Holography without frames: sculptural installations incorporating ‘drawn’ elements

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Abstract. Since its adoption by artists, shortly after the process became practical in the 1960’s, holography has struggled to be accepted as a legitimate medium within the visual arts. A number of key milestones, during the early developmental process of creative holography, are acknowledged with reference to sparse critical discussions. The value of ‘traditional’, framed, wall-based display is explored and a number of sculptural installations by the author, which have attempted to question this method of presentation, are discussed. Floor-based installations, which involve the integration of drawn holographic elements within site-specific locations, are examined.

1. Historical parameters
When any medium, which might be termed ‘new’, becomes available to creative practitioners, there is often a period of insecurity. This manifests itself within the research activities of the ‘early adopters’, as practical difficulties for those wishing to exhibit the results, and with curators who are unfamiliar and unsure where, in a historical context, this new manifestation might ‘sit’. Holographic images are no exception.

If we consider that holography developed using two distinct methods of display, dictated entirely by their optical production and reconstruction requirements, it is possible to examine distinct influences on creative development.

The very early laser transmission holograms demonstrated by Leith and Upatneiks in the USA [1], presented a dichotomy for display. Viewing their first holograms required laser light to be directed through the holographic plates using the same path taken by the original off-axis recording beam. The display light shone through the plate from behind, out into the space occupied by the viewer - a display configuration diametrically opposed to more ‘traditional’ methods of presentation. As practitioners in the field, we embrace this off-axis transmission configuration without question. It is, after all, the optical path, which allows this type of holography to make its recordings and was a huge practical development compared to the earlier, in-line, recording and display geometry proposed and demonstrated by Gabor. [2]

For the scientists making the holograms, this method of display is a completely acceptable one. It mimics, with clear logic, the process of recording. It also embedded the display of these early holograms within the laboratory, not just because of the need for coherent light from a laser, but the physical support structures of the optical elements used in the recording. They were often displayed on the optical tables used to record them. Margaret Benyon was one of the first artists to identify issues of
display and presentation in relationship to holography. In her 1971 exhibition at the University of Nottingham she presented laser transmission holograms on a large rotatable ‘table’ so that each framed transparent plate could be moved into the reconstruction light of the laser. [3] This was an unusual display device in a gallery context in that it attempted to accommodate the display light from the side.

In Russia and Europe, where progress was being made using reflection holography, a completely different, and more familiar, display system was being used. As reflection holograms required the display reference beam to be reflected from the surface of the holographic plate (a more ‘traditional’ approach compared to side/back illuminated laser transmission holograms) and could use non-coherent white light, holograms recorded using this process were easy to frame, hang on a wall, and illuminate from above – a traditional gallery configuration.

2. Critical engagement
As Rebecca Coyle and Philip Hayward rightly identify, “Critical discourse around holography in the 1970’s was minimal”. [4] This is an accurate reflection of the early gestation period where minimal discourse, and some basic analysis, tended to be either defensive, mainly from makers and promoters in the field, or dismissive, mainly from the few established critics who attempted to engage intelligently with this ‘new’ medium. During these early stages, there appears to have been an attempt at assimilation of this unfamiliar, phenomenon-based, recording and display process by artists, scientists and critical observers.

Coyle and Hayward go on to pinpoint one of the key issues in this ‘struggle’ for ‘acceptance’: “Despite the special facilities required for illumination of the holographic image, much holographic art fits far easier within the traditional gallery context of two dimensional display than contemporary technology performance or computer interactivity”. [5] The early framing of holography has been either instructional or an attempt to conform to that traditional gallery context. Visitors needed help to ‘access’ visually, physically and conceptually, the contradictory images they were being presented with; visually solid objects with no physical (real) substance.

3. Frame as boundary
Unsurprisingly, the traditional frame offered an opportunity for familiarity and, possibly, acceptance. For reflection holography, it became the norm, both practically and aesthetically. The glass holographic plates, using traditional frames, allowed work to be securely ‘hung’ on gallery walls (a clear practical advantage, particularly for curators and installers). The accepted boundaries of the frames provided viewers with a familiar and defined basis on which to engage with the content the frame encased. It is this issue of containment which caused a significant visual and conceptual fissure.

Viewers bring with them an acquired (subliminal) knowledge of how to view ‘art’ on walls, which includes an understanding of where the work stops (the edge of the frame), orientation (we know where the top and bottom are), the nature of completion (the work is deemed ‘finished’) and spatial location through the definition of the picture plane (the surface contains the visual illusion of volume). Applying these learnt, and now standard, visual indicators, to holographic imaging causes difficulties of interpretation on both a visual and a conceptual level. Holographic space has a set of parameters which do not appear to conform to our post-Renaissance understanding of the depiction of volume on a flat surface. [6] There is also a dangerous clash of values. We use 9 sources of information to perceive space in a natural environment (occlusion, height in the visual field, relative size, relative density, aerial perspective, binocular disparities, accommodation, convergence, and motion perspective) [7]. When we view a flat ‘picture’, we understand that an illusion is taking place on the picture plane and compensate perceptually and conceptually. Unfortunately, when holograms are framed in a format which makes them ‘appear’ like flat pictures, but display stored holographic volume, a visual and perceptual conflict occurs. What appears to be a traditional, framed picture of the illusion of space actually contains information which is three-dimensional but we still apply the 9 ways of assessing them, normally reserved for the natural (real) world. What was an attempt to introduce the unfamiliar observer to an unusual imaging system, through familiar methods of display,
actually causes a mismatch of expectations and increased difficulty in processing visual and conceptual aspects of the work on show.

4. Frame as support

For those artists working with transmission holography (laser and white light), the physical requirement of the display (reconstruction) light to pass through the transparent holographic plate from behind, has allowed frames to be used as a support rather than a physical defined edge (although in some examples they perform both functions).

This approach to framing is fundamentally different from that of wall-based examples as it ‘offers up’ the transparent glass plate, which can be looked through. It is this acknowledgement of the ‘window’ principal, and the understanding that there is ‘space’ behind the plate which does not logically connect to the content of the hologram. It can trigger an extra element of investigation on the part of both the artist and the viewer. As Achim Lipp identifies when discussing how glaziers approach and view recently delivered (holographic) glass sheets: “Their eyes don’t stop at the surface of the glass. One clearly sees how their pupils continually change focus; over and over again they shift their eyes to a new point at a new distance. Sometimes the look concentrates on a thing quite near to them, maybe just a yard away from the pane of glass, sometimes the pupil relaxes, reaches out into the distance — and the whole time the pane that the ‘look’ must pass through is leaning on the wall of the art building.” [8]

When we ‘look’ through transparent planes such as these, we appear to be comfortable with the concept of there being ‘space’ behind. I would, therefore, suggest that this helps us visually disengage from the framing in a way which does not happen in framed reflection holograms. The viewer can accept that any frame involved is there to support the glass sheet. It is peripheral, whereas with reflection holograms it is acknowledged (through historical precedent) as a boundary.

This subtle difference in how we visually and conceptually engage with the frame has allowed artists, working with transmission holography, to begin incorporating the physical aspects of the frame. This is succinctly demonstrated in Rudie Berkhout’s ‘12mW Boogie’ [9] and in versions of ‘The New Territories’ [10] where transparent holographic plates are edged with black frames and mounted on black industrial tripods. The framing device shifts in character to become an element in a recognisable, sculptural, installation. Here the emphasis of the holographic plate shifts to become a demonstrable optical device, particularly when mounted on tripods where the inference of the telescope, and ‘looking’ into a different world, is difficult to ignore.

4. The hologram as frame

There are examples of artists who have not employed physical framing, using instead either the actual glass substrate of the holographic plate as the main support system for the image area, or lamination onto similarly sized, or larger, sheets of glass and plastic sheeting. ‘Cartesian Memory’ [11] by Sam Moree ‘sits’ in the top right of a larger column of glass which extends out of the gallery floor. The addition of luminous krypton tubing contributes to the overall structure of the installation and offers a visual pathway from the gallery floor, up to a section of the complex holographic image, and back down to the floor. The fact that there is also a ‘window’ effect in being able to look through the transparent sheets, to the gallery space behind, establishes the work within the architectural structure in which it is shown.

Holograms are incorporated into installations where they are integral to the architecture and materials which surround them and therefore become framed through the context in which they are viewed. Vito Orazem’s ‘Stop’ sign, although not conceived as a visual artwork, does highlight many of the aspects of placement and relationships with existing surrounding elements, as well as the position of the observer and the limited viewing zones of holographic display. His study for a holographic stop sign, an optical ‘barrier’ for subway tracks, uses as its frame the edges of the public subway platform. [12]
5. Placement
Several works produced between 1989 and 2012 have been exhibited by the author of this paper. They attempt to explore the restrictions of traditional framing [13] and interrogate placement and the use of drawn holographic elements in site-specific installations. Three of these will be described in practical and constructional detail here. They range from initial research stages, through site-specific gallery installations, to the most recent piece incorporating existing, functional objects. No attempt to interrogate the conceptual, critical or experiential aspects of these works is included here, partly because, as in all of these pieces, those elements are the triggers which attempt to activate the work in context, and partly because the results of this research are based on a physical and visual engagement.

Often holograms are, quite naturally, clustered together into media-specific exhibitions, which have not only proved very popular (less so critically) but helped establish a ghetto mentality. [14] There is safety in numbers and the visual fidelity of these mammoth survey exhibitions has hidden many aspects of critical engagement. The relevance of works incorporating holography being seen alongside other media, so that they can be ‘tested’ using the same criteria of critical interrogation, is paramount.

5.1 Positive Attempt
‘Positive Attempt’ (figure 1) was originally shown in a group sculpture exhibition alongside a broad mix of media and installation techniques. [15] Apart from attempting to engage with an emotional narrative, it was the first opportunity to use projected light as a device for illuminating holograms. Of particular importance was the need to establish a direct link between the content of the holographic image, in this case hand-drawn scribbles, and the light which made them visible.

Figure 1. Positive Attempt, 1998, multiple reflection hologram fragments, glass circle, projected light. First shown at 3-D ’89, National Sculpture Open Exhibition, Watermans Arts Centre, Brentford, UK.
Several reflection holograms of gestural marks, by two individuals, were captured using the Denisyuk recording technique. These were displayed pseudoscopically so that the ‘drawn’ element, with no discernable content, existed in the space between the observer and the holographic plate. This visual device is used in almost all subsequent works.

Each hologram was sealed on the back (emulsion) side and then broken into pieces. There was no attempt to engineer specific shapes from the broken sections. These fragments, characteristics from two people, were mixed together and placed in a circular area on a large circular glass sheet which was raised off the gallery floor by 2 cm. A circular drawing, incorporating a larger ‘patch’ off-centre was produced and made into a high contrast black and white 35 mm projection slide. This drawn image was then projected vertically down from the gallery ceiling onto the large glass circle and the arrangement of holograms.

Light from the projector (itself a drawing) illuminated the hologram fragments, allowing each to reconstruct its own, stored, set of marks which then appeared just above the surface of the installation. As the glass circle was transparent, any ‘unused’ light passed through it to appear on the gallery floor, slightly subdued, due to loss of light as it passed through the dark ‘tint’.

What resulted was a series of drawn marks in separated spatial locations, which were only visible from certain angles as viewers moved around the circular structure. As the holographic fragments were randomly orientated, each would ‘release’ its section of marks at differing viewing positions. A kinetic ‘pulsing’ was produced, which directly related to the speed and direction of the passing viewer. There was, therefore, a tangible connection between the work and the viewer.

Framing here was undertaken by the circular glass ‘platform’ and the ‘drawn’ light which illuminated the piece.

5.2 Sight Lines

‘Sight Lines’ (figure 2) was constructed specifically for installation at Gallery 286, London, UK [16] and provided an opportunity to engage with the existing ‘white box’ volume of the gallery space, its white painted floor and the traditional wall areas.

Reflection holograms are often displayed on gallery walls, as mentioned previously, to connect with an accepted method of graphic display. In this case they have been moved away and in front of those walls to act as a barrier (line) to the graphic elements, which are shown in the more ‘traditional’ location. Nine rusted metal plates, each incorporating a small reflection hologram of the shadow of liquid, are hung from the gallery ceiling and illuminated from a position close to the vertical wall behind. This not only allows reconstruction of the holographic images, but casts a rectangular shadow of the metal plate onto the white floor at a location between the observer and the plates.

Photographs of each plate and hologram were edited to select a single, thin, section through the length of the hanging object and these were hung at eye height on the wall behind the piece. This ‘traditional’ viewing location is separated from the viewer by the construction hanging in front of it.

A series of lines and boundaries are ‘drawn’ in the gallery space: On the wall, suspended in front of the wall and on the gallery floor.

A final aspect of the installation is in the 9th metal plate which is embedded in the gallery wall, offering a suggestion that the undulating installation continues through the wall and, possibly, much further across London. The implication of a constructed space, more normally associated with holographic images, is reinforced with a physical indicator and another opportunity to suspend belief by engaging with this ‘other’ possible narrative.
5.3 Tizio Water

‘Tizio Water’ (figure 3) was installed as part of the Archipelago exhibition [17] which featured experimental practice from a range of art and design disciplines at Nottingham Trent University. Artists were asked to consider themselves and their practice as islands. Those islands could be the work of one practitioner, of an established collaboration, or a group brought together by common concerns.

The installation consisted of two elements; a rectangular reflection hologram of the shadow of liquid and a Tizio table lamp designed by Richard Sapper in 1971. One aim of the installation was to interrogate the symbiosis of the historic 'found' object (recognised, celebrated and archived in major international art and design museums [18]) and the 'historic' holographic recording (unknown, displaced and functionless). The latter is made visible by the presence of the former. The acknowledged supports the unacknowledged.

This small rectangle of 'ground' inverts the normal impression of an archipelago - here the holographic shadow of liquid is the defining terrain, edged by the junction between the glass holographic plate and the surrounding solid architecture (the gallery floor).

Approached from a distance, the black crane-like structure of a Tizio table lamp offers a graphic and defined 'point to view from'. It is, in a way, instructional - guiding the viewer to an observation.
point in the same way that traditional frames guide a viewer to the section they should look at. Its light is precisely directed down onto a holographic rectangle, which appears black and flat from a distance.

Common elements of frame, location and illumination are disrupted in an attempt to engage with each component and question their relationship to each other within an historical art and design context.

![Figure 3](image)

Figure 3. Tizio Water, 2012, installation with reflection hologram and Tizio table lamp. Bonington Gallery, Nottingham Trent University, UK.

### 6. Conclusion

The duality of framed holograms, based on their optical recording and reconstruction geometries has, rightly, become blurred as artists engage with the medium as a legitimate process for practical research output.

There will continue to be ‘lowest common denominator’ displays where framing is a basic first choice. This approach may also be utilized because of issues of practicality, security or architectural display restrictions. However, as artists continue to engage with the critical interrogation of process, placement and contextualisation, the physical frame, and substrate on which holographic emulsions are manufactured, will need to become integral to critical analysis in the same way that other display technologies are absorbed and assessed within the visual arts.
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