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VOL 19 NO 3 VOLUME EDITORS **LANFRANCO ACETI, STEVE GIBSON & STEFAN MÜLLER ARISONA** EDITOR **ÖZDEN ŞAHİN**

Live visuals have become a pervasive component of our contemporary lives; either as visible interfaces that re-connect citizens and buildings overlaying new contextual meaning or as invisible ubiquitous narratives that are discovered through interactive actions and mediating screens. The contemporary re-design of the environment we live in is in terms of visuals and visualizations, software interfaces and new modes of engagement and consumption. This LEA volume presents a series of seminal papers in the field, offering the reader a new perspective on the future role of Live Visuals.

LIVE VISUALS

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The Encounter, Elif Ayiter, 2010, Screenshot of Cinematic Play Session in Second Life. © Elif Ayiter. Used with Permission.

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LEONARDO ELECTRONIC ALMANAC, VOLUME 19 ISSUE 3

Live Visuals

VOLUME EDITORS
LANFRANCO ACETI, STEVE GIBSON & STEFAN MÜLLER ARISONA

EDITOR
ÖZDEN ŞAHİN

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When Moving Images Become Alive!

"Look! It's moving. It's alive. It's alive... It's alive, it's moving, it's alive, it's alive, it's alive, it's alive, IT'S ALIVE!"
Frankenstein (1931)

Those who still see – and there are many in this camp – visuals as simple 'decorations' are living in a late 19th century understanding of media, with no realization that an immense cultural shift has happened in the late 20th century when big data, sensors, algorithms and visuals merged in order to create 21st century constantly mediated social-visual culture.

Although the visuals are not actually alive, one cannot fail to grasp the fascination or evolution that visuals and visual data have embarked upon. It is no longer possible to see the relationship of the visual as limited to the space of the traditional screens in the film theater or at home in the living room with the TV. The mobility of contemporary visuals and contemporary screens has pushed boundaries – so much so that 'embeddedness' of visuals onto and into things is a daily practice. The viewers have acquired expectations that it is possible, or that it should be possible, to recall the image of an object and to be able to have that same object appear at home at will. The process of downloading should not be limited to 'immaterial' digital data, but should be transferred to 3D physical objects. [1]

Images are projected onto buildings – not as the traditional trompe l'oeil placed to disguise and trick the eye – but as an architectural element of the building itself; so much so that there are arguments, including mine, that we should substitute walls with projected information data, which should also have and be perceived as having material properties (see in this volume "Architectural Projections" by Lukas Treyer, Stefan Müller Arisona & Gerhard Schmitt).

Images appear over the architecture of the buildings as another structural layer, one made of information data that relays more to the viewer either directly or through screens able to read augmented reality information. But live visuals relay more than images, they are also linked to sound and the analysis of this linkage provides us with the opportunity "to think about the different ways in which linkages between vision and audition can be established, and how audio-visual objects can be composed from the specific attributes of auditory and visual perception" (see "Back to the Cross-modal Object" by Atau Tanaka).

iPads and iPhones – followed by a generation of smarter and smarter devices – have brought a radical change in the way reality is experienced, captured, uploaded and shared. These processes allow reality to be experienced with multiple added layers, allowing viewers to re-capture, re-upload and re-share, creating yet further layers over the previous layers that were already placed upon the 'original.' This layering process, this thickening of meanings, adding of interpretations, references and even errors, may be considered as the physical process that leads to the manifestation of the 'aura' as a metaphysical concept. The materiality of the virtual, layered upon the 'real,' becomes an indication of the compositing of the aura, in Walter Benjamin's terms, as a metaphysical experience of the object/image but nevertheless an experience that digital and live visuals are rendering increasingly visible.

"Everything I said on the subject [the nature of aura] was directed polemically against the theosophists, whose inexperience and ignorance I find highly repugnant. . . . First, genuine aura appears in all things, not just in certain kinds of things, as people imagine." [2]

The importance of digital media is undeniably evident. Within this media context of multiple screens and surfaces the digitized image, in a culture profoundly visual, has extended its dominion through 'disruptive forms' of sharing and 'illegal' consumption. The reproducibility of the image (or the live visuals) – pushed to its very limit – has an anarchistic and revolutionary element when considered from the neocapitalistic perspective imbued in corporative and hierarchical forms of the construction of values. On the contrary, the reproducibility of the image when analyzed from a Marxist point of view possesses a community and social component for egalitarian participation within the richness of contemporary and historical cultural forms.

The digital live visuals – with their continuous potential of integration within the blurring boundaries of public and private environments – will continue to be the conflicting territory of divergent interests and cultural assumptions that will shape the future of societal engagements. Reproducibility will increasingly become the territory of control generating conflicts between *original* and *copy*, and between the layering of *copy* and *copies*, in the attempt to contain ideal participatory models of democracy. The elitist interpretation of the aura will continue to be juxtaposed with models of Marxist participation and appropriation. [3]

Live visuals projected on public buildings and private areas do not escape this conflict, but present interpretations and forms of engagements that are reflections of social ideals. The conflict is, therefore, not solely in the elitist or participatory forms of consumption but also in the ideologies that surround the cultural behaviors of visual consumption.

Object in themselves, not just buildings, can and may soon carry live visuals. There is the expectation that one no longer has to read a label – but the object can and should project the label and its textured images to the viewer. People increasingly expect the object to engage with their needs by providing the necessary information that would convince them to look into it, play with it, engage with it, talk to it, like it and ultimately buy it.

Ultimately there will be no need to engage in this process but the environment will have objects that, by reading previous experiences of likes and dislikes, present a personalized visual texture of reality.

Live visuals will provide an environment within which purchasing does not mean to solely acquire an object but rather to 'buy' into an idea, a history, an ideology or a socio-political lifestyle. It is a process of increased visualization of large data (Big Data) that defines and re-defines one's experience of the real based on previously expressed likes and dislikes.

In this context of multiple object and environmental experiences it is also possible to forge multiple individualized experiences of the real; as much as there are multiple personalized experiences of the internet and social media through multiple avatar identities (see "Avatar Actors" by Elif Ayter). The 'real' will become a visual timeline of what the algorithm has decided should be offered based on individualized settings of likes and dislikes. This approach raises an infinite set of possibilities but of problems as well.

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The life of our representation and of our visuals is our 'real' life – disjointed and increasingly distant from what we continue to perceive as the 'real real,' delusively hanging on to outdated but comfortable modes of perception.

The cinematic visions of live visuals from the 19th century have become true and have re-designed society unexpectedly, altering dramatically the social structures and speeding up the pace of our physical existence that constantly tries to catch up and play up to the visual virtual realities that we spend time constructing.

If we still hold to this dualistic and dichotomist approach of real versus virtual (although the virtual has been real for some time and has become one of the multiple facets of the 'real' experience), then the real is increasingly slowing down while the virtual representation of visuals is accelerating the creation of a world of instantaneous connectivity, desires and aspirations. A visuality of hyper-mediated images that, as pollution, pervades and conditions our vision without giving the option of switching off increasingly 'alive' live visuals. [4]

The lack of 'real' in Jean Baudrillard's understanding is speeding up the disappearance of the 'real' self in favor of multiple personal existential narratives that are embedded in a series of multiple possible worlds. It is not just the map that is disappearing in the precession of simulacra – but the body as well – as the body is conceived in terms of visual representation: as a map. These multiple worlds of representations contribute to create reality as the 'fantasy' we really wish to experience, reshaping in turn the 'real' identity that continuously attempts to live up to its 'virtual and fantastic' expectations. Stephen Gibson presents the reader with a description of one of these worlds with live audio-visual simulations that create a synesthetic experience (see "Simulating Synesthesia in Spatially-Based Real-time Audio-Visual Performance" by Stephen Gibson).

If this fantasy of the images of society is considered an illusion – or the reality of the simulacrum, which is a textual oxymoron at prima facie – it will be determined through the experience of the *live visuals becoming alive.*

Nevertheless, stating that people have illusory perceptions of themselves in relation to a 'real' self and to the 'real' perception of them that others have only reinforces the idea that Live Visuals will allow people to manifest their multiple perceptions, as simulated and/or real will no long matter. These multiple perceptions will create multiple ever-changing personae that will be further layered through the engagements with the multiple visual environments and the people/avatars that populate those environments, both real and virtual.

In the end, these fantasies of identities and of worlds, manifested through illusory identities and worlds within virtual contexts, are part of the reality with which people engage. Although fantastic and illusory, these worlds are a reflection of a partial reality of the identity of the creators and users. It is impossible for these worlds and identities to exist outside of the 'real.' This concept of real is made of negotiated and negotiable frameworks of engagement that are in a constant process of evolution and change.

The end of post-modernity and relativism may lead to the virtuality of truism: the representation of ourselves in as many multiple versions – already we have multiple and concurrent digital lives – within the world/s – ideological or corporate – that we will decide or be forced to 'buy into.'

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It is this control of the environment around us and us within that environment that will increasingly define the role that live visuals will play in negotiating real and virtual experiences. The conflict will arise from the blurred lines of the definition of self and other; whether the 'other' will be another individual or a corporation.

The potential problems of this state of the live visuals within a real/virtual conflict will be discovered as time moves on. In the end this is a giant behavioral experiment, where media and their influences are not analyzed for their social impact *ex ante facto*; this is something that happens *ex post facto*.

Nevertheless, in this ex post facto society there are some scholars that try to understand and eviscerate the problems related to the process of visuals becoming alive. This issue collects the analyses of some of these scholars and embeds them in a larger societal debate, hinting at future developments and problems that society and images will have to face as the live visuals become more and more alive.

The contemporary concerns and practices of live visuals are crystallized in this volume, providing an insight into current developments and practices in the field of live visuals.

This issue features a new logo on its cover, that of New York University, Steinhardt School of Culture, Education, and Human Development.

My thanks to Prof. Robert Rowe, Professor of Music and Music Education; Associate Dean of Research and Doctoral Studies at NYU, for his work in establishing this collaboration with LEA.

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My special thanks go to Deniz Cem Önduygu who has shown commitment to the LEA project beyond what could be expected.

Özden Şahin has, as always, continued to provide valuable editorial support to ensure that LEA could achieve another landmark.

Lanfranco Aceti
Editor in Chief, Leonardo Electronic Almanac
Director, Kasa Gallery

1. 3D printing the new phenomenon will soon collide with a new extreme perception of consumer culture where the object seen can be bought and automatically printed at home or in the office. Matt Ratto and Robert Ree, "Materializing Information: 3D Printing and Social Change," *First Monday* 17, no. 7 (July 2, 2012), http://firstmonday.org/ojs/index.php/fm/article/view/3968/3273 (accessed October 20, 2013).
2. Walter Benjamin, "Protocols of Drug Experiments," in On Hashish, ed. Howard Eiland (Cambridge, MA: Harvard University Press, 2006), 58.
3. " The point here is not to issue a verdict in the debate between Adorno and Benjamin, but rather to understand the debate between them as representing two sides of an ongoing dialectical contradiction." Ryan Moore, "Digital Reproducibility and the Culture Industry: Popular Music and the Adorno-Benjamin Debate," Fast Capitalism 9, no. 1 (2012), http://www.uta.edu/huma/agger/fastcapitalism/9_1/moore9_1.html (accessed October 30, 2013).
4. Paul Virilio, *Open Sky*, trans. Julie Rose (London: Verso, 1997), 97.

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Interactive Animation Techniques in the Generation and Documentation of Systems Art

by

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ABSTRACT

This paper summarizes the systematic processes employed by the artist and illustrates how interacting with digital data using live animation techniques is used to generate ideas and document visual decision-making in the creation of a piece of work. As an artist with a systems background, the author is interested in the borderland between systematic approaches to production versus intuitive experimentation through action art. In contextual terms he has applied this approach to environment and place, producing art from walks. He has named these System Walks. Collecting experience and information through walking in the System Walks is a personal attempt to bring the technological approach of spatial analysis in the forms of GIS and GPS along side the surrealist, aesthetic and impressionistic approach of visual art. This duality of objective and subjective is accommodated in the ideas of Psychogeography. The paper will give a brief overview of Systems Art, Psychogeography and Walking as art. It will then describe the art process of the author and the performative role interactive animation plays in the art production.

BACKGROUND

The author originally worked with remotely sensed satellite image data, and the development of Geographical Information Systems, (GIS), for environmental and development projects. He worked on large spatial database systems that compared social and environmental data against satellite images to find spatial and temporal patterns in natural and man-made activity. Subject specialists, such as soil scientists and social scientists each had their own methods for sampling, categorizing and presenting the data. The author was drawn to the way complex physical and social systems were integrated, modeled and visualized spatially and temporally. In particular he was interested in sampling, boundary and category issues found when cross-referencing the specialist data and the satellite images. For example how the, colour value of a pixel on a large satellite image could be attributed to changing phenomena on the ground, and how this can be represented with a clear delineated boundary. This would often involve checking the accuracy of the data by going out in the field and walking with a GPS and a digital camera, and seeing how reality at that point in time corresponded with the data. The author made such fields walks in South and Central America, the Middle East and Africa.

As part of the research process spatial and temporal patterns and phenomena in the satellite images were discovered that could not be explained by the model or systems derived from specialist fields. Visual patterns were discovered in the data through intuitive visual manipulation (such as animating the data over time) that could not be readily explained by subject specialists. The author questioned how such patterns could be perceived in the data, when the system (the scientific methods employed in the collection and organization of the data) could not support such findings. Thus the system that encompassed all the different data sets and methods required constant revision to accommodate the new results.

A hypothesis presented itself, which ultimately led into the field of systems art. It was that all the specialist models employed by the different professional fields were necessary abstractions of reality, specific to those fields, and whilst these models could be understood as offering a supportive framework to interrogate the data to a certain depth, ultimately the last step required an intuitive leap of the imagination. It was this borderline between a well-defined system and the transgression of the system that fascinated the author, and continues to fascinate him as an artist. How systems are revealed, revised, transgressed and fail. How phenomena is experienced, documented, abstracted and presented are ongoing concerns for the author.

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SYSTEMS ART

The artist's work can be understood from a Systems Art perspective, although it also draws from the procedural and performative approach of Abstract Expressionism and the conceptually driven land art of Richard Long and Hamish Fulton.

Systems have been identified within most disciplines and in simple terms can be described as a set of integrated elements that form a coherent whole. Kenneth Boulding noted, "a system is anything that is not in chaos. We could turn the pattern around and define a system as any structure that exhibits order and pattern." [1] Systems theory, as applied to art grew from a group of conceptual artists in the late 1960's, such as Jack Burham, Hans Haacke and Sol Lewitt, all of whom referenced Weiner's *Cybernetics*, and Ludwig Von Bertlanffy's *General System Theory* in their writing and work. Their work was concept driven and organised by rules, and although referenced or incorporated technology made a distinction between their conceptual art and art-and-technology (electronic art). Sol Lewitt's noted the divergence between conceptually driven cybernetic work and technology driven work in his essay "Paragraphs of Conceptual Art" (1967). [2] He described conceptual art as a quasi-mechanical process: "In conceptual art the idea of concept is the most important aspect of the work . . . [t]he idea becomes a machine that makes the art." Whereas electronic art was in danger of being uncritically focused on the materials and the spectacle of technology. As Sol Lewitt's stated "new materials are one of the great afflictions of contemporary art. . . . The danger is, I think, in making the physicality of the materials so important that it becomes the idea of the work (another kind of expressionism)." [3]

A key figure in Systems Art is the artist Hans Haacke. In 1971 he proposed a Guggenheim show in which a caged Mynah bird repeated the words 'All systems go.' Haacke could not train the bird to repeat the phrase

The systems artists made their methods explicit and the rules were central to the idea of the work, whilst the Abstract Expressionist did not explicitly acknowledge the role rules, and processes played in their work.

though, and the project was treated as a conceptual proposal. The suggestion in the title is that ultimately all systems are open, and subject to failure or uncontrollable external factors. In an earlier work, (*Chickens Hatching*, 1970), Haacke had created a controllable system that relied on a simple feedback system of lamps and thermostat to control the hatching of chicks. This contrasts with *All Systems Go*, as the later work relied upon a parameter that could not easily be moderated in a system; namely the bird talking. [4] These two works highlight the limits of controllable systems that contain variables that are difficult to predict and control. In particular the Mynah bird's free will, even contained within a clearly defined system is unknowable and uncontrollable.

It is also worth noting the art historical context of such work. The conceptual art of the systems artists, such as Sol Le Witt, can be understood as a generational revolt against the Abstract Expressionists that operated on a trail and error basis as they attempted to achieve grand but vague visual goals. This action led approach of the Abstract Expressionists in turn contained something of a revolt by referencing Impressionism, over, for example, Cubism. The underlying motivations though between Impressionism and Abstract Expressionists were different, as noted by De Kooning, "As the impressionists attempted to deal with the optical effects of nature, the followers [of Abstract Expressionists] are interested in the optical effects of spiritual states." [5] Whilst critic Clement Greenberg had largely dismissed the metaphysical interpretation of this work he held it in high esteem in formal terms. On the other hand the father of conceptual art, Marcel Duchamp, described Abstract Expressionism as a cult devoted to the material on the canvas and the apex of retina motivated art at the expense of ideas. [6] Thus he fuelled a new generation of artists to work primarily with the idea, it could be argued at the expense of the procedurally driven visual aspects of the Abstract Expressionist project.

Interestingly there was a process driven aspect of the work of Abstract Expressionists, which complimented the systems thinking developed by artists such as Sol Le Witt, Hans Haacke and Jack Burnham. This similarity was evidenced by the fact that rules and methods were employed by both groups of artists to produce a work. The fundamental difference was one of conscious acknowledgement of these systems. The systems artists made their methods explicit and the rules were central to the idea of the work, whilst the Abstract Expressionist did not explicitly acknowledge the role rules, and processes played in their work. Rather they attributed their success to the act and performance. Rosenberg in *The American Action Painters* (1952) described Pollock's complex work as "not a picture but an event." [7] The patterns being a visual record of Pollock's movement and the randomness of the paint he expertly managed. Pollock, like Rothko would make work in series, often re-working an idea. In much the same way that a jazz musician will repeat a jazz standard many times until he instinctively knows how to deviate from a standard. As Mark Rothko said, "If a thing is worth doing once, it is worth doing over again and over again, exploring it, probing it." [8]

The author's work has a dialectical relationship to the action painting of the Abstract Expressionist, and the conceptual art of the systems artist. The work is an attempt to have the freedom of the Abstract Expressionist enjoys through action, and working through a painting; whilst acknowledging and using the systems framework within which the art resides. As a starting point each work, series of works, or a system begins with a walk.

WALKING AS AN ART SYSTEM

Collecting experience and information through walking is an attempt to bring the technological approach of spatial analysis in the forms of GIS and GPS along side the surrealist, aesthetic and impressionistic approach of visual art. This duality of objective and subjective is accommodated in the ideas of Psychogeography. The origins of Psychogeography can be traced back, primarily to Paris and to Charles Baudelaire's 1863 essay, "The Painter of Modern Life" in which he

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described the Flâneur, "a person who walks the city in order to experience it." [9] The first major written work by a Flâneur practitioner was the unfinished *The Arcades Projects* by Walter Benjamin in which he documents in great detail his walks and interactions in the former arcades of Paris. This idea of the passive urban stroller was transformed in the 1920's by the founder of surrealism André Breton who used the urban stroll as a positive tool to challenge perceptions of reality. Over time the perceived failure of Surrealism to reform society through these methods new, more explicitly political groups developed that played on surrealist ideas. The Situationist International, under the direction of Guy Debord did much to define Psychogeography as it is understood today. At the heart of Psychogeography was the aim of combining subjective and objective knowledge and Debord attempted to resolve this inherent paradox in his 1958 book *Theory of the Dérive*. [10]

On another level the author's work references the performative aspect of conceptual land artists, such as Richard Long and Hamish Fulton. Long has contextualized his walking through a broad cultural history from Pilgrims to the wandering Japanese poets, the English Romantics, and contemporary long-distance walkers. [11] The underlying thread of each of these movements is that walking is a way of engaging with the world. Walking provides the means of exposing oneself to new, changing perceptions and experiences and of acquiring an expanded awareness of surroundings. Through such experiences, and through a deeper understanding of the places we occupy, we acquire a better understanding of our own position in the world. [12] Likewise the author's walks, although based on systems, (which can include geo-information, maps or socio-economic systems,) are a way of finding the point where he can transcend the system in both walking and mapping terms and express a deeper essence of the place, as articulated in Heidegger's conceptions of place and topology. [13]

Both Long and Fulton are concerned with the relationship between man and nature whereas the author is interested in how this relationship is mediated and represented through information in art and science. The work of Long and Fulton can be described in both performance art terms, as the act of the walk is central to the work, but also in conceptual art terms, as at the route of each walk is an idea. This idea maybe relatively simple, such as ' to walk in a straight line for 100 meters,' but without this idea the art does not exist. Their work though cannot be easily categorized solely as conceptual art, as the idea does not take primacy over the walk. The idea must be realized through the walk. "The relationship between the idea for a walk, the walk itself, and the physical evidence of the walk, is a fundamental issue in Long's art. While it is possible to identify these components singly, it is the interaction of these components that provides the fabric of his work." [14] This essentially distributed system of production and reception is instructive in understanding the walks of the author. As the work of art is distributed across, the idea, the walk, the collection of data, the manipulation of data, the production of the visual artifacts, and the reception of the constituent parts by the audience.

Thus despite the author's experience of data collection on a macro-scale through GIS and Satellite image processing techniques he has chosen walks as it is a direct way of experiencing a place qualitatively, and a useful way of capturing data quantitatively, due the relatively slow movement through space. Returning to the idea of systems art, a walk can be defined as an art system that produces outputs, which in turn is representative of both the environment and sense of place. The walks made are a solitary performance that is recorded. The art work made from the walks are a culmination of organizing and interrogating the recorded information in a systematic way, and then transcending this order to make controlled but spontaneous decisions during the live interaction processes.

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METHODOLOGY

The System walks are conceptual art in the sense that they are based on an idea. These ideas may have a formal or conceptual basis. For example certain walks are repeated in different environmental conditions to capture the changes in light and flora. Whilst other walks are part of a broader conceptual idea in relation to methodology or society. The System Walks though are more than the conceptual idea, as the walk and production of the artwork from the walk are integral to the work; to form a complex distributed system. A System Walk, for example, may consist of six definable parts, such as the idea, the walk, the data derived from the walk, the live interaction with the data to produce art works, such as prints and films and a film documenting the interaction. In addition the surrounding reception, such as the compulsion of the viewer to re-imagine the walk, could be included as a constituent part of the system. Thus these works can be considered as distributed systems, as they consist of discrete but interdependent parts of a whole. The final art 'works' of films, prints, and paintings should be considered as system outputs of a system that was created to structure and evaluate the experience of the walk and idea. The stages of a typical system walk will now be summarised, highlighting the key part gestural computer input devices such, as drawing tablets and MIDI controllers play in the production of the work in real-time.

THE WALK AND DATA CAPTURE

A system walk may follow a pre-defined route that is decided upon in advance. An example of this is the ongoing series of walks in the northwest of Scotland, through mountains, such as Stac Pollaih, Suilven, and Cul Mor. Due to the wilderness conditions the route waypoints are pre-installed in a GPS unit, to act as an approximate guide. Other walks, usually in urban environments, may not follow any predefined path, and operate more as psychogeographic strolls in the city. An example of this is a series of random walks in the Balat district of Istanbul in Turkey. In both the pre-mapped and free walks the GPS unit is carried to log key information, such as path coordinates, altitude, distance and speed. Depending on the work being made all this information is potentially valuable. A specialist GPS unit, (Garmin GPSmap 62s) is favored to capture the route over a smart phone with GPS capability, as the GPS is more accurate, will not lose the satellite signal and has professional mapping software and GIS support. A small waterproof time-lapse camera, (GoPro Hero), is worn on the chest using a secure harness, leaving the hands free to negotiate obstacles. The camera is programmed to take a photograph at designated time intervals, such as every 10 or 20 seconds. The timings are synchronized with the GPS to log the positional information of each image. The wide-angle lens of the camera automatically captures the whole panorama of the landscape. This removes the 'authorial intent' from the process, as the artist cannot make compositional and framing decisions. This is important, as at this stage the camera is merely sampling the colour values, whilst independently the artist experiences the walk, unencumbered by the need to manage, edit, or curate the experience.

STUDIES IN COLOUR

On return to the studio the sequences of still frames are turned into stop-motion films and are used as the basis to produce all subsequent art works. It is at this stage that the intent of the artist comes into play as he extracts colour and meaning from the imagery captured during the walk. The artist has designed a computer-based system, developed using the Touch-Designer software, to allow the colours and positional information to be extracted from the film interactively. The film runs through each frame slowly, at a frame

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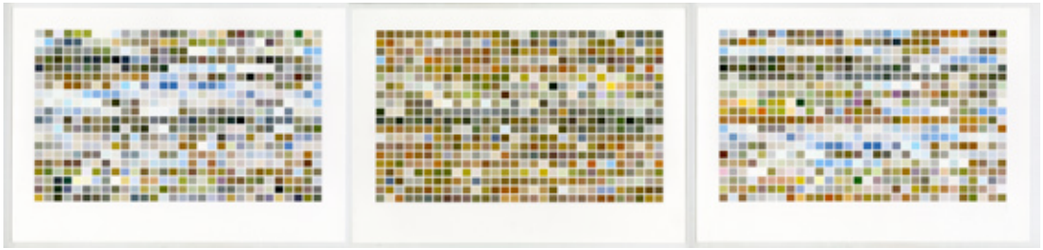

Figure 1. *System Walk: The Three Brethren*, (3 iterations), Paul Goodfellow, 2012, Epson K3 ink on paper and on paper, Aquarelle Rag. Each work 310 gm, 420mm × 594mm. © Paul Goodfellow, 2012. Used with permission.

rate of 1 frame per second. Therefore each second of this process is equivalent of 10 seconds of the walk, based on a 10 second time-lapse sequence. Therefore it would take one hour of interaction to run through a film of a ten-hour walk. This process is engineered to force a more intuitive and direct interaction to the material. The frame rate can be adjusted interactively in real-time, to allow the artist to have the optimal dynamic relationship with the material. If the material runs too slowly it may give too much time to ponder each frame, for example in compositional terms. If it runs too quickly it will give insufficient time to make the correct aesthetic selections of colour.

The selection of colours is made using a drawing tablet and pen. A continuous line is drawn across the film using a digital drawing tablet for the duration of the film. By directing the pen across the screen the RGB values are sampled, one for every frame. This process can be repeated indefinitely until the work feels complete. These can be turned into an animation that shows the progression of the walk through the addition of the abstracted blocks of colour, or can be printed as fixed abstracted maps or landscapes.

In the first set of example work the sampled colours are laid out as a grid of colours, starting in the upper left hand corner of the screen working down the screen from left to right. Figure 1 shows 3 versions of the work based on same walk from the Scottish Borders town of Selkirk to a group of large cairns, dating from the sixteenth century called to the *Three Brethren*. An interesting aspect of the work is that each iteration of the work derives a different range and composition of colours. Thus giving a direct record of how the artist interacted with the material at that point in time.

In the second Figure the same process of real-time sampling takes place, but this time the colours are saved as spots of colour. The film is shown on two screens. From one screen the colours are sampled using the tablet, and on the second the spots are superimposed onto the film. As the film progresses the image is obscured by the spots. The size of the spots is controlled in real-time with a midi controller that allows the spots to be scaled in real-time. This adds a compositional and an additional aesthetic element to the work. Again the process of interacting with the work allows the artist to become familiar with the material and process new colour selections and compositions with each iteration. Figure 2 shows several photographs produced from a walk in Berlin that has

Figure 2. *System Walk: Berlin,* (4 photographs from series), Paul Goodfellow, 2010-ongoing. Epson K3 ink and on paper, Aquarelle Rag. Each work 310 gm, each photograph 285mm × 290mm. © Paul Goodfellow, 2010. Used with permission.

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been repeated a number of times since 2010. The walk has been repeated in various weather conditions and at different times of the year.

In the third Figure the same process of real-time colour sampling takes place, but this time instead of selecting solely on colour, elements of the photographs are also selected. These sampled elements of interest are extracted as spots. On one screen the spots of the photograph are sampled using the tablet, and on the second the spots are overlaid on a white canvas, as you would in a collage. As the film progresses the white canvas is filled with overlaid photographic elements. The size of the elements is controlled with a MIDI controller that allows them to be scaled in real-time. Figure 3 shows stills from a walk made in the Balat district of Istanbul.

These pieces work like collage, layering the generated shapes, in an attempt to avoid the art historical baggage that comes with gestural painting. It is inevitable that gesture plays a part in the work, but this happens at the digital stage and is centered on the hand movements with the controller and tablet. In Bataille's *History of Modernism* he described collage as one of the key acts of creative decomposition: the killing of painting. [15] Joan Miro, another artist who employed collage techniques mischievously declared: "I want to murder painting." [16] This approach to painting with

Figure 3. *System Walk: Istanbul,* Paul Goodfellow, 2011–12, stills from digital film. © Paul Goodfellow, 2011. Used with permission.

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colour is not an attempt to kill painting; rather an attempt to pin down what is systematic in construction process.

In the final, more visually complex example, colours are again extracted from the images, but this time the shape that represents the sample is controlled by other data, such as altitude, temperature, or speed. The shape is based on the idea of the Superellipse, proposed by Johan Gielis, also known as the Superformula, and is controlled by these other factors, such as altitude. Again one screen shows the film to be sampled, whilst the second shows the evolving composition. This work can be repeated indefinitely to produce evolutionary films and completed compositions. Figure 4 shows work produced from a walk in the rough terrain of Applecross in Northwest Scotland to the old settlement of Airigh-Drishaig.

Uniting all these works are two underlying principles. Firstly they are all produced from clearly defined systems that deal with sampling spatially collected colour values. Each system is designed to allow the artist to make spontaneous, intuitive decisions about colour selection and these selections are visually captured. Secondly all of the work has two or more distinct temporal dimensions. The initial data is collected in a specific space-time, and then the data is manipulated in a second space-time. Each work produced captures both the original material and how that was mediated through the second space-time of the production. The final set of works in Figure 4, *System Walk: Airigh-Drishaig,* are to some degree different in that the system is more complex and can be seen as

Figure 4. *System Walk: Airigh-Drishaig*, (3 iterations), Paul Goodfellow, 2011-ongoing. Pencil, ink and gouache on paper, Aquarelle Rag. Each work 310 gm, 420mm × 594mm. © Paul Goodfellow, 2011. Used with permission.

either accommodating hand drawn elements, or that the system has been transgressed by the hand drawn elements and consequently the system is need of revision.

CONCLUSIONS

The aim of the author's work on one level is to capture the essence of a walk, a landscape and sense of place in abstract art work produced using systematic techniques. On another level he is interested in the way the spontaneous decision-making is taking place within this strict framework, and how these intuitive decisions can be documented through animation.

This paper has described how interactive animation techniques are used to manipulate the data to produce new work, but also captures in real-time these intuitive decisions being made in the works creation. There is no such thing as a perfect model in the real world that perfectly reflects the phenomena it seeks to represent, as there will always be variables that you cannot account for. A system therefore can only be an approximate model of the real world. These abstracted works can therefore only be an approximate model of the walk, landscape and sense of place, but through

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repeated interaction, can still be an accurate model of how the artist reflected upon the walk and the data the walk produced.

In Walter Benjamin's essay "The Work of Art in the Epoch of its Technical Reproducibility," [17] he notes that whilst technology has long been a part of human society modern technology transforms the spatio-temporal coordinates of experience. He uses the Lithograph to illustrate this point noting that whilst it is capable of producing many copies of a work each will be unique to the time and place it was produced due to the inherent variability in the process. Like wise the systems employed here to produce these works in real-time captures a unique work, that whilst based on the original source material is specific to the response to the material and the gestures employed at the time of interaction. Technology is therefore not merely reproducing the images produced during the original experience of the walk as it is mediated by the second space-time experience of the interaction to produce something original each time the interaction takes place.

The work discussed in this paper is both the product of the artist applying, (and enjoying the benefits of applying), systems methodology within an art context. Whilst at the same time inherent within this work is an explicit acknowledgement of the limits of applying a rigid methodology that cannot accommodate change. The work illustrates the difficulty of the artist to remain with the rules of the system, and therefore any given system needs to be revisable. That is, due to spontaneous, aesthetic, or sub conscious decision-making the artist, however disciplined will inevitably transgress the system. The work produced during this spontaneous transgression may of course be the most interesting, and the methods employed by the artist are designed to capture and record these transgressions, and evolve the system further to incorporate these changes. In this way more of the instinctive decision-making of the artist is made explicit, understood and incorporated back into the system.

In allegorical terms the work reflects back to the original systems science research of the author, and attempts to highlight that it is inevitable for a system, model or theory to evolve due to ideas that cannot be fully accommodated in the present system. There have been examples in recent scientific research, such as the handling of climate change data, where the transgression of a model, methodology or system is not explicitly acknowledged due to social, institutional or even philosophical reasons. Likewise the adherence to flawed economic models that are not accommodating, or modeling accurately the spontaneous intuitive decisions being made by economic traders has contributed to the widespread financial crisis of most western economies since 2008. The author contends that it is the responsibility of the systems artist to embrace systems thinking in order to highlight the limitations of this approach. ■

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