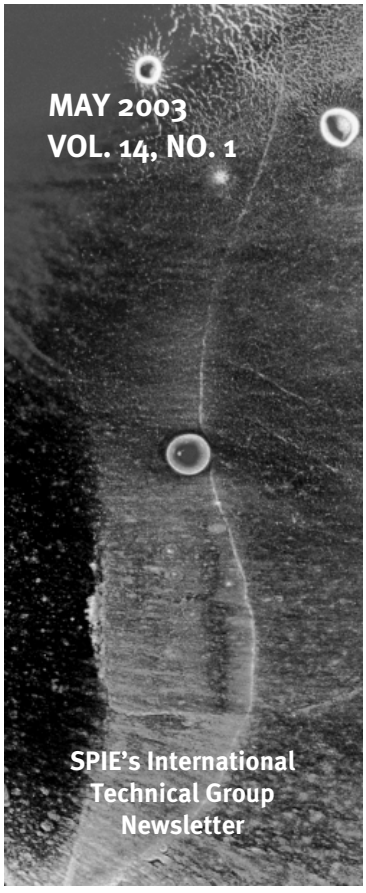

Special Issue on:
Art Holography

Guest Editors
Rebecca Deem, Zone Holografix Studio, 5338 B. Vineland Ave., North Hollywood, CA 91601.

Fred Unterseher, Pasadena City College, Natural Science Dept., Electro-Optics Program, Pasadena, CA 91106.

Newsletter now available on-line

Technical Group members are being offered the option of receiving the Holography Newsletter electronically. An e-mail is being sent to all group members with advice of the web location for this issue, and asking members to choose between the electronic and printed version for future issues. If you are a member and have not yet received this message, then SPIE does not have your correct e-mail address.

To receive future issues electronically, please send your e-mail address to:

`spie-membership@spie.org`

with the word `holography` in the subject line of the message and the words `electronic version` in the body of the message.

If you prefer to receive the newsletter in the printed format, but want to send your correct e-mail address for our database, include the words `print version preferred` in the body of your message.

HOLOGRAPHY

Shadowy Figures: Chiaroscuro of early Italian art transposed to a hogel-vector hologram

Darkness has always been an important pictorial element in holograms. Quite apart from the scientific application of interferometry, artists have developed uniquely holographic ways of using darkness in visual composition. For the most part, holographic artists interested in darkness have achieved their effects by optimising aspects of the optical recording process—hence the subjects of these works have been real things such as actual drawings, diffusion screens, wires, hot air, people, etc..

Although computer-graphic subjects (where the direct relationship between the recording of the image and the subject and its lighting has been removed) offer boundless possibilities in the positioning of darkness, so far there are few examples of the dominant use of darkness in holographic compositions where a computer-graphic, rather than real, subject is used.

Throughout the history of Western art, the intellectual climate has impacted upon the approach of artists to darkness. This correspondence has been investigated by Michael Baxandall in *Shadows and Enlightenment*, in which he identifies *Joachim and the Shepherds* by Giotto; *Baptism of the Neophyte* by Masaccio; and *Drapery Study* by Leonardo da Vinci as key examples.[1]

My current project, entitled *Shadowy Figures*—which is funded by the Australian Research Council—attempts to transpose the way in which darkness is employed in these works into a hogel-vector hologram. The figure in this hologram is the art historian Dr John Gage who, though best known for his work on color, Turner and Constable, has also written on black light in Matisse and Italian Renaissance social history. Gage was draped in similar weight fabrics, positioned as the figures in the Giotto, Masaccio and da Vinci works, and Cryax-laser-scanned to obtain *x*, *y*, and *z* coordinates. These point-cloud data were used to generate three, 3D polygonal surfaces of the draped fig-

Continues on page 9.

Figure 1. Two views of Shadowy Figures. *This hologram, together with several holographic and historic works, will be on show at the Ivan Dougherty Gallery in Sydney, Australia in October. Check the web site http://www.cofa.unsw.edu.au/galleries/idg/news for details. A DV of the entire project is available from Paula Dawson.*

Review

Art Holography: The Real Virtual 3D Images

George Dyens has recently completed and released his long-awaited interactive CDRom *Art Holography: The Real Virtual 3D Images,* produced by his MGD Productions, in association with Research Group in Media Arts (GRAM) at the Université du Québec a Montréal, (UQAM). Dyens commented that the goal of the project, supported in part by the Shearwater Foundation, was to demonstrate to the widest audience possible just what a holographic image is, how it has been used creatively by artists, the different artistic trends that have emerged, and how holography has influenced artists work. He deliberately chose not to address formal technique, optics, or to take an encyclopedic approach to the artist's work: this, he says, has been well done elsewhere.

The CD is user-friendly and offers numerous stills and video clips of holographic art works, artists, and sections of exhibitions. After selecting the appropriate language option (French or English), the CD opens to a preface with a summation of main topic sections: *Introduction to Holography Art*; *Influence of Technological Tools on Artists' Expressions; Various Artistic Trends; The Artists* (a list of one hundred); *Bibliography;* and the *Credits*. Each main topic section is sub-divided with more in-depth information. The *Introduction* itself has ten such sub-sections on lasers, light, color, immateriality, interactivity, space/time, 3D, photography, and computers, with a visual to illustrate and accompany each sub-section statement. The other sections contain nearly twice as many sub-sections and under these some even contain subcategories. Dyens use of poetic license in his descriptive analysis gives the user some insight into his passion for the subject of art and holography. He states in the *Introduction* that "holography is a love story with light, what light is to holograms stone is to sculpture," in the section on the *Influence of Tools* he states that "lighting is the very soul of holograms."

The *introduction* attempts to demystify the characteristics of the hologram like its immateriality and 3D qualities, and its relationship to other media like photography and computers. Each of these sub-sections is accompanied by an explicative statement and a short video clip or a loop of stills to illustrate the aim. The *tools* section sets out to demonstrate how the technological aspects have influenced the artists. It lists some 19 different sub-sections with obvious inclusions like the continuous-wave and pulse laser. A sub-section on *Holographic Optical Elements* (HOEs) is represented with three sub-categories including monumental as well as much smaller collage works.

The *artistic trends* section enumerates 18 movements: some are closely related to conventional art practice such as abstraction, landscape or still life while others are particular to holography, like holo-poetry and pure light. The *artists* section lists one hundred names compiled in alphabetical order, a formidable number of individuals plus their works. This section however, is somewhat uneven. Some artists are represented with only one or two pieces of work while others have as many as twenty. Not all the works have titles 'available', while others have been mislabelled. Very few of the works are dated, yet some are incorrectly dated and some artists have statements about their work while others do not. All in all it should be acknowledged that the works do double or triple duty to illustrate points addressed in other sections. The *Bibliography* and *Credits* sections are brief.

Once the user selects a given sub-section, a descriptive statement appears along with a list of art works that speak to the point. The sub-section *shadowgrams,* under *tools,* has a list of forty art works to scroll and choose from as examples of the term. An exception is *holographic installations,* under *artistic trends,* which is the only sub-section without a statement. A statement would be especially helpful for this sub-section since it lists three subcategories and scale is not always evident in the illustrations. At first glance it may seem to be self-explanatory with the subcategories of: *architectural installations, autonomous installations* and *environmental installations.* The selection of *architectural installations* alone, however, brings up some twenty-four choices. Without references to details and scale, it is not apparent that Bleyenberg's *Eyefire* is actually 26 holographic panels, each 1m × 2.5m on the exterior wall of a four-story building, while Wesley's *Monument to Leith and Upatniecks* is an art work of maquette proportions.

Although not even video, let alone a static image, can take the place of experiencing an actual hologram, the CD does offer a survey of many of the holographic art works created over the last thirty-odd years and the commentary points towards the wide range of diversity among them. All in all, this digital document certainly represents an enormous undertaking. The cost of the CD-ROM is Euro€/US$22 for purchases by individuals, and €/$52 for corporations and organizations, both amounts include handling, tax and shipping. It can be ordered on line at the address below.[1]

Rebecca Deem

Reference

1. http://art-holo.uqam.ca or contact Georges Dyens, 4464 Sherbrooke Street, Westmount, Québec H3Z1E6, Canada. Fax: +1 514/933 1808.

Tell us about your news, ideas, and events!

If you're interested in sending in an article for the newsletter, have ideas for future issues, or would like to publicize an event that is coming up, we'd like to hear from you. Contact our technical editor, Sunny Bains (sunny@spie.org) to let her know what you have in mind and she'll work with you to get something ready for publication.

Deadlines for 14.2 are:

17 July 2003: Suggestions for special issues and guest editors.

25 July 2003: Ideas for articles you'd like to write (or read).

19 September 2003: Calendar items for the twelve months starting November 2003.

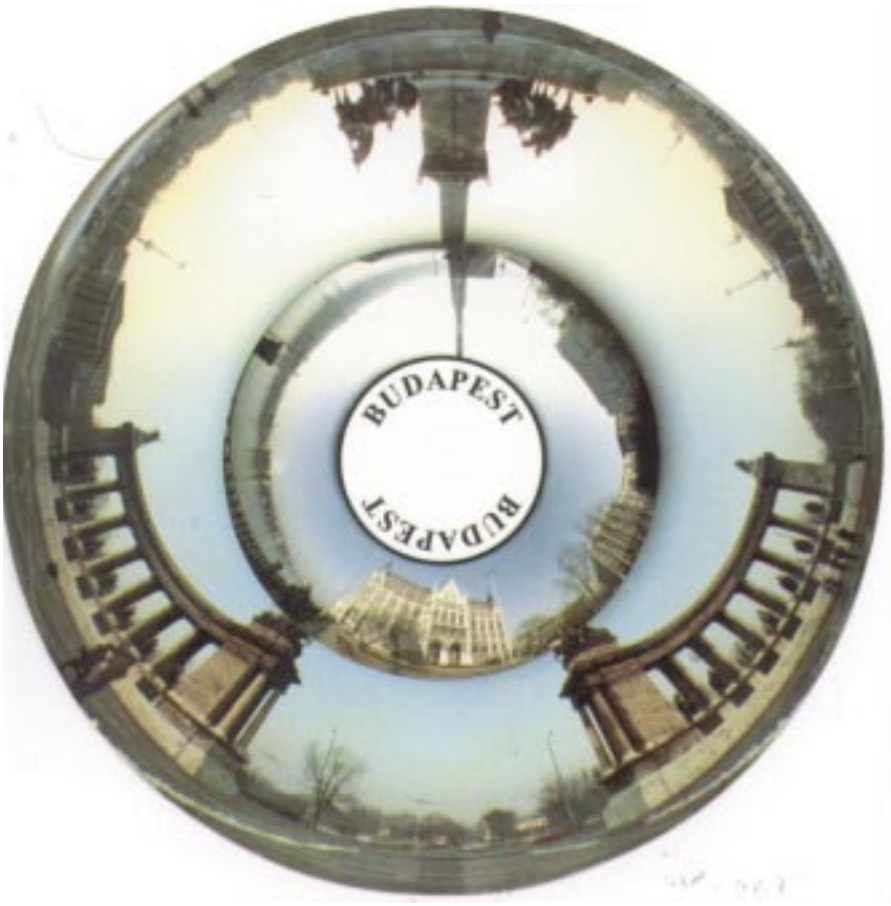

Figure 2. A photograph of Budapest taken by Greguss using his panoramic lens.

Electronic Imaging symposium returns to San Jose

The Electronic Imaging conference for 2004 is moving back to San Jose Convention Center after a one-time stint in Santa Clara. It is scheduled for January 19-22, a week ahead of Photonics West. The *Holography: Materials and Applications* section will be co-chaired by me and Hans Bjelkhagen, with a holographic exhibition under the direction of Steve Smith.[1]

The Call for Papers from SPIE will have an added topic: *Artistic Concepts and Techniques.* Artist Margaret Benyon is our new addition to the Organizing Committee and will help us to address this area.

Authors are encouraged to exhibit their experimental results related to their papers. Space at the exhibition, being limited, must be requested from Steve Smith as early as possible.

We are very grateful to Toppan Printing Company and the Shearwater Foundation for their generous financial contributions to our 2003 holography activities. These funds help maintain the exhibition, invite authors who are otherwise unable to attend, and buy food and drink for our social functions. Please have your company consider making a contribution to SPIE, specifying that it should go to holography.

Tung H. Jeong

Reference

1. E-mail: sls@media.mit.edu

Figure 1. Caricature of Pál Greguss, supplied by his wife Edith.

Pál Greguss dies at 81

We are sad to announce that Pál Greguss Ph.D., Professor Emeritus at the Budapest University of Technology and Economics, Hungary, and a NASA-Prize-winning scientist and inventor, died recently in Budapest, Hungary, following a tragic accident. He is mourned by his wife[1] Edith, four children, ten grandchildren, brother, sons- and daughters-in-law, and other relatives, as well as by his friends, colleagues, students, and everyone who respected and loved him.

Those wishing to pay him tribute are invited to donate to his favorite foundation—the Hungarian Photography Foundation—with the note: "In memory of Pal Greguss".[2]

Reference

1. E-mail: greguss.edit@freemail.hu
2. Name of the beneficiary: Magyar Fotográfiai Alapítvány. Account number: 10402506-25018781. Name of the Bank: Kereskedelmi és Hitelbank. SWIFT Bank Code: OKHB HUHB.

My fondest memories of Prof. Greguss, a wonderful and generous character, were of his enthusiastic demonstrations of his panoramic lens: a product of which is shown. He will be sadly missed.

Sunny Bains, Editor

Large format art holograms installed in the Centennial Hall, Tokyo Institute of Technology.

In January 2003, the art holograms *Murmur of Aqueus 1995* were installed in the Centennial Hall[1] at Tokyo Institute of Technology,[2] Ookayama campus, known for its a very geometric and modern architecture. The holograms were set in a corner of the main hall with a high ceiling (about 7m in height) with a large glass wall, facing south, on the ground floor. Figure 1 shows a perspective view. For better lighting conditions, a shading screen was put between the glass wall and holograms to interrupt the direct sunlight.

Murmur of Aqueus[3] *1995* is composed of three large-format pieces, all of which are multicolor transmission holograms.[4] Each piece is 1.745m high by 1.08m. Each hologram film is laminated between two pieces of glass 2.1m high by 1.08m wide by 8mm thick. The laminated pieces are supported by a heavy stainless-steel stand that is fixed to the floor.

The holograms are shadowgrams made from brushwork. Behind them, a flat water vessel (10cm high by 3.3m wide by 2.1m deep) with three mirrors in the bottom is set on the floor. There is also a device we prepared for making ripples in the water surface in such a way that water drops fall from the top and a small object floating on the water moves irregularly. So, the lights for hologram reconstruction reflect from these mirrors, and give life to the reconstructed images (see Figure 2).

This hall is open to the public, and so offers a good opportunity to introduce the art holography to a wider audience.

Finally, I would like to describe my artistic intentions behind these pieces, as originally expressed in the catalogue. “Rainbows on the palm. Spinning colors of light-like threads, giving a malleable form like clay. Such an image can be realized by means of holography. Each trace of ‘brushwork’ from the drawing hand floats in three-dimensions. Like streams of light in frozen time, its appearance changes all the time, depending upon one’s viewpoint. Rainbows on the palm…reproduced by light reflected in water, and integrated with ripples. One senses the presence of time and light.”

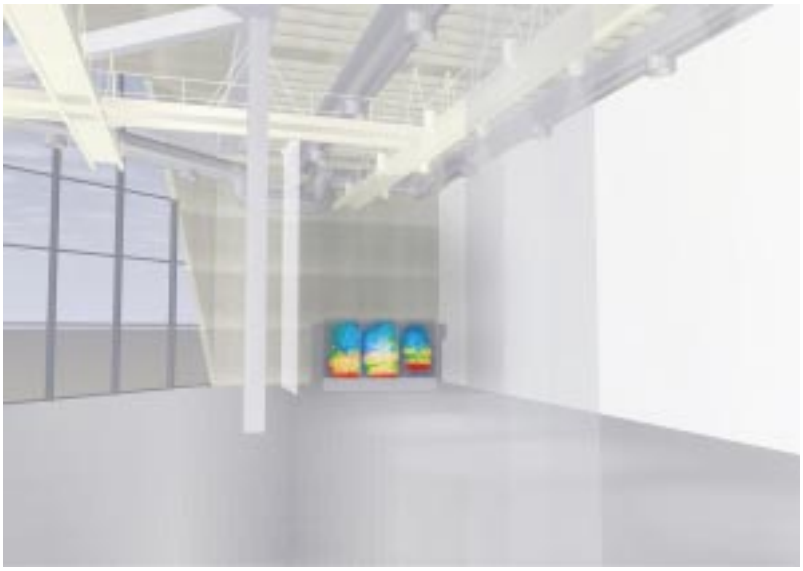

Figure 1. Perspective of the setting. Computer graphic by Tenshin Yokoyama.

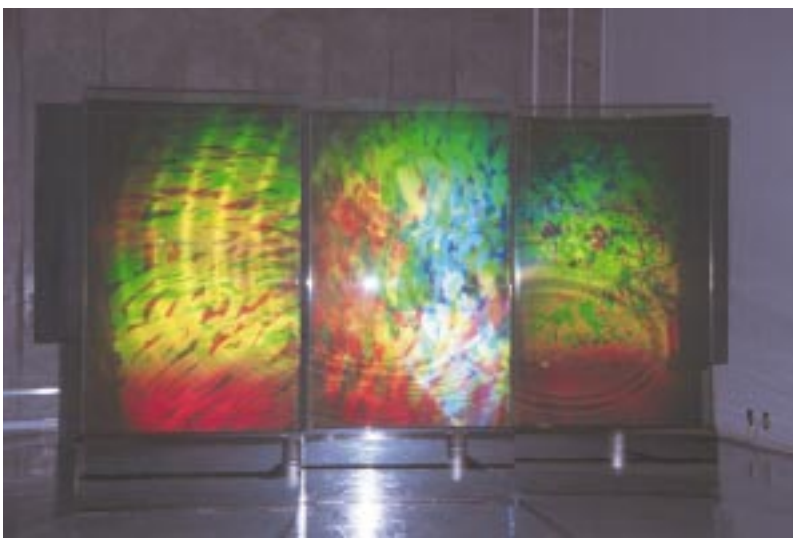

Figure 2. Reconstructed images with ripples.

Setsuko Ishii
Independent Artist
1-23-26-404, Kohinata, Bunkyo-ku
Tokyo 112-0006, Japan
E-mail: gp5s-isi@asahi-net.or.jp
http://www.ne.jp/asahi/setsuko/ishii/

References

1. Designed by Kazuo Shinohara
2. Tokyo Institute of Techology, 2-12-1,Ookayama, Meguro-ku, Tokyo 152-8552, Japan.
3. Aqueus: Another name of Zeus in Greek mythology. Maidens in Zeus’s temple misheard the sound of a sacred fountain as the voice of Zeus. Aqueus, meaning “watery”, is said to be derived from this fable.
4. These holograms were made at, Holographics North, Inc., 444 South Union Street, Burlington, VT 05401, USA.

UK Spaces: Andrew Pepper shows at the Butler Institute of American Art

At the end of May this year, Andrew Pepper will begin a six-month exhibition of holography at the Butler Institute of American Art, Ohio. Known for its encouragement of art and technology issues, the Butler has mounted several solo and group exhibitions of artists who incorporate various aspects of technology in their art. Not only will Pepper show a number of 8 × 10" reflection holograms—produced over the past 25 years—that examine drawing and shadow, but the exhibition will include a site-specific installation running along several meters of the exhibition space in the Butler's Beecher Wing, part of their Center for Technology in the Arts.

Sight Lines Wall is a developmental installation based on work first shown in London at Gallery 286 during Pepper's solo exhibition in 2001. Eight rectangular metal plates patterned with rust markings, each containing a small hologram of liquid, will hang on metal wires, just in front of the Butler Gallery wall. The lights used to illuminate each rectangle will not only make the three-dimensional liquid (stored in the hologram) visible, but also cast a shadow down onto the wall. The wires, from which each metal rectangle will hang, form an integral element. They will divide the featureless wall into vertical sections, while the shadows they cast will produce drawing-like marks on and around the metal and holographic sections. The images will occupy space in front of the wall, on the surface of the wall, and within the holographic sections.

Thin, digitally-altered photographs of the surface of each metal rectangle will be displayed along the wall, producing a graphic, linear, division through the gallery space.

"I'm curious how work can adapt to a particular space or environment," says Pepper. "All of the holograms have been recorded in the UK over several years. These small 'chunks' of holographic volume are now being transported to the USA and reconstructed in a new environment. This aspect of moving space about always fascinated me when visiting the large group exhibitions which took place in the late 1970s and throughout the 1980s. There would be volumes of space from Japan, the USA, Australia, Germany, and all the other countries in which the artists and scientists had recorded their work. Until holography came along, people were never able to move space about in this way and, although it might not have been the main concern of the artists when they made their work, it is always an underlying consideration.

Figure 1. A view of the Sight Lines installation which was part of Pepper's solo exhibition Deep Shadows? at Gallery 286, Earl's Court, London, UK.

The aim of *Sight Lines Wall,* at the Butler, is to take these previously recorded volumes of space that hold the shadow of water patterns, themselves like abstract drawn marks, and display them as a single line that runs along one wall of the space within the Butler building. In the previous installation at Gallery 286, the metal plates framing and containing the small holograms were hung slightly above the floor and undulated across the gallery, with the final plate being buried within the gallery wall. The suggestion was that this line of hanging metal plates and holograms continued on under the Earl's Court Road (the main road on which the gallery is located), and possibly out into central London and beyond. "I am curious how the space in the Butler gallery will affect the installation of the holograms and their placement. Although I have been planning this exhibition for a while, with the Butler staff, and have provided them with descriptions and images of how the installation will look, they have been extremely generous in not pinning me down too much and allowing me to install the new installation once I've spent some time in the gallery space. Although it is always exciting to be invited to show work at a new venue, simply digging out the old familiar pieces and hanging them on the wall becomes uninspiring. UK Spaces' gives me the opportunity to not only show some 'familiar' works, but develop a new piece specifically for that site," says Pepper.

The water holograms, which make up part of *Sight Lines Wall,* are simple single-beam Denisyuk reflection holograms on glass. A sheet of clear glass was placed in the path of the recording beam, in front of the holographic plate, and liquid was smeared onto this glass sheet. Just before the recording was made, the liquid was moved with fingers being drawn through it so that a pattern of marks became visible. As this liquid was placed in the recording beam of the holographic setup, it cast its shadow onto the holographic plate and also onto a featureless background 2cm below the recording plate. Once processed, the holograms are rotated to display the pseudoscopic image, giving the impression that the liquid marks are in front of the holographic plate. Not only are the shadows of the liquid displayed just above the surface due to the pseudoscopic nature of the reconstruction, but their pattern is also visible as a graphic mark on the surface of the plate. Moving around in front of these holograms causes a kinetic effect as the shadow of the liquid appears to move over the static graphic patterns on the plate's surface.

Pepper's exhibition will run from May 28th-October 26th, 2003 at the Butler Institute of American Art, 524 Wick Avenue, Youngstown, Ohio 44502, USA.

For more details visit:
http://www.apepper.com/butler or
http://www.butlerart.com

August Muth: DCG Art Holographer

Over the past eighteen years. August Muth has created his art works using dichromated gelatin (DCG) holography. Introduced to form in New York City, he frequented the Museum of Holography and made contact with veteran DCG holographer Fred Unterseher. During his early years as a holographer he also spent time with Richard Rallison, a pioneer DCG holographer and inventor. As he continued to hone his skills, he formed Lasart Ltd., a vehicle to create small DCG works and jewelry that were produced at the DCG studio/laboratory in Norwood, CO. A native of New Mexico, he moved to Santa Fe in 1994 to re-establish and cofound a DCG laboratory/studio with artist Ana MacArthur. They supported the facility in part with Muth's designs in DCG jewelry and small sculpture. His work over the past eight years has focused on art glass sculpture, while MacArthur's focus has been the use of DCG with mixed media installations, hybrid art works, and sculptures.

Muth has developed and perfected techniques to produce DCG holograms with a proprietary archival procedure that he has continued to monitor over the past ten years. He has exposed his sealed holograms to a variety of environmental conditions including continual direct sunlight and temperatures ranging from over 100˚F down to minus 10˚F. Sealing techniques that isolate the DCG emulsion from the environment and chemical processing that largely prevents the degradation of the emulsion are two of the major components that render the results archival quality. Some of his art works in Manaus, Brazil—commonly considered rain-forest territory—have been routinely monitored over the past eight years.

In addition, he has also advanced broad-spectrum imaging, with both narrow-band and broadband color control. His color palette has a range of spectral colors including a unique broadband pink-white and a narrow-band deep ruby red. The scale of the work varies: but it isn't uncommon for him to produce works as large as 22 × 24inches. These achievements have made it possible for him to create extraordinary art work and offer his expertise to other artists.

The commissioned work is produced under a subsidiary of his company called The Light Foundry. An extended series/edition of DCG holograms is currently underway for the renowned *Light and Space* artist James Turrell. Muth first worked with the Turrell camp in 91-92 when he acted as a consultant on the initial development, and then helped with the production of a series of reflection holograms for a Turrell project organized by The Center for Contemporary Arts in Santa Fe. Turrell turned to DCG holography in 1996, and Muth began producing monoprint-type[1] DCG reflection holograms for him, resulting in art works that have been exhibited and purchased at galleries worldwide.

Figure 1. Expansive Reflections 15" × 8" × 7", August Muth 1998. Photo by August Muth.

Recently in 2000, reviewer Doug Harvey of the *LA Weekly*, commented that, "In spite of … market concerns, some of the big name artists also come through swimmingly. The slightness of Turrell's untitled minimalist glass hologram, for instance, is atoned for by its sheer loveliness." Turrell has a well-developed art career and often commands prices in the mid-five-figure range for a single piece of holographic art work. Muth has also worked with several art holographers including Patrick Boyd, Shu-Min lin, and the author, as well as collaborating with Ana MacArthur and Fred Unterseher. Works resulting from The Light Foundry may be either split-beam reflection, transmission, or Denisyuk reflection holograms.

Currently Muth's own art work takes the form of either large wall-hung works or glass sculpture. The sculptural works have multiple holographic layers, some with up to fifteen different layers of holographic emulsion on separate sheets of optical glass. The layers are laminated together and fashioned as a whole into a sculptural form using an assortment of cold-glass working tools. The wall-hung works are also composed of multiple layers. "The mysteries of light and of mind have always been part of my work since my early experimentation with water prisms," he commented, "and they extend to my current work ….. My progress in developing and refining processes and techniques in this demanding and challenging technology have allowed me to manipulate light into subtle forms. My most recent body of work involving the lamination of holograms on multiple layers of optical glass I refer to as *Time Capsules*, a reference to light as the vehicle of time." See Figure 1.

Muth's art work has been shown internationally and concurrently with such glass-art notables as William Morris at The Center for Contemporary Crafts, Houston, Texas. His work is also frequently exhibited at other art galleries that specialize in art glass such as Mostly Glass (Englewood, NJ) and Gallerie D'Art (La Jolla, CA). Muth received the prestigious Shearwater Foundation artist award in 1996.

Rebecca Deem

References

1. Moser, Joann. **Singular Impression: The Monotype in America,** p. 2, The Smithsonian Institute Press, Washington, D.C., 1997.

Holography with the human form

When I started working in holography I became captivated by the way that the medium transformed the human body. As I wrote in a previous article, the central theme of my work as an artist has always been the human figure: its beauty, its complexity, and its ability to express in gesture and movement the hidden realities that lie at the core of the human spirit and heart. When carefully observed, the body is but a thin shield, a permeable membrane that can obscure but not obliterate the psychological and spiritual dimensions of each person's aspiration to transcendence.

Figure 1. Descent.

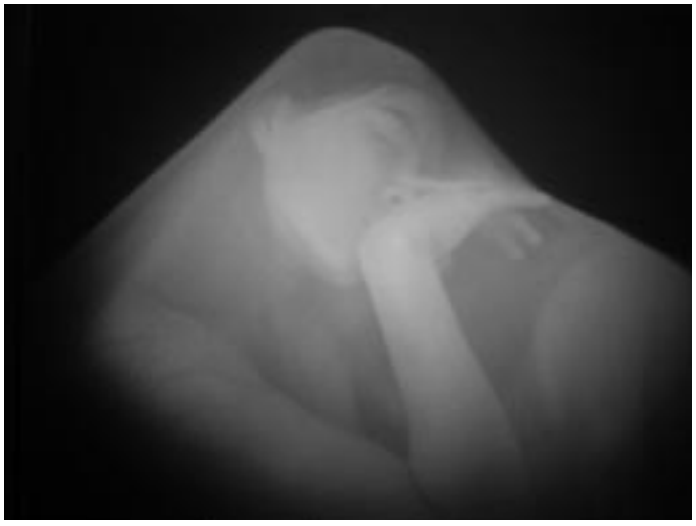

Figure 2. Cocoon.

The nude figures in my holograms are all engaged in the primordial journey that has been a constant theme of legends and myths. This journey takes us from a state of separation and individual isolation into a position of integration and illumination. It is the pilgrimage of the psyche from its descent into the abyss, the unconscious (see Figure 1, *Descent)* to a state of transformation and reintegration.

Figure 3. Awakening.

Some of the pieces in my series *Into the Night* represent angels in flight descending into matter. In others, nude figures are still encased in their cocoon, not yet awakened (see Figure 2,*Cocoon)*. Other figures with hair fanning behind them plunge into the world of the unconscious, while others stand transformed within a field of light (see Figure 3, *Awakening).* This came out of the work I did in portraiture for more than 20 years.

I have made portraits of the famous and the everybody and the power and impact of a holographic portrait never ceases to amaze me. The medium has the ability to capture on film a much deeper sense of the person than a photograph and can reveal the reality that lies behind the façade of personality.

My latest work combines hologram with video. *Water Dreams* (see Figure 4) consists of a hologram mounted on a screen with a rear-projected video of abstract water. In *Extase,* a hologram of a nude figure illuminated by laser light is standing in a field of light provided by the rays of fiber optic strands that extend from floor to ceiling.

In addition to my art projects, I have been the Director for the Center for the Holographic Arts for the last four and a half years. The Center was founded by the late Dan Schweitzer and

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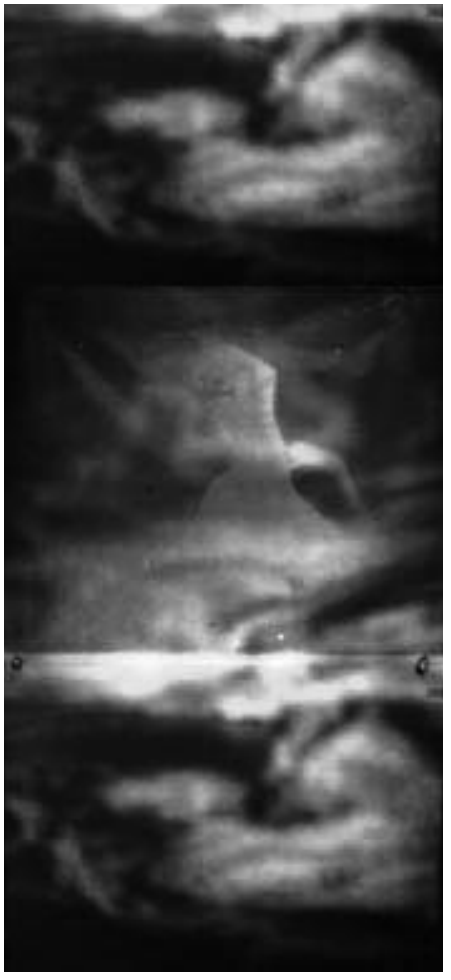

Figure 4. Water Dreams.

Researching the history of holography

Holography, in the half century since Dennis Gabor's seminal publications, has had a wide and varying impact. The technology has been repeatedly recast: from spartan beginnings by Gabor, to its high-tech revitalization by lasers as 'lensless photography' during the 1960s, to do-it-yourself sandbox know-how during the 1970s, to the mass-produced and ubiquitous embossed product today. Popular engagement with the new medium has also fluctuated. Booms of popular and artistic interest have as often been followed by the closure of studios and research groups.

A research project at the University of Glasgow, UK, has identified over 40,000 publications on holography, which include some 20,000 papers, 10,000 conference presentations, 7,000 patents, 1,000 books and 1,000 dissertations to the end of 2001.[1] Hundreds of exhibitions of holographic art around the world have had a comparable impact on public awareness. These published and displayed works have been the products of nascent communities of practitioners, ranging from the initial scientists and engineers of the 1960s, to artists and educators at schools of holography from the 1970s, to entrepreneurs during the 1980s. During that time, holographers have become increasingly self-aware about their special collection of skills, practices and markets. Creative holographers continue to struggle, however, for recognition beyond their community. Overall, holography has been a subject combining optimism and retrenchment, broad aims and narrow niches.

The University of Glasgow research is exploring the history of the peaks and troughs of holography, and the sociology of those who have conceived the subject. Some of the questions to be answered include:

- What factors have influenced the path of holography and its practitioners?
- Where has it achieved its greatest successes?
- Why did it fail to thrive in other domains?
- How does it broach the scientific-artistic divide?
- How typical is it of modern 'technoscience'?

These questions are part of a larger research program studying the historical interactions between academic science, industry and society during the late 20th century.[2-4] Among the topics of interest are the genealogy of technical development; the growth of communities of holographers; the history of research groups, funding, firms, schools, studios and galleries; the trajectory of forecasts for the new medium; and the influence of holography on popular culture.

This 'subject in the shadows' is being traced through its practitioners, the holographers who created modern holography, and the documentation that they have produced. The project is presently supported by grants from the British Academy, the Shearwater Foundation, the Carnegie Trust, and the American Institute of Physics Center for the History of Physics. This funding is enabling a wide range of practitioners to be interviewed. The disparate sources of funding hint at the specialist groups that make up the subject. Some of the oral histories will be archived by the AIP Center for the History of Physics, for example, and the Shearwater support is particularly helpful in researching art holography.

In addition, limited-circulation publications on holography such as exhibition catalogues are being accumulated for academic collections. Equally importantly, archives are being identified and investigated. These include the well-known MIT Museum collection of archives based on the documents of the New York Museum of Holography, which closed in 1992. Private collections are also important, because they reveal important complementary information about personal perspectives and experiences.

Holographers can assist this project in several ways: first, by granting extended interviews either in person or by telephone; second, by making known, and providing access to, unpublished information such as file collections, correspondence and photographs; and third, by publicizing this ongoing research to practitioners who may not be members of the SPIE Holography Group. As the aim of the project is to record a fully representative history of holography, additional funding is also being sought to enable access to further international sources.

The products of this historical research will include articles for specialist journals and wider readerships, and ultimately a book intended for a broad audience. This research is timely, because the first generation of practitioners will not be available indefinitely, and because the unpublished materials that many holographers have acquired are historically significant, ephemeral and increasingly rare. For these reasons the writing of an accurate history and the establishment of an archive of international holography are both important and pressing.

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Holography with the human form

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myself with grants from the Shearwater Foundation. The Center's mission is to facilitate and promote the art of holography. It offers Artist-in-Residence places and receives proposals once a year. Since our beginnings, more than 40 artists have created over 250 art pieces. The center provides me with great satisfaction: it is also great fun to collaborate with fellow artists and help them achieve their vision.

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Shadowy Figures: Chiaroscuro of early Italian Art transposed to a hogelvector hologram

Continued from cover.

ure.

The next critical issue to investigate was the role that architectural context played in interpreting Giotto, Masaccio and daVinci, something that could not be appreciated from reproductions scaled down for a book. To understand this fully, I traveled to Italy and viewed the works and related examples. The Giotto work is high on a chapel wall in Padua, near to a bright-blue, barrel-vaulted ceiling patterned with golden stars, intricate borders and circular portraits. Masaccio's fresco in Florence is in a far smaller chapel, and the figure itself seems almost life size and illuminated from the real window just to its left. The Leonardo is a small, detached drawing, which at arm's length reveals an intermingling of the linen texture of the actual surface and the graphic treatment of the fabric.

At the same time as I was observing the effects of scale and lighting, I was also noting the effect that the darkness within these art works was having on me as an observer. I compared my immediate impressions of Giotto, Masaccio and da Vinci to the analytical notes of Baxandall, the empathetic observations of Hills,[2] and the astute comments of Gage, and then considered how these filtered impressions could be reinterpreted through occlusion, retinal disparity, motion, relative size, convergence and accommodation.

I used many of Giotto's devices: framing to make a wide, flat, complex border of less-saturated hues around the figure, thus avoiding spatially cropping the figure as the viewer moves; neutral-hue twisted stone columns protruding front and behind to suggest that the figure is sculpture, which adds interest through occlusion; and, finally, rotating the overhead barrel-vault to form a vertical semi-cylindrical background containing the figure.

To achieve the transposition of darkness, I selected the most striking and original feature of each artists work and reinterpreted it within the synthetic holographic environment in the following way. The lighting of the Giotto figure is dependant on, and linked to, the position of the observer. Wherever the viewer is located, the illumination of the figure seems to originate from that point—the viewer is a light source and the shadow increases as the angle increases away from the perpendicular of the observers gaze. Masaccios lighting is fixed, originating from behind left of the picture plane and cast diagonally across the figure (on computer screens an identical positioning of shadows is used beneath pull-down menus). See Figure 1 (right). Leonardo da Vinci had comprehensive thoughts on darkness, the most exotic of which was that darkness was a force greater than light, which radiated in a similar manner. To convey this, a so-called negative light, a Maya software tool that sucks light out, was positioned in the viewer's space. See Figure 2 (left).

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Art Holography shown at Electronic Imaging Symposium 2003

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is currently exploring the impact of light: especially sunlight on the health and vitality of the human organism.

Unterseher presented two DCGs from the *Kinetic Yantras* series. They reflect his exploration of technical media and ancient sacred geometry. Technically, the holograms can best be described as off-axis, Fourier-transform-lens matrix, holographic optical elements (HOEs). The viewer may see one color with the left eye and a different color with the right eye simultaneously, which brings into question the process of seeing and what takes place in the eye/brain to create a coherent image. He describes his artwork as an exploration of the nature of light and its relationship to the ways we perceive and experience the world.

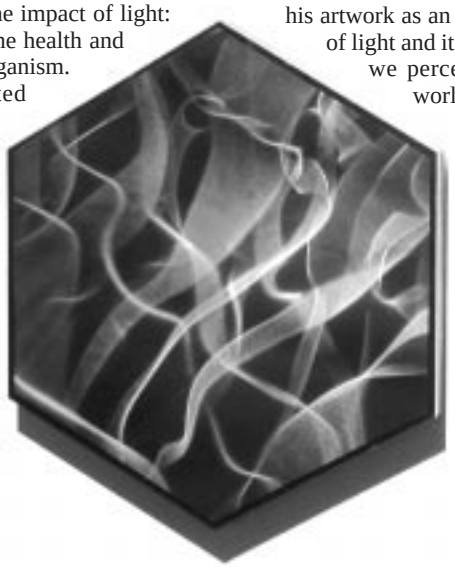

Figure 2. Cubic Fold #3, by Rudie Berkhout (2002). Red-and-blue, 11"×13", six-sided, reflection hologram.

Conners exhibited one multi-panel rainbow hologram entitled *The Caged Canopy*. The work included six of the initial eighteen holograms created for the installation piece of the same name. The landscape-based shadowgrams of plants enclosed in netting is a subtle expression of the concern for the destruction of the natural environment.

Schreiber's work consisted of long horizontal strips of 8"×10" rainbow stereograms. He describes the work, entitled *Uni*, as a shattered or non-linear action. Images repeat along each line of the holograms and on opposite sides of the glass, exploring the perception of content based on physical location. The Cardio Pulmonary Resuscitation *(CPR)* works are studies for a larger work-in-progress that will also focus on Life Support Systems. The work depicted CPR treatment administered between a couple and appeared ambiguous to some viewers.

Berkhout exhibited two works titled *Lift-off* and *Cube Fold #3* (see Figure 2). "By experimenting, I 'ask' the medium what its unique qualities are," he said. The imagery that unfolds are transformations of light through a variety of lenses, including holographic ones, "I isolate light patterns, movements and/or shapes and arrange them in real or virtual holographic space," he says.

Rebecca Deem

To see more (and color) pictures of the exhibition, please go to:
http://web.media.mit.edu/~sls/SPIE_Index.htm

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The International Society for Optical Engineering

Holography

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Art Holography shown at *Electronic Imaging* Symposium 2003

An exhibition of holographic art works took place at the *Practical Holography XVII* meeting as part of the SPIE and IS&T Electronic Imaging conference, held in Santa Clara, CA, in January of this year. At the same meeting, Dr. Tung H. Jeong, Professor Emeritus Lake Forest College and a long-standing supporter of art holography, chaired the *Practical Holography* conference. Part of the philosophy of this meeting has been to encourage artists to present papers, display their work, and interact with a broad range of holography professionals.

Figure 1. Speaking volumes, 26 × 17", Doris Vila 2000.

SPIE received a 2002 Shearwater Foundation award worth $10,000.00 to support the attendance of eight artists to the conference. Each artist's travel and expenses were covered by the grant and the conference registration fee was waived. Dr. Jeong organized the artist's participation while the physical exhibition was managed, designed, and mounted by Steve Smith, research engineer with the Spatial Imaging Group at the MIT Media Laboratory (Cambridge, MA).

Most of the artists showed reflection holograms with the exception of two artists who exhibited rainbow transmissions. Margaret Benyon, Rudie Berkhout, Shu-Minlin and Doris Vila showed silver-based reflection holograms using a wide range of techniques. Ana MacArthur and Fred Unterseher presented DCG reflections and Betsy Connors and Matthew Schreiber exhibited rainbow transmissions.

Benyon showed two holograms. The first, entitled *Cornucopia*, is a computer-morphed animation of images of coral appropriated from Ernst Haeckel's *Kunstformen der Natur*. Polymorphic 'tweening' of the two end images generates the hypothetical images in between. The master hologram was made at the Royal College of Art, London, with the assistance of Roddy Cañas. Her second piece, entitled *At the Still Point*, is an animated hologram of two cabbages spinning towards each other. This piece is about psychological time. The viewer controls the speed of animation: you move, it moves. "All of us—animal, vegetable and mineral—are rotating together once a day on this planet," Benyon reminds us. The title comes from a poem by T. S. Eliot: "At the still point of the turning world, there the dance is." The pulse-laser master hologram was made with the assistance of Dan Schweitzer and Ana Maria Nicholson during the first artist-in-residence (A-I-R) placement at the HoloCenter, NY.

Shu-Min Lin presented two pieces originated using multi-channel pulse-laser masters entitled *Chain* and *To accept reality is the first step....* He describes the later piece as a representation of brokenness, fragility and the binding together of people in their separate and inconsolable pain. The viewer can only see a few images at a time, leaving the others trapped in obscurity.

Vila's holograms spring from an image of tearing up a book, throwing it up in the air and trying to read the scraps of paper as they fall to the ground. *Speaking volumes*, 26"× 17", is a Diptych (two facing pages of a book). On the left, an infant's head peers into falling paper pieces. On the right page, drops of milk fall through an open atlas. In *Reading between the lines*, 17"×13", an art-history classic is opened for study with a hand-held magnifying glass and the ghost image of a blindfolded woman.

MacArthur showed two large-format DCGs entitled *The Unveiling*, 12"×14", and *The Unveiled Blackbody*, 24"×24". The former consisted of four fused hologram layers in a single multi-color creation. She describes herself as a "light artist" who has incorporated dichromated gelatin holograms into her mixed-media installations, sculptures, and hybrid art works over the past 17 years. Her interests vary from deep ecology and ancient Persian culture to the most recent works dealing with photobiology. She

Continues on page 9.

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