Across Light: *Through Colour II*

I Azevedo $^1$, M Richardson $^2$ and L M Bernardo $^3$

$^1$ ARCA-EUAC, University School of Arts of Coimbra, Portugal, ID+ (Research Institute for Design, Media and Culture), Post-Doc Researcher from the Fundação da Ciência e Tecnologia in Faculty of Sciences, Department of Physics and Astronomy, University of Porto, Portugal and in De Montfort University, Leicester, Faculty of Technology, The Imaging & Display Research Group, UK

$^2$ De Montfort University, Leicester, Faculty of Technology, The Imaging & Display Research Group, 2.27 Queens Building, The Gateway, LE1 9BH, UK

$^3$ Faculty of Sciences, Department of Physics and Astronomy, University of Porto, Rua do Campo Alegre, 687, 4169-007, Porto, Portugal

E-mail: azevedo.mariaisabel@gmail.com

**Abstract.** This paper intends to be a reflection on the end product of the process of preparing movies to digital art holograms, comparing the kind of space and movement between those images and the ones in a previous paper. This paper explores too questions about the act of seeing through those images and it is concerned with the surrounding debate of ideas for new experimental methodologies applied to holographic images.

1. **Introduction**

In a recent paper titled “Across Light: Through Colour” [1], we have explained the expressive possibilities of the holographic medium in the creation of digital art holograms and lenticulars. The paper’s subject was essentially concerned with time as expressed through change and transformation. Light and colour played an important role in the construction of a special space and special time. Exploring holography as a time-based medium some scenes can be seen left and right or back and forward deliberating a visual dialogue inside holographic plate with the viewer. That dynamic experience of seeing a digital hologram where the image is not static, but in a non-stop transformation, questions us about the act of seeing. In that paper, our method for image capturing was explored using the HoloCam Portable Light System whereby a camera is running parallel to the floor and in front of the scene. In the present paper, we have used another geometry, that explores the same system using the
Canon camera angled at 45 degrees (toward the floor), and produced another series of digital art holograms and lenticulars. In this case the scenes were captured from top to bottom carrying on another kind of set-up and compositions where the floor is the place where things happen. We built another kind of space, projecting the blue, red and green light, angled toward the floor 45 degrees too, collocating objects on the floor, and suspending and moving another, mixing and projecting another colours, on the other objects and on the floor.

2. Concepts in art about representation and illusion

In the act of opening our eyes we receive a mass of visual information that can often become anaesthetic. In everyday life, vision is very limited, because we only see what our instincts require to solve practical problems. We only pay attention to what we need and is likely that we are blind to what we don’t “need” to see. In fact perception is connected with symbolic conventions, and the visual stimuli depends upon habits and conditions of observation. When we are reading a book, or listening to music, we enter into a larger space than the room of the activity. Our imagination helps us enter this space, especially in visual arts, and the imaginative space of the artist. *Why you don’t enter? If you don’t like it you can go out again* [2].

What are images? For example, to Damásio [3], the word images means mental patterns with each sensorial way. Not only related at “visual” images nor static objects, but also sonorous images, or body inside images like those described by Einstein when he was trying to solve problems. In the passing of time, historic generations from each culture and society, art was always expressed to establish different rules of representation and production, because it was always using the technical devices from each epoch. A technological innovation is only important to an innovation in the art, if it implies new relationships, new ideas, new utilizations leading to a new consciousness. When the public viewed Muybridge’s [4] pictures depicting the moment of a horse galloping with the four legs in the air, they never looked to a horse galloping in the same way. This is an example of mechanisms that change the way we see. Today representation seems natural to photography, but not natural for holography, because we have learned how to look at a two-dimensional photographic image through a long cultural process that may be traced in history back to Brunelleschi and Alberti. So, some holographic images only seem to be "realistic", if people are changing their notion of the real. Changing their notion of the real, they will be able to establish a symbolic relationship between those images that
challenge their senses and their notion of what images are and how they work, and the world [5].

"Realism is a matter not of any constant or absolute relationship between a picture and its object but of a relationship between the system of representation employed in the picture and the standard system", as wrote Goodman [6].

Representation is a matter of context and illusion a matter of how understanding the relationship between objects and images that represent objects. The aim of illusion could be to create in the audience the same response that the viewer would have to the object in similar conditions of observation. Perhaps we can say that art has never been a pure representation, "that was figurative without been representative", as said Deleuze [7]. An artist depicting an image is never doing that without imprinting himself in each work of art. Even to a photographer, a pure representation is an impossibility. Perhaps we could define representation as an interpretation of another representation in infinitive way: each one interpreting in different and unique way, reinventing the work of art. "The works of art are done by the viewers", to quote Marcel Duchamp [8].

It does not mean that traditional ways of making art has been exhausted. Today we live in a time of synchronization where we have a mix of universal language and trans-disciplined multimedia offering new ways of appreciation join together different cultures. The act of taking a hologram might be described as a more accurate way of collecting data about our world than taking a photography, but Denisyuk advised "it is natural to imagine that the property of a three-dimensional hologram is brought about by the fact that its structure somehow aspires to copy a given object’s form, but it is very difficult to prove this since no method for predetermining an arbitrary three-dimensional object is known to optics" [9].

Holography is one of many new “Hyper-Medias” that allows a three-dimensional form to superimpose another three-dimensional form, as one may envisage a double exposure in photography, but in real space, in real time where one can walk around the projected images and view them as one would a sculpture [10]. In “reality” this is not something we would see in everyday life. On one hand we need to learn some rules to see some kind of representation as natural, in the other hand we can see new forms of images that may help us to see our “reality” in a different kind of way. Similar to the way photography made profound changes in the way we see ourselves and the world around us, as said Susan Sontag [11]. Holography could do the same, even more if we are understanding holography not to “reproducing” the world but opening new formal play and unexpected imagery, where can coexist photography, film, video and electronic image manipulation into the digital holographic image, perhaps could be a land to develop new ways of seeing ourselves and the world.
3. Digital holographic images

The fusion of digital holographic images is derived from different artistic fields such as photography, film and video. In the previous paper we have explained the expressive possibilities of the holographic medium in the creation of digital art holograms and lenticulars. Having in mind holography as a time-based medium, acting through light and colour, the final images can be seen in transformation, left and right or back and forward, carrying on a visual dialogue inside holographic plate with the viewer, and questioning himself about the act of seeing. In that paper, we used the HoloCam Portable Light System, that is a Syn4D imaging device system that produces a sequence of digital photographic shots of a real scene in a format designed for use with HPO, horizontal parallax only, digital holographic Syn4D printers. The device has been designed for use with holographic Syn4D printer operated by Geola [12] group in Vilnius, Lithuania. The final Syn4D print contains a realistic colour four-dimensional image of the filmed subject.

![Figure 1 - The HoloCam Portable Light](image)
![Figure 2 - The HoloCam in the space where we will built a scenario](image)

When the movies were finished they were sent to Geola in Lithuania to be printed as reflection holograms. The title of this series is “Across Light: Through Colour” and are shown in the illustrations. In “Pop Dog” (Fig. 3) there is a singer that suddenly transforms into a dog and the dog transforms again into a singer. There are few moments during the transforming that both occupy the same space. The idea of this work was related at the movement from artists to protect animals, like People for the Ethical Treatment of Animals (PETA). Here the artist transforms into a dog she wants to protect and the dog is acting like an artist too, using the same clothes and wig. As the viewer moves in front of the holographic image, he can see that non-stop
transformation, from the left to the right and from the right to the left, forward and backward.

![Figure 3 - Pop Dog](image)

**Figure 3** – "Pop Dog", Digital Reflection Hologram, 18x13cm. (Recorded with Sony)

"Velasquez" (Fig. 4) is homage to the painter, and to the painting, Las Niñas. A girl does gumball and the rail camera projects in the girl glasses, showing the moment of the movie record. As the viewer moves left to right or right to left the ball inflates or deflates, and we can see the mouth movement through the transparency of the ball. The space can be seen in the glasses by reflection. The viewer occupies the camera position and he reconstructs his personal image through the one recorded by the camera.

![Figure 4 - Velasquez](image)

**Figure 4** – "Velasquez", Digital Reflection Hologram, 18x13cm. (Recorded with Sony)

In “Talk-Talk” (Fig. 5), there are two figures, one small wearing female glasses, (glasses with a woman’s eyes looking out), the second with male glasses, (glasses with a man’s eyes looking out). They represent the both sides of human being, the male and the female. A space inside other space, a shape inside another shape. The little figure is speaking from the left to the right and from the right to the left, each time the viewer is moving in front of that holographic image, the figure is speaking and changing position, in a colour movie acting all the time.
These images are recorded using Canon IS3 camera (Fig. 5) and Sony HDR CX105 camera (Fig. 6), on the rail, using the HoloCam, to compare different effects. Approximately thirty movies were recorded, but only four digital holograms were selected for printing. We observed that the movies made with the Sony camera have a tendency to be red, and the red is without alternate transparencies and opacities. Utilizing the Canon camera we found a higher colour content. One may notice the white dotted pattern in the costume of the sitter appears red within the Sony recordings.

Pictures used from the Canon present an image identifiable with a kind of timeless quality, that specificity seems interesting to explore in next digital art holograms. In the present paper, we have used another geometry for image capturing that explores the same system using the Canon camera angled at 45 degrees (toward the floor) and carrying on a different kind of space and movement as compared to the movies in the previous paper.

In capturing the scenes top to bottom, we used the floor to build another kind of set-ups and compositions and we produced another series of digital art holograms and lenticulars titled “Across Light: Through Colour II”.

We recorded near fifty movies but we only selected four to printing. In “Peter Pan” (Fig. 7) we can see feet and legs depicted behind a balloon, as if about to kick it. Three colours were projected to overlap three shadows in the middle of balloons; these balloons are moving slowly - mixing the colour of shadows on the
floor. The white leggings also have colours projected onto them which change as the observer moves to view the holographic plate.

Figure 7 – “Peter Pan”, Digital Reflection Hologram, 18x13cm. (Recorded with Canon)

“A Being from Space” (Fig. 8) is a masked being without expression, blowing bubbles in a non-defined space. Like planets in orbit, the bubbles hover inside the hologram as if creating another universe yet to be finished.

Figure 8 – “A Being from Space”, Digital Reflection Hologram, 18x13cm. (Recorded with Canon)

In “Earth Lighting” (Fig. 9), a Moon balloon is jumping in direction at the Earth balloon near at a hammer and a shining stair. It is jumping, up and down depending viewer movements, the hammer is presented like something dangerous about to happen to the planet.

Figure 9 – “Earth Lighting”, Digital Reflection Hologram, 18x13cm. (Recorded with Canon)
In “The Gardener” (Fig. 10) a human figure, an entity, is partially showing through the feet and a white dress, inside a celestial garden. A frog is recognizing the entity, and all the elements in the garden are celebrating his presence, shining, moving and projecting colours between them, for all and forever, depending the viewer movements.

Figure 10, “The Gardener”. Digital Reflection Hologram, 18x13cm. (Recorded with Canon)

Using different cameras on the HOLOSHOT rail, we discovered several problems occurred with the digital printing process due to non-calibration by GEOLA.
1. Because the cameras were not synchronized, both the Sony HDR CX105 and Panasonic Lumix G2 did not focus to the centre of the required scene because of the predictive focus modes. Whereas the Canon IS3 camera, with changes made by GEOLA, formed the correct focus.
2. Both the Sony and Panasonic cameras are not focusing to the centre of the scene, and in the end the frames have a different sizes, which was not suitable for the digital holographic Syn4D printers in GEOLA.
3. Colour saturation was observed to change in the Sony camera, as it warmed in the studio environment. This was especially noticeable in the digital hologram “Talk-Talk” (recorded with Sony) and after looking the movies in the camera and observing in computers too, the blue colour projected on the black curtain, in the back of the figures, was turned green after two or three movies. We conclude that the camera when was warm has changed colours. Then we decide to use a white support having in mind, if doing that, the colours will not change.
4. Experiments with the cameras angled at 45 degrees toward the floor and with the three light colours projectors, red, blue, green, projecting at the floor near 45 degrees recorded blue, green, red – red, green, blue; blue, red, green – green, red, blue; green, blue, red – red, blue, green. This test was repeated with Canon IS3 camera and the same with Sony HDR CX105 camera and Panasonic Lumix G2 camera. Each of these factors changed the aesthetic of the digital hologram -
different environments with that change and a kind of pallet that we can use depending the kind of space and ambiance we want to create in another holographic images.

4. Conclusion
The quality of these digital holographic images is dependent on true colour observations that play an important role in the construction of space and time. The audience will interact with events that have no beginning, or end, that can be perceived in any direction, left and right or forward and backward, in a symmetrical time, and depending on the relative position of the viewer. The relationship with the scene inside holographic plate and the viewer when looking at the plate is fundamental, the image is activated from a multitude of positions in a similar way that we interact with the "real world".

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