Through the orchestration of multitudes of overlapping 2D-animated layers within three dimensions, Buerkner creates an unstable post-Cubist visual universe, which celebrates an abstracted, multi-perspectival version of space. This highly expressive use of stereoscopy reinforces the spatial and visual ambiguity of the film's narrative.

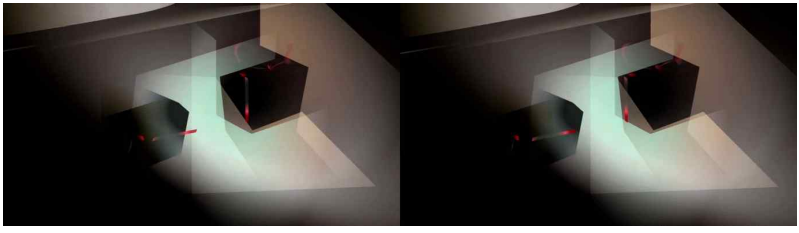

Figure 4. Sebastian Buerkner (2013) The Chimera of M.

Lastly, I would like to mention random-dot stereograms as a further approach towards paradoxical stereoscopic spaces. Popularized by the Magic Eye books series of the 1990s, random-dot autostereograms constitute single images of random dots which are computer-encoded with a depth map. When seen with the correct binocular convergence, the two-dimensional noise patterns open up into a fully three-dimensional scene hidden within. The revealed 3D space itself isn't impossible, it relies on parallax and stereoscopic fusion to appear. However, the effect of something tangibly spatial appearing out of two-dimensional noise is so surprising and unique, that it warrants being included in this section.

Ⅴ. III=III

III=III was developed for Animamix Biennale 2015-16 very much as an experiment, a first approach towards 'impossible' spaces, and techniques that disrupt stereoscopic realism[2]. III=III presents a series of vignettes which explore binocular effects ranging from subtle to extreme. My aim was to incorporate binocular rivalry while maintaining enough parallax-based geometry to ensure stereopsis. Several scenes explore different colours

2) To be precise, there is one earlier experiment with 'impossible' spaces, an animated loop for Pulfrich effect 3D glasses entitled Forms II (Karate) (Hattler 2011). Here, motion capture data is abstracted inside a polyhedron mirror, creating complex spatial confusions. It was produced at CalArts with a group of Experimental Animation students, and guided by technical and inspirational advice from Michael Scroggins.

in left and right eye to create lustre. This effect is at times almost unnoticeable, as it doesn't draw attention to itself. A stronger effect is achieved when an object remains stereoscopically fused, while its textures are considerably different in left and right image. The viewer can process the image as three-dimensional, while simultaneously being confronted with the destabilising sensation of binocular rivalry. Only in one scene, used for 'shock value,' the rivalry is so extreme that the image is completely unfusable. Here, wireframe tubes, one per eye, rotate in opposite directions. At this point viewers often take their 3D glasses off to escape the jarring sensation. I also used depth maps to create deformations and invisible, inverted spaces. In one scene, clusters of cubes move towards the viewer. When seen in motion and through 3D glasses, an opposite movement of invisible cubes reveals itself. In two scenes, I adapted the Magic Eye technique with animated stereo pairs of random dot images. These sections were the parts most commented on by the Animamix audience, as they elicit the greatest amount of surprise, derived from the extreme difference between watching the screen with 3D glasses and without.

Figure 5. Max Hattler (2016) III=III at POST PiXEL.: Animamix Biennale 2015-16, Hong Kong

Ⅵ. Conclusion

Stereoscopy holds the potential for expanded uses that go beyond the emulation of human vision and the faithful recreation of perspectival space. This can take the form of spaces where depth relations are disjointed and paradoxical, or where a new dimensionality and visual intensity is excavated from flat source material. The use of binocular rivalry allows for unique perceptions ranging from the subtle observation of lustre to the uncomfortable, destabilising experience of a complete breakdown of stereopsis.

Having been reluctant about stereoscopy and its relevance to my work in the past, this research has opened

up many new lines of inquiry for me. I am now extremely excited by the still relatively untapped potential for artistic expression. Alternate uses of stereoscopy constitute modes of expanded cinema which allow for novel ways of seeing that are at once deeply personal – individual to each viewer – and unique to technologically aided binocular vision. These approaches force ways of seeing which are impossible in the real world. As such, they can be seen as a true expansion of the senses.

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국문초록

망가진 시선으로부터 확장된 추상까지

막스 하틀러

최근 영화적 제작에서 필름과 애니메이션은 입체시각과 3D 댑스를 관객들을 위해 만들고 있다. 소비자 입장의 VR 기술의 성숙은 동시에 미디어 제작 추세를 3D 공간, 컴퓨터 게임에서 포르노 비디오 그리고 아카데미에 노미네이트된 VR 단편 'Pearl'에 이르기까지 박차를 가한다. 이 모든 작업들이 양안시차의 정도에 반응하는 우리의 눈이 뇌의 좌우반구에 영향을 받아 입체시를 이루는 입체 퓨전과 연관이 있다. 이는 인간의 정상 시각을 모방한 것이다. 하지만 실험적 작업에서는 3D 공간 제작이 바람직한 것만은 아니다. 본인의 추상 애니메이션 작품에서, 본인은 2D의 평평함과 장소의 혼돈성을 즐겨 사용한다. 이러한 점이 본인이 추상적 시각을 추구하는 부분이다. 내 앞에 있는 것과 무엇이 뒤에 있는지를 즉각적으로 이해할 수 없어서, 감상에서 요구되는 효과를 강화한다. 2015년에 큐레이터인 제프리 쇼(Jeffrey Shaw)가 나에게 아니마 믹스 비엔날레(2015~2016)를 위한 입체시각 작품 제작을 요구했다. 이것이 나로 하여금 어떻게 3차원에서 초결정적 공간보다 입체경이 장소적 시각의 혼돈을 성취하는가라는 질문에 대한 호기심이 일도록 만들었다. 그리고 연달아서, 어떻게 추상과 실험 움직임 이미지 실행이 입체경으로부터 새로운 시각과 네러티브 기회를 여는 해택을 얻을 수 있는가, 만약 유기적인 융합을 넘어서는 방법으로 사용된다면 말이다.

주목할 만한 작업은 전통성 내의 전형적인 예, 양안시에 대한 확장된 접근이 본 논문에서 논의될 것이다. 본고에서는 본인이 아니마믹스 비엔날레를 위해 작업한 반복 입체시 애니메이션 III=III의 간략한 소개와 예술가들이 관심가질 만한 기술, 즉 입체시와 관련된 더욱 실험적이고 확장된 작업방법에 대해 논할 것이다.

주제어: 입체시, 양안시, 추상 애니메이션, 실험적, VR

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