Casting Out the Self v3.1
By Lucy Soutter

When it comes right down to it, do you know how a digital image works? Could you explain to a child how an image captured from the world can be digitally heightened or altered? Or how a computer-generated image is produced? Of course, you do not need to know. For all its advantages, the digital age has alienated us from the inner workings of everyday machines, devices and processes. Constructed digital images have come to look ordinary to us now, "the new normal." While most of us have played around with Instagram filters or Photoshop effects, a tiny minority understands the technology that underpins them. Research scientists in technology graphics labs are the high priests of our new visual reality. The keepers of the mysteries. The rest of us just sit back and let the images wash over us.

Ritual, reality, performance and staging have been constant in Dominic Hawgood's art practice for the better part of a decade. His work has explored hypnosis, glossolalia (speaking-in-tongues), exorcism, shamanism and hallucinogenic drug trips. In every case, he has devised a mode of image making not merely to record an altered state, but to produce a visual analogue for it. Whether the objects and actions are genuine, staged, or somewhere in between, the work has an intensity that invites viewers themselves into altered states. Since 2014, the artist has focused not merely on images, but on environments; sculptural installations that envelop the audience with light and sound. As Hawgood's work has moved into 3 dimensions and moving image he has delved deeper into the digital realm, playing with the potential of realistic imagery untethered from the constraints of real-world physics or optics, and opening up an investigation of the means of digital image production. The resulting work focuses less on depicted content than on the experience of the viewer.

Casting Out the Self has been his most ambitious project to date, evolving like software though several different iterations, and oscillating between real and virtual forms. The ostensible subject matter is the paraphenalia found on the altars of urban shamans. These are the rattles, beads, pipes and idols used by those journeying in search of alternate worlds, with or without the assistance of mind-altering substances such as Ayahuasca or DMT. Key to the project is its equal reliance on imagery from the science of digital imaging and CGI such as 3D scanning rigs, or the chrome and black balls used to record the full spectrum of light for high dynamic range images (HDRI). The props of Ayahuasca and of the scientific imaging test are united in that they are both the apparatus for a ritual transformation: from this world to the shamanic world, from the analogue to the digital, from the real to the virtual.

Commissioned by online magazine POSTmatter in 2016, version 1.0 of Casting Out the Self exists only on the web. Viewers can watch an animation of a rotating Buddha (a favoured motif in the CG community) or zoom in and out of high-resolution still-life images featuring feathers, a bottle, a bone. The uncanny visual properties of the images are rooted in their making: rather than hiding behind a slick, pre-programmed surface texture, the CGI Buddha is skinned with a tri poly mesh surface that is both believable and bizarre. Black and white still lifes are rendered strange. Layers of the light have been separated so that highlights remain and scattering is removed. Like those on a shamanic or psychedelic trip, viewers see more than they would expect in these specular, spectral images.

The next version of the project, v2.0, took the form of an installation at Brighton Digital Festival and the British Science Festival in autumn 2017. The work came back to the gallery in both a real and virtual sense: installed in the exhibition, the digital animation offered an imagined show located within a detailed 3D render of the galleries at the FOAM museum in Amsterdam. The images and objects in the exhibition had been modelled rather than captured. The mind-bending complexity that had gone into this work was difficult for a viewer to grasp without knowing, for example, that the artist had worked from scratch to build a digital kaleidoscope or a moving lenticular image and then render them in three-dimensional space.

Casting Out the Self, v3.0 was the most embodied physical presentation to date, this time a sequence of room-sized installations in the actual galleries of FOAM in 2019 (although different rooms from those featured in v2.0). Works from previous versions of the project finally appeared in physical space. The Buddha from v1.0 appeared as a large projection, the lenticular image similar to the one in v2 could be seen in its actual shimmering glory. A 3D-sculpted foreshortened Buddha in an illuminated niche produced a strange floating effect thanks to carefully positioned LED lights. Rounding out the context for the project, an essay by curator Mirjam Kooiman, ranged across topics as broad as the mysteries of consciousness, "bullet time" visual effects, and the mechanics of lighting optics in relation to CG imagery.

In the context of the museum speculative objects took on an additional weight, the gravitas of the temple rather than the domestic living room or academic lab environment.

V3.1 is a pared-down selection of works from the Foam exhibition to highlight the core of the project. With this publication it offers viewers an additional layer of references from the artist, allowing them to look 'under the hood', so to speak. The light installation in the first room is an array of light pillars, drawing its inspiration from a rudimentary 3D scanning rig. The arrangement of reflective balls within is a reference to an emblematic example in the science of imaging: a collection of computer-generated spheres as used to illustrate an academic paper by imaging guru Paul Debevec. An altar to the source material for digital imaging, the piece hovers between object and experience.

The second room offers viewers a chance to experience first-hand the connection between the digital and the psychedelic. Riffing on Dr David Schwarzmann's research into "Induced Dissociative States" it offers a digital recreation of his experimental apparatus. Flickering at a particular frequency, the screens create mild visual hallucinations, digital phenomena taking the viewer beyond ordinary sensory perception.

Casting Out the Self is a shape-shifting project, dispersed across a number of platforms, reflecting the rapidly evolving landscape of digital imaging. The project also captures something enduring, the way that the uses of technology reflect deep human drives. We might come to understand more about the mechanics of computer imaging technology, but we will not entirely dispel its mysteries because they are our own.

"A strange odour prevailed as I inhaled the acrid smoke from the pipe, and fought to keep it down. Eyes closed, bronchi tingling, a low humming commenced as I rested with my head on my knees, and my heartbeat melted away. A wipe transition momentarily descended upon the scene, simultaneously flipping it upside down as I looked up. Darkness promptly followed, then exquisite light. Turning to the side I glimpsed a face dissolve into geometry, the voice crystal clear, razor sharp. This was ultra high definition, a new mathematical perspective, the digital realm."

Dominic Hawgood

Dominic Hawgood is a cross-disciplinary artist whose practice has emerged out of photography's expanded field, and progressed towards site-specific installation. His work spans both still and moving image, with an increased use of digital media informed through an interest in visual computing, perception, and the role of the lens within VFX. Since graduating from the Royal College of Art in 2014, Dominic has had solo exhibitions at TJ Boulting, London, UK; Oonagh Young Gallery, Dublin, Ireland; Brighton Digital Festival X British Science Festival, Brighton, UK; and Foam Fotografiemuseum Amsterdam, Netherlands. He has also won the British Journal of Photography International Award and been selected as a Foam Talent in 2015. Hawgood lives and works in London.

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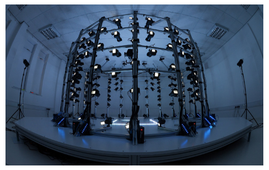


*Photo Credit: **ten24***

I've found scanning apparatus a source of much inspiration. The structures are fascinating, and in recent years there has been an influx in photogrammetric rigs, with companies offering all kinds of ingenious solutions for capturing people, objects, materials, and detailed surface texture. Often these involve complex multiple camera setups, programmed lighting solutions, and sophisticated software pipelines. Individuals such as Professor Paul Debevec from University of Southern California Institute for Creative Technologies Graphics Lab have been instrumental in the development of such capture systems, bringing the film and game industries together. Debevec and his team of computer scientists are renowned for their pioneering light stage work, most notably the Digital Emily Project, which leveraged latest-generation techniques in high-resolution photo-realistic face scanning, character rigging, video-based facial animation, and compositing.

The dissemination of this high-level research has undoubtedly helped educate the VFX community, and enthusiasts working in both stills and moving image. The affordability and advances in lens, sensor, computing, and lighting technologies has meant huge leaps forwards in realism, but it is still possible to achieve amazing results by applying concepts from these papers with the most modest of means. Individuals are now able to fabricate image capture solutions of their own, and rig builds have become a wild west of design, with a diversity in approach leading to projects ranging from the absurd and impractical to the most sophisticated and advanced.

I include as reference, a 3D body-scanning rig from ten24, a UK based scanning company. It demonstrates the scientific/ industrial/ technological look of a lot of rigs on the market, lighting systems that are intriguing in a sculptural way. I appropriated these aesthetics into the display of Casting Out the Self, and custom designed and fabricated lighting solutions of my own.

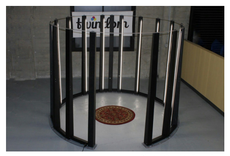


*Photo Credit: **Twindom***

Twindom is a company producing full body scanning rigs for creating low-resolution 3D models of people. It uses a similar approach to more technical capture systems, where a person is positioned in the centre of a camera array, and is photographed from 360 degrees. Here the photographic data assists in the generation of a low poly 3D mesh that is output ready for 3D printing, rather than for detailed texture creation to be incorporated into VFX pipelines. The configuration of this particular rig imparts a sense of the monumental, and I was drawn to the ritualistic nature of the arrangement.

Colour, luminance, and quality of light are factors that impact our perception of the world. Olafur Eliasson's Room for one colour (1997) is a good example of just how dramatic this effect can be, where monofrequency lamps mounted to the ceiling of a white room reduce the viewers' spectral range to yellow and black. In this instance if you shine a single wavelength of light you get a monotone effect. Effectively one is experiencing the world in grey scale, because our ability to perceive other colours requires the stimulation of cone cells, in varying amounts and at the correct wavelengths.

Our eye is populated with both rod and cones cells, of which rod cells are more plentiful and have far greater sensitivity, particularly to the blue-green region of the visible spectrum around 500 nanometers. The human eye has a wavelength response from around 400 to 700nm, with peak sensitivity at 555 nanometers (in the green region of the visible light spectrum). The transmission of light through the eye becomes progressively lower at shorter wavelengths, so in the blue-green region about 50 percent reaches the retina and at beyond that it drops off significantly.

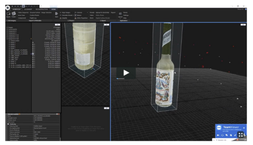
The images generated by rod stimulation alone are relatively unsharp and desaturated, so in twilight and low light conditions detail is harder to define. We know the human eye is much more sensitive to yellow-green, and less so to blue, and that the spectral quality of light effects how materials react. The LEDs in my exhibition are narrow band RGB, which give out an overall low intensity bluish light, creating a strong color but with a more monotonal image and softer color details. However the stronger rod response keeps the monotonal range clearly defined, and the effect is to a surreal, clinical feel.

*Photo Credit: **USCICT Graphics Lab***

These are the hands of Chloe Legendre, a computer scientist working on a paper called 'Practical Multi Spectral Lighting Reproduction'. It introduces a novel method of capturing and replicating light without the need of a spectrometer, and a light probe positioned alongside a configuration of nano colour charts is visible in the reference image. In this instance the mirror ball simply gives the reader a more accurate understanding of the scene, but if being used for HDR light probe capture then the black sphere ensures highlights do not clip.

Curious to learn more about this paper I set about reproducing the calculations, and building an algorithm in Matlab to analyse the exact readouts of a colour chart illuminated by LEDs. This required accessing data straight off the camera sensor prior to any logarithmic or camera curves were applied to the RAW file, and then solving a non-negative least squares calculations to compute necessary output necessary to drive and LED.

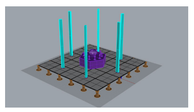
The research underpinning the USCICT paper concerns the spectral quality of LEDs, an important and overlooked aspect of contemporary imaging that is hugely misunderstood, and affects both stills and moving image. The spectral power distribution of an LED across the visible spectrum impacts the accurate rendering of materials, and is affected by the narrow band characteristic of phosphors used in LED technology. Colour render index (CRI) is a scientific measurement of select colour samples reacting to a specific light, and is supposed to help one better understand the performance of an illuminant. However, even this is not accurate, as light can appear the same to our eye, but have different spectral characteristics. If a material does not react well to certain wavelength, and a light source is missing that particular band, you run the risk of detail loss and poor colour replication.



Agua de Florida is cologne made in Peru, and widely used by shamans for purification, cleansing, and healing. It is believed to have protective properties that attract healing spirits, and is used in different rituals and ceremonies, including Ayahuasca. This product features on the front of this pamphlet, as well as in recent animation work of mine, and was digitally reconstructed for these purposes. Reproducing this bottle involved some complex scanning techniques and unusual work flows between various photogrammetry and 3D sculpting software. To maintain realism, the bottle was scanned and the labels digitally lifted off so that complex surface contours were retained which would have been difficult to model. For more accurate material capture, polarised light was used to extract diffuse label textures that were placed back onto perfectly UV unwrapped meshes. A new version of the bottle was precisely modelled to match the 3D scanned reference, and the labels positioned onto the digital object, exactly as they appeared in the real world.

*Photo Credit: **Centro Yachak***

This scene depicts an altar being used for the purposes of a Tobacco and Ayahuasca ceremony. The image was incorporated into my personal research, and became a key reference in the production of recent CG animation work that focused on the detailed construction of a ceremony, involving the 3D modeling and scanning of various objects.



In planning shows, including this one at TJ Boulting, I create detailed architectural representations of the gallery space, and accurate 3D visualisations of objects, sculptures, and installations. By creating detailed models with materials that are physically accurate, it becomes possible to more precisely predict the outcome of design decision. This kind of workflow is invaluable not only at the planning stage, but as a documentation of kinds, and a tool in the creation of further artworks.

*Photo Credit: **Saban 360***

The Saban 360 is a battery operated DIY photogrammetry rig designed by a small company. It is constructed from off-the-self parts that are simply bolted together, and runs off two programmed Arduinos, with custom LED light panels. In a 2017 digital reconstruction of Foam Fotografiemuseum, I decided to appropriate the design as a screen display system in a virtual gallery build. I identified the rig parts online, lifted the technical data, and 3D modelled each component that enabled me to accurately reconstruct my own digital version. The resulting 3d model was used in an animation work (v2.0) shown as part of Brighton Digital Festival x British Science Festival.

This test render is taken from a current animation that simulates a new imaging technology I have co-developed and fabricated with Jules Malcomson. The camera rig design can extrapolate information otherwise impossible to capture from conventional methods and can be used for both stills and moving image.

The image underneath is a self portrait captured using the rig, and below is documentation of the rig being tested at Direct Digital.

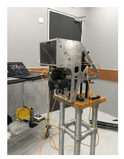


*Photo Credit: **Antoine Toisoul***

Antoine Toisoul's paper 'Image based lighting with office room environment' presents a novel technique to render objects under any arbitrary illumination. Written as part of the Advanced Computing course at Imperial College, the paper includes an image that demonstrates a connection I have been making between scientific imaging experiments and psychedelic ceremonies. In this scene a researcher moves a light around carefully arranged objects in an office environment set-up as a free-form light stage. The strange composition appears like a digital ritual.

*Photo Credit: **Charles Gatewood***

In 2017 I went to see Dr. David Schwarzmann (University of Sussex) who was at the time researching Lucia N°03 as part of his paper, EEG Functional Connectivity and Phenomenology of Induced Dissociative States. Lucia N°03 is a stroboscopic, scientifically researched lighting device, designed to evoke altered states of mind using flickering halogen lights. The product was developed with therapy and wellness in mind, and uses controlled patterns and varying frequencies of light to affect the visual, mental, emotional and physical state of the viewer. Having experienced a short session sitting in front of this machine, I was fascinated by the strong visual reaction I had, the intensity and clarity of the geometric patterns that formed in my mind, and the sensations I experienced. It had a distinct psychedelic flavour. In 1958 Brion Gysin, a painter, writer, sound poet, and performance artist, documented a similar experience:

"Had a transcendental storm of colour visions today in the bus going to Marseilles. We ran through a long avenue of trees and I closed my eyes against the setting sun. An overwhelming flood of intensely bright colors exploded behind my eyelids: a multidimensional kaleidoscope whirling out through space. I was swept out of time. I was out in a world of infinite number. The vision stopped abruptly as we left the trees. Was that a vision? What happened to me?"

In response to this experience, Gysin and his engineer friend Ian Sommerville went on to develop the DREAMACHINE, a cylinder with slits cut in the sides and a suspended light bulb at its centre, which was placed on a turntable and rotated. The rotating object projected light at a constant frequency that corresponded to alpha waves present in the human brain, creating a trance-like hallucinatory state.

When developing works for Casting Out the Self, I was looking for ways in which I could make a direct connection between the digital and psychedelic experience. I decided upon a flickering screen solution which used a custom coded Raspberry Pi, strobing randomly between 5 - 35hz so if you sit in front of the screen, eyes closed, face almost touching it, you can experience a subtle but altered state of consciousness.

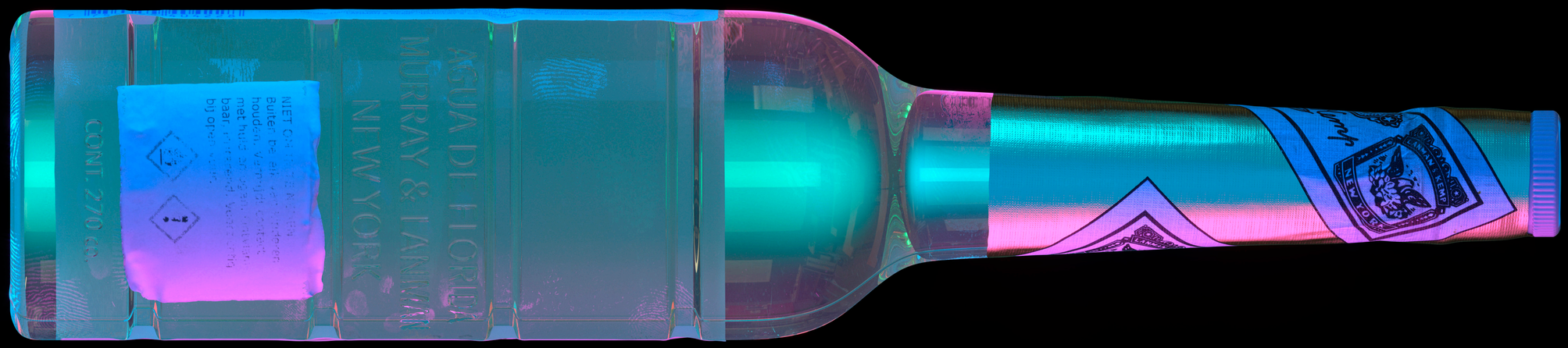
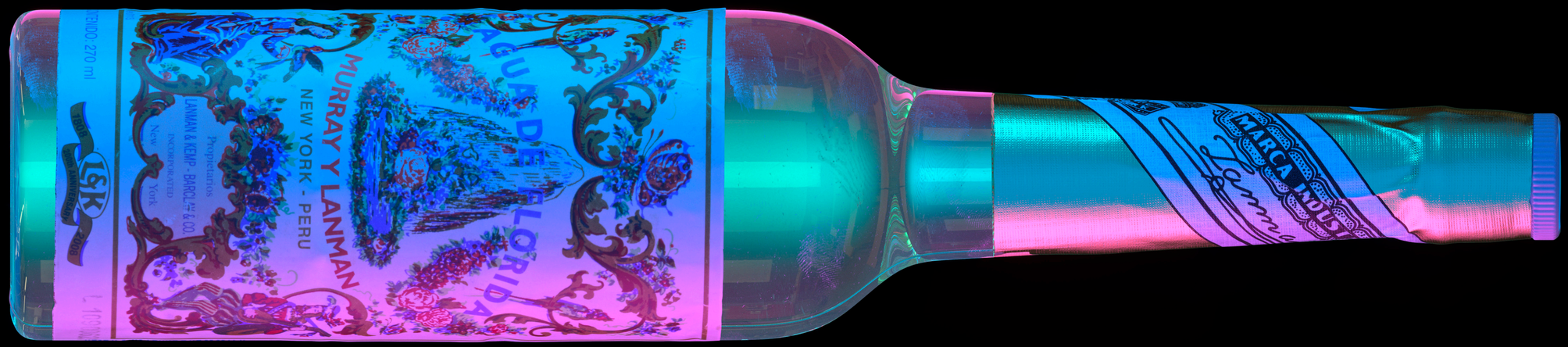
*Photo Credit: **Mind Foundation***

*Photo Credit: **Paul Debevec***

The sphere arrangement in my light installation was taken from a SIGGRAPH 98 paper by Paul Debevec called 'Rendering Synthetic Objects on to Real Scenes'. The high dynamic range (HDR) light probe image from Grace Cathedral, which records the incident illumination conditions at a particular point in space, is a recurring asset within his research. HDR images represent a greater range of luminance levels than a standard photograph, and are produced by combining several different, narrower range, exposures of the same subject matter. To accurately replicate lighting conditions in a scene, you require an HDR image that captures light from every angle converging on a single point.

One of the easiest ways to create a light probe image is to acquire an HDR image of a mirrored ball, or alternatively capture a 360 panoramic using a camera mount system. The captures are then either unwrapped or stitched together in software, depending on the process used, and an equirectangular HDR image output. At render time, it is then possible to project the captured light rays back onto 3D objects, a technique that drastically increases realism, although unlike the real world, the light lacks proximity, and is infinitely far away. The bearings used in the installation were purchased from McMASTER-CARR, a company from which Debevec sources his.

*Photo Credit: **Surface 360***

These are the plastic pedestals used in my installation. In a strange coincidence, a chrome sphere breaking a paving slab, appears on the company website.

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