



St James Hatcham Church Gallery
Goldsmiths, University of London
Open to Public, 7—14 November 2014
Open Daily 10.00am—18.00 (GMT)



Goldsmiths
UNIVERSITY OF LONDON

FOREWORD

A major exhibition exploring the twilight world of human/machine creativity, including installations, video and computer art, Artificial Intelligence, robotics and Apps by leading artists from Goldsmiths and international artists by invitation.

The vision for organising the Creative Machine Exhibition is to show exciting works by key international artists, Goldsmiths staff and selected students who use original software and hardware development in the creative production of their work.

The range of work on show, which could be broadly termed Computer Art, includes mechanical drawing devices, kinetic sculpture driven by fuzzy logic, images produced using machine learning, simulated cellular growth forms and the self-generating works using automated aesthetics, VR, 3D printing, and social telephony networks.

Traditionally, Computer Art has held a maverick position on the edge of mainstream contemporary culture with its origins in Russian Constructivist Art, biological systems, “geeky” software conferences, rave/techno music and indie computer games. These artists have defined their own channels for exhibiting their work and organised conferences and at times been entrepreneurial at building collaborations with industry at both a corporate and start-up level (with the early computer artists in the 1970s and

1980s needing to work with computer corporations to get access to computers). Alongside this, interactive media art drew upon McLuhan’s notion of technology as extensions of the human to create participatory, interactive artworks by making use of novel interface technology that has been developed since the 1980s.

However, with new techniques such as 3D printing, the massive spread of sophisticated sensors in consumer devices like smartphones, and the use of robotics by artists, digital art would appear to have an opportunity to come more to the fore in public consciousness. This exhibition is timely in that it coincides with an apparent wider growth of public interest in digital art, as shown by the Digital Revolution exhibition at the Barbican, London and the recent emergence of commercial galleries such as Bitforms in New York and Carroll/Fletcher in London, which, acquire and show technology-based art.

Computer Art has many subcategories and within this exhibition we focus on six of these in which we can include the artists as follows:

1. **Mechanical Creative:** Balint Bolygo, Ian Gouldstone, Felix Luque Sanchez, Alex May & Anna Dumitriu
2. **Robotic Drawing and 3D Printing:** Cecile Babirole, Daniel Berio, Damien Borowik, Jon McCormack, Patrick Tresset
3. **Machine Image/Sound:** Memo Akten, Simon Colton, Brock Craft, Lillevan, Manu Luksch, Parashkev Nachev, Adam Parkinson, Vesna Petresin, Quayola, Peter Todd

4. **Mutation Art:** William Latham, Andy Lomas, Naoko Tosa
5. **Pioneers:** Paul Brown, Ernest Edmonds, Yoichiro Kawaguchi
6. **Critical Practice:** Harwood/Wright/ Yokokoji

Brief Introduction to the Artists and their Work:

Bálint Bolygó is a young artist originally from Hungary who lives in London and who works with metal, wires, pen and ink, light, various surfaces, materials and textures, computers, and builds animated artefacts at the crossroads between engineering and art. Balint has been exhibited internationally, in Europe and North America, and is a regular contributor to the Kinetica Art Fair in London.

Ian Gouldstone is a BAFTA-winning filmmaker and videogames designer, originally from NYC. In 2010 Ian cofounded with David Surman Pachinko Pictures, an award-winning boutique games studio based in London. Ian is a graduate of Harvard (Mathematics) and the RCA, and is now working towards his PhD in Arts and Computational Technology at Goldsmiths.

Félix Luque Sánchez, originally from Spain, is a new media artist now based in Belgium. Felix brings us his double pendulum piece driven by fuzzy logic in which we see a pendulum appear to lose concentration and drop, reminiscent of 1970’s kinetic art with a fiercely techno angle.

Alex May and **Anna Dumitriu** are the UK-based artist duo presenting the Robot artwork *HARRI My Robot Companion* previously shown at Bletchley Park, the Watermans Gallery, the Science gallery in Dublin, and other venues, which adds a figurative element to the show combining surveillance cameras and robotics together in one piece with an uneasy and quirky presence. Alex works with code, video mapping, performance, and creative technologies; Anna’s work blurs the boundaries between art and science with a strong interest in ethical issues raised by emerging technologies and their impact on society.

Cécile Babirole has a dual background in computer graphics and experimental music. In the 1980’s, following work in architecture at the French Minister of Culture, she founded and was bass player in the French industrial music band, Nox. In the 1990’s she was an early specialist in 3D computer graphics, creating imagery for television channels such as Arte and performing live 3D graphics with ultrasound gesture-sensing in the trio, Sensors_Sonics_Sights (which included Atau Tanaka and the late Laurent Dailleau). *Copies Non Conformes* takes a classic school punishment phrase, adds generational loss reminding us of copies of copies of cassette tapes, to invite us to think about the dictum, “I should not copy”, in this age of surveillance, piracy, and privacy concerns.

Daniel Berio is a young graffiti artist from Florence, Italy, who has a background as a games programmer and multimedia practitioner. A recent graduate of the Royal Academy of Art, The Hague (Netherlands), Daniel has now joined the Computing Department at Goldsmiths, within the new IGGI Doctoral Centre, to pursue his research ideas at the frontier of graphical designs and

computerised machines he calls *graffitizers* that can extend his graffiti art practice while making it possible to obtain greater insights in the creative practice itself.

Damien Borowik is a recent graduate of Goldsmiths’ MA Computational Arts Course (2013). Damien originally focused on painting, then increasingly used performing drawing machines (one of which is in the show) to create and present his work, which has been exhibited at the London Kinetica Art Fair in 2013; more recently he held a residency at Samsung in Seoul, in South Korea.

Jon McCormack is an electronic media artist, theorist and computer science researcher from Australia. Jon has created many virtual worlds and evolutionary art and musical entities since the 1990’s, such as Eden, which have been exhibited internationally. In Creative Machine he presents some earlier works which use large-scale cellular automata to generate rule-based drawings reminiscent of Audrey Beardsley’s black and white line illustrations. McCormack is an associate professor at Monash University, a Visiting Research Fellow at Goldsmiths, in the Computing Dept. and was until recently an artist in residence at Ars Electronica in Linz, Austria.

Patrick Tresset is a French artist, who after a period of studies in art and programming, moved to London in the mid 1990’s to further develop his practice. More recently, in the course of his master and doctoral studies at Goldsmiths he has developed a research agenda at the crossroads between visual perception, AI and computer vision, non-photorealistic rendering and robotics (project Alkon: www.aikon-gold.com). This led him to create *Paul* the robot, an extension of Patrick (the artist) in the form of

a creative robotic drawing entity. *Paul* has seen its work exhibited internationally and the Tresset’s projects have received worldwide attention in the media. Patrick was awarded the Lumen Bronze Prize 2014.

Memo Akten was born in Istanbul, Turkey and initially trained as a mechanical engineer. As an artist-developer, he has released code libraries and mobile apps that allow embodied interaction with common-day consumer devices. He has applied his knowledge of physics to particle systems in gesture painting systems (Body Paint) presented in creative settings as interactive installations. Noticeably, Laser Forest has been exhibited at the Barbican’s Digital Revolution exhibition, and *Forms* received the Golden Nica in Computer Animation/ Visual Effects of the Prix Ars Electronica 2013. Memo has recently joined Goldsmiths to embark on a PhD within the new IGGI doctoral centre.

Simon Colton’s work is an AI rule-based system, often referred to as *the Painting Fool*. Colton first started work on this project when he was on the faculty of the computer science department at Imperial College. He then moved to Paris to develop his artistic ideas while visiting the Sony Labs. Colton has since joined Goldsmiths. *The Painting Fool* has an on-line presence and has been performing live at various international venues (www.thepaintingfool.com).

Brock Craft is a lecturer in physical computing at Goldsmiths and is also a senior tutor in Information Experience Design at the Royal College of Art. His work has centred on interaction design and usability in a variety of domains including Human-Computer Interaction, Product Design, Digital Art, and Learning.

In the exhibition Brock shows a piece made of software-driven dynamic LED lights which is continually changing and mutating.

Lillevan studied politics, film and film theory, writing scripts and being very active in the film & animation scene in the late 80s and early 90s. After a period of soul-searching, coupled with new and affordable technologies, he came back into the world of moving imagery. Lillevan recontextualises, combines and politicises existing film images and fragments. The selection of images can either support the soundtrack, or work against it, the aim being to achieve a dialogue. Some film doesn't need sound, the images producing the rhythms, and propelling the viewer into a psycho-visual-composition.

Manu Luksch is an intermedia artist whose practice interrogates conceptions of progress through the devising of tools and frameworks and the instigation of processes, with a strong emphasis on research and collaboration – often with groups whose experience and expertise is under-recognised. She is founding director of ambientTV.NET, a crucible for independent, interdisciplinary projects at the intersection of art, technology and social criticism. Her focus is on the effects of emerging technologies on daily life, social relations, urban space and political structures.

Vesna Petresin is a Fellow of the Royal Society of Arts who trained as an architect earning a PhD in 2002 with a thesis on the temporal aspects of composition in architecture, art and music. She is a research fellow to Cecil Balmond (previously the Deputy Chairman of Arup). She founded *Rubedo* in London in 2005, together with artist and film director Laurent Paul Robert, as an

art practice and a think tank. Vesna has an international career as an academic, a performing artist mixing the digital and the real and as a designer of advanced concepts in architecture and the visual arts. She is currently an artist in residence at ZKM, Centre for Art and Media, in Karlsruhe, Germany.

Quayola is a visual digital artist from Rome now based in London. He investigates dialogues and the unpredictable collisions, tensions and equilibriums between the real and artificial, the figurative and abstract, the old and new and in this exhibition shows his print work *Rubens Venus Adonis 1* based on the Rubens painting. Quayola's work has been widely exhibited at the Venice Biennale; Park Ave Armory, New York; Grand Theatre, Paris; Sonar Festival, Barcelona; Elektra Festival, Montreal and the Clermont-Ferrand Film Festival. His work *Forms* with Memo Akten, received the Golden Nica in Computer Animation/Visual Effects of the Prix Ars Electronica 2013.

Peter Todd, a young British artist and programmer based in Winchester who holds an MSc Arts Computing from Goldsmiths. Peter uses fractals with a Virtual Reality interface and his work is reminiscent of a 3D "Escher-like" worlds, as it immerses the viewer in a psychedelic experience.

William Latham in his Interactive *Mutation Space* Computer/Video Installation shows evolving complex organic forms driven by a Kinect sensor and touchscreen set of interactions and large-scale printed translucent curtains. *Mutation Space* also includes new work with the auto-aesthetic selection of bred organic form variants by the computer. William is a pioneer of Evolutionary Computer Art, which he started to explore and establish

as a new art form in the mid-1980's when he was a Research Fellow at the IBM UK Scientific Centre in Winchester, collaborating with mathematician Stephen Todd.

Andy Lomas who recently won the Lumen Golden Prize (2014) presents another type of cellular growth and simulation work. Andy has been working for many years in film and special effects, taking leading roles at international companies such as Dreamworks, FrameStore and (currently) The Foundry.

Naoko Tosa is a leading Japanese computer artist working since the late 80s. She has further developed the virtual forms theme forward with her beautiful multi-screen video work from her "Space Flower Series" recently on display in Singapore. This piece will be shown in the new SIML Chamber. Currently Naoko is a professor at Kyoto University and a visiting professor of the National University of Singapore.

Pioneer computer artists **Paul Brown** and **Ernest Edmonds** (both based in Australia and the UK) are included showing early rule-based print works from the 1960s and 1970s, representing the earliest generation of computer art. Paul originally trained at the Slade, then worked in commercial film effects and animation before focussing on computer art and is widely regarded a key pioneer with works in many collections including the V&A. Ernest who has exhibited computer art since 1972 has over 200 refereed publications in the fields of human-computer interaction, creativity and art. He recently curated at the GV Art Gallery "The Automatic Art" show which spanned British Constructivist art since the 1960s through to current day computer art.

Yoichiro Kawaguchi is another pioneer of computer art active in Japan since the 70s. We present his high definition film called *Growth: Mysterious Galaxy* from 1983. Kawaguchi is one of the first international artists to establish a presence for computer art at the yearly international joint academic and industry gathering of the Computer Graphics field (SIGGRAPH conference series), where his work has been represented and on display almost every year since the late 1970's.

Graham Harwood and **Matsuko Yokokoji** have lived and worked together since 1994. They co-founded the artists group Mongrel (1996-2007), specialising in digital media and established the MediaShed a free-media lab in Southend-on-sea (2005-2008). They often work with communities and local authorities, recently creating the works *Data Entry* and *Pits to Bits* problematizing the "Joint Strategic Needs Assessment" document developed by the Liverpool NHS Primary Care Trust. Harwood is lecturer in practical methods in the Centre for Cultural Studies at Goldsmiths, and convenes the MA in Interactive Media. In 2008, Harwood and Yokokoji joined long-time collaborator, **Richard Wright** to produce *Tantalum Memorial* winning the 2009 Transmediale first prize and featured internationally.

The Creative Machine exhibition is the first event to make use of Goldsmiths' new *Sonics Immersive Media Lab (SIML) Chamber*. This advanced surround audiovisual projection space is a key part of the St James-Hatcham refurbishment. The facility was funded by capital funding from the Engineering & Physical Sciences Research Council (EPSRC) and Goldsmiths, as well as research funding from the European Research Council (ERC). This is connected respectively to the Intelligent Games/

Game Intelligence (IGGI) Centre for Doctoral Training, and Atau Tanaka's MetaGesture Music (MGM) ERC grant. The space was built by the SONICS, a cross-departmental research special interest group at Goldsmiths that brings together the departments of Computing, Music, Media & Communications, Sociology, Visual Cultures, and Cultural Studies. It was designed in consultation with the San Francisco-based curator, Naut Humon, to be compatible with the Cinechamber system there. During Creative Machines, we shall see, in the SIML space, multiscreen screenings of work by Yoichiro Kawaguchi, Naoko Tosa, and Vesna Petresin, as well as a new immersive media work by IGGI researcher Memo Akten. At the private view there will be a special live performance and London premier of the duo of Berlin-based visual performer Lillevan with Goldsmiths musician and researcher Adam Parkinson.

We would like to acknowledge the generous support from Arts Council England and in particular thanks to Jon Pratty at ACE for all his work.

Special thanks to exhibition producer Steph Horak along with the exhibition design team Alastair Frazer, Angus Braithwaite, and Nicky Donald.

William Latham, Atau Tanaka and Frederic Fol Leymarie Curators, November 6th 2014

MEMO AKTEN

Memo Akten (b. 1975) is an artist and engineer born in Istanbul (TR), currently based in London (UK). He develops systems that abstract behaviour to create unfamiliar familiarities and encourage new perceptions on our relationship to science, nature, technology and culture.

Inspired by the processes that shape our lives, he uses the tools of science as a lens to the world. Through visual, sonic and behavioural metaphors he creates artefacts that reveal, extract, amplify and abstract the unseen harmonies, tensions and poetry found within these phenomena. His work plays at the boundaries between abstract and figurative, and spans multiple disciplines including images, videos, sound, light, digital sculptures, dance, large scale installations, performances, software and online works.

In 2013 his work FORMS won the Golden Nica at the Prix Ars Electronica. His work has been exhibited and performed around the world at venues such as The Victoria & Albert Museum (London, UK), Royal Opera House (London, UK), Garage Center for Contemporary Culture (Moscow, RU), La Gaité lyrique (Paris, FR), Holon Museum (Tel Aviv, IL), EYE Film Institute (Amsterdam, NL), STRP Biennial (Eindhoven, NL), FILE Festival (Sao Paolo, Rio, BR), Lisbon Architecture Triennale (Lisbon, PT), Royal Festival Hall (London, UK), Queen Elizabeth Hall (London, UK) and many more (see <http://www.memo.tv/category/calendar>).

A strong supporter of open-source and believer in the sharing of knowledge, he is one of the core contributors to the openFrameworks project and gives lectures and workshops around the world.

Simple Harmonic Motion

Simple Harmonic Motion is an ongoing series of projects and research investigating complexity from simplicity – specifically the emergence of complex behaviour through the interaction of simple multilayered rhythms. It is inspired by natural and mathematical phenomena, as well as works by the likes of Norman McLaren, John Whitney, Steve Reich, John Cage, Gyorgi Ligeti and Edgar Varèse.

The initial motivation for the project is a personal abstract memoir of growing up in and experiencing Istanbul. Inspired by Orhan Veli Kanik's poem *Istanbulu Dinliyorum* ("I'm listening to Istanbul with my eyes closed"), it is a very non-literal sonic interpretation of the cultural diversity of the city; a collision of cultures and intertwined opposites: progressive vs conservative, religious vs secular, liberal vs authoritarian, extreme decadence vs severely moral; interwoven not only in the same city but in the same streets, the same buildings. Seemingly conflicted yet managing to not only co-exist, but to breed thriving and flourishing subcultures. In the chaos of the city, a rich tapestry of different lifestyles, different patterns and rhythms cross paths on a daily basis. The intersection of these rhythms create complex cyclical, quasi-periodic patterns. Movements that may initially appear to be random and arbitrary are actually governed by an elaborate order creating recognizable yet constantly evolving behaviour.

In the installation, both image and sound are driven by the same mathematical principles and algorithm: a complex signal, broken down into its basic elements operating at different frequencies. While this underlying fundamental principle – the fourier series – is a purely abstract mathematical theorem, it is also responsible for our understanding of almost every aspect of the physical, biological and social world; including but not limited to acoustics, economics, quantum mechanics, predicting earthquakes, protein structures, DNA and the composition of distant stars and galaxies.

The *Simple Harmonic Motion* series of works transposes the invisible elegance found in these abstract mathematical equations, driving almost every aspect of our lives, to a medium we can see, hear and feel.

Through the use of customised software, a number of 'agents' are created and assigned a simple behaviour, a repetitive pattern of movement and sound. On their own, each agents' is monotonous and mechanical, acting completely unaware of its neighbours and 'the bigger picture'. However the interaction of the different agents' behaviours create complex, rich, evolving behaviours and compositions – both visually and sonically.



CÉCILE BABIOLE

Cécile Babiola is a French artist based in Paris. In the 80s she was first active in the music field, then in electronic and digital arts. Her creations combine visual and audio arts through installations and performances that investigate digital medias with irony. Image, sound and interactivity are the components of her practice.

From performance to participative installations, her recent works concentrate more on technological issues. She aims to transpose and twist around standardised uses in the field of creation.

Industry and equipment appear like a common thread running throughout all her work: engines or sewing machine concerts, installations on a bus or in a mine, digital making. Babiola integrates the field of mechanical devices and mass culture to draw a confrontation between creativity and determinism, past and present usage, obsolete and contemporary techniques.

Her work has been exhibited internationally: Centre Pompidou Paris, Mutek – Montreal Elektra, Fact Liverpool, MAL Lima, NAMOC Beijing, and distinguished with numerous awards and grants: Ars Electronica, Locarno, prix SCAM, bourse Villa Médicis, Transmediale Berlin, Stuttgart Expanded Media Festival.

She is also a member of the artists-curators collective Le sans titre <http://lesanstitre.net>

Copies Non Conformes

The installation *Copies Non Conformes* (“Certified Inaccurate”) explores the erosion and mutations that take place in the reproduction of small sculptures of the 17 letters in the sentence: “JE NE DOIS PAS COPIER” (“I must not copy”). This line is inspired by the punishment commonly meted out to schoolchildren, who are ordered to copy fifty or a hundred times by hand prescriptions and proscriptions like “I must not talk in class”. In this case, the prohibition is not copied by hand but by a digital duplication process: each letter is modeled and printed in 3D, and the resulting object is then digitized by a 3D scanner. This new model is reprinted, and so on and so forth, a certain number of times in a row. Because each subsequent generation accentuates the previous morphological alterations, the last reproductions become unrecognizable. *Copies Non Conformes* diverts the printer and scanner from their usual functions, using them instead to generate shapes unobtainable in any other way. And through the random distortion of the letters, information is either added or lost at each stage.

Copies Non Conformes might be glossed as expressing one of the paradoxes of our digital culture: on the one hand, we have the endless reproduction of information, and on the other, the physical media carrying that information (CDs, hard drives etc.) – and hence the information itself – are becoming increasingly fragile. *Copies Non Conformes* is in this sense a *vanitas*, a vision of the digital world in ruins – rather like Hubert Robert’s *Vue Imaginaire de la grande galerie du Louvre en ruines*, which he painted in 1796, the year the Louvre was closed due to structural defects only three years after the museum first opened to the public.

The artist will be present during the Creative Machine exhibition. She will carry on her piece on site, adding more lines to the ones already produced. The artist at work and the process of the letters erosion will be exposed as a weeklong performance.



DANIEL BERIO

Daniel Berio (1978) is a software developer, artist and designer from Florence, Italy. Since a young age Daniel got actively involved in the international graffiti art scene and his work became known in Italy, Europe and the USA. In the meantime he developed a professional career first as a graphic designer and later as a programmer in video games, multimedia and audio-visual software. In 2010 Daniel moved to the Netherlands where he worked as a graphics programmer for VJ software Resolume. In 2013 he obtained a Masters degree from the Royal Academy of Art in the Hague, where he researched methods of simulating his graffiti-drawing style algorithmically and developed drawing machines and installations materializing the output of the generative-graffiti process. The artworks resulting from this research have been shown in galleries and festivals across the Netherlands and Europe. Today Daniel is continuing his research in the procedural generation of graffiti with his PhD studies in Goldsmiths University in London in the *Intelligent Games and Game Intelligence (IGGI)* programme.

Graffitizer3

Graffitizer3 is part of a series of works by Daniel Berio which revolve around the computational exploration of graffiti style. Graffiti is the art of the abstraction of the letter form. Letters are distorted, fragmented and interlocked in complex ways, often to the point of becoming unreadable to the untrained eye. Daniel aims at transferring this same form of abstraction to his computer generated works with the process of Graffitization: The (computational) process that applies the stylistic principles of graffiti art to digital forms (media?).

This iteration of the Graffitizer series explores the material aspects of graffiti style with the use of drips, which are a characteristic that can be commonly seen in tags made with a marker. A vertically mounted drawing machine produces drawings with indian ink on paper. The ink continuously flows to the tip of a modified pump marker, resulting in a design made of dripping lines. The chaotic dripping of the ink leaves a permanent trace on the wall on which the machine is mounted and results in a pattern that emerges in time during the course of the exhibition.

The machine is driven by a software system that is being developed by the artist, in which he has implemented a series of procedures that model the gestures, the grammar of forms and some of the compositional rules that govern his process when drawing graffiti letters. The system allows one to easily combine such procedures algorithmically into sub-programs that generate a variety of designs that are consistent with Daniel's hand-style but augment it with the 'power' of generative techniques.



BALINT BOLYGO

Born in Pécs, in 1976, Hungary, family to the UK at age of nine. He graduated with an MA in Fine Art sculpture at Edinburgh University in 2001. Bolygó's early mechanical sculptures already attracted public attention at Bloomberg New Contemporaries 2002, Nottingham's Angel Row Gallery *Remote Control* 2004, and *Magnetic Visions* Kinetica Museum London 2006. His first solo exhibitions in London included *Soft Machines* at the Hiscox Art Projects in 2003 and *Mappings* at the Long and Ryle gallery in 2005. He worked at Antony Gormley's Studio for over six years, whilst he moved to London and established his own studio in East London. The exploration of science, mathematics and engineering in his work led him to work closely with organisations such as London's Kinetica and the International Kepes Society.

His time-based sculptures and drawing machines have been shown internationally. Shows include; San Fedele Art Prize, Milan 2008, 'Kinetic Step' at Step 09, Milan 2010, 'In Praise of Shadows' V&A London, 2009, 'Locus Solus' Benaki Museum Athens 2010, 'Lightwave: Defy the Darkness' Science Gallery, Dublin 2009, and Hybrid Art Moscow, 2011. His international solo shows include 'Pulsar' Feszek Club Budapest, 2009, 'Filament' Delloro Contemporary Art, Berlin 2011, and his two debut shows in the US at Huret & Spector Gallery and Boston Cyberarts gallery, 2013.

Bolygó's work explores the processes in the making of images and objects. His work harnesses natural forces to create tangible systems that move, make and create spectacular events where the 'act of making' of a work of art becomes just as important as the object itself. Bolygó lives and works in London.

Trace II

Trace II is a sculptural device that alludes to scientific discoveries and the experimental apparatus of science. It is essentially a mechanical computer that draws its analogue programme from a revolving plaster head. The carefully balanced mechanism slowly measures the topography of a cast human head and translates its undulations onto a rotating cylindrical surface. The result is an evolving topographical diagrammatic depiction that is truly unique every time.

The work alludes to our notions of self and how through technology humans have found numerous visual representations for the individual. Medical advances have brought about well-recognised depictions such as DNA profiling, retina scans, MRI scans and 3d scanning. *Trace II* investigates the process behind the image making, and reconnects the viewer in a tangible way, with the process behind these fantastical images. *Trace II* is not only a drawing machine that draws emphasis on the human condition but also questions our ability to understand the ever increasing advances in technology around us. *Trace II*, uses the more visually transparent and tangible technology of the past – more likened to the nature of the fingerprint – to allude to technology of the present. In this respect *Trace II* attains a timeless characteristic, where the alienating nature of today's technology is contradicted. Today so much of our technology comes through a screen from a complex array of codes and programmes that only a few can understand and even then it can be a less than fulfilling visual experience. This 'technological alienation' can often leave the viewer detached from the lengthy creative processes that lie behind the screen, constituting so much of a focus for digital artists today.

Trace II is a generative work where the artist's head becomes the code for a complex mechanical algorithm. The plaster head is the 'source code' for the 'Da Vinci' – like contraption that literally feels the undulations of the human head and converts these features into a spiralling topographical map of the 3-dimensional object.

The structure of *Trace II* is open and the workings are transparent so the viewer is free to discover the process visually. The mechanism alludes to our advancing technology whilst it looks back in time, when technology was less alienating and more physical.

Trace II challenges a number of issues related to authorship of artwork: is it the product, the machine or the performance? Can or should all these be viewed independently? What are the implications of artworks being created in the artist's absence? Is the drawing mechanism an autonomous machine that churns out artwork or is it a precise instrument or tool that the artist has control over, thereby maintaining the artist's status as a decision maker?

Trace II reveals hidden patterns from natural forces that our surrounding world provides us with. The piece makes traces of these forces over hours and presents us with an event that is slowly unfolding in time, into an 'act of creation' where process, machine and product are one.



Trace II (self portrait), 2013

Wood, steel, aluminium, brass, plaster, mechanical components, motor, pen

DAMIEN BOROWIK

Damien Borowik is an artist who works with mediums and embraces digital craft. In his work, he investigates the human condition, where the experience of time is an inescapable factor of our quest to sublimation.

Whether in his paintings, digital or hybrid work, Borowik strives to create work that aspires to contemplation of the sublime, and where creation processes remain apparent and form an essential part of the resulting artefact.

His practice is intrinsically linked to the art of making, where the usage of tools and processes occurring during creation of an artefact become integral to its aesthetic. While considering their inherent qualities, he explores the shaping of mediums using various tools; traditional, virtual, customised or bespoke, by hand, code and machine.

Resonating closely with aleatoric art on one hand and abstract expressionism on the other, Borowik produces work in both analogue and digital form, often intertwining them in the creative process.

Borowik started to study applied arts in Paris at the École Nationale Supérieure d'Arts Appliqués et Métiers d'Arts (ENSAAMA), before continuing his studies in Graphic Design at Central Saint Martins in London where he has been working for the past 12 years.

In 2013, Borowik completed a Master in Computational Arts at Goldsmiths. Since then, he has collaborated with the artist Shen Xin to create the virtual reality work *Lehrstück – A Prototype*. He also completed an artist residency at Samsung in South Korea in May 2014, and has been invited to participate to MoOD Brussels 2014 fair. Damien Borowik has also participated very recently in the Kinetica Art Fair in London.

www.dborowik.com

Drawing Machine

This project is being created in an iterative process by the artist, where the code is developed according to the physical qualities of the machine.

Damien Borowik works with his machine in a dialog, where he is learning to nurture the mark-making qualities of the machine to reveal its inherent procedural aesthetics through the drawings it creates.

In its current state, the drawing machine uses pens and markers to create ambiguous and timeless drawings, where the viewer can contemplate a vision of our inescapable man-made world.

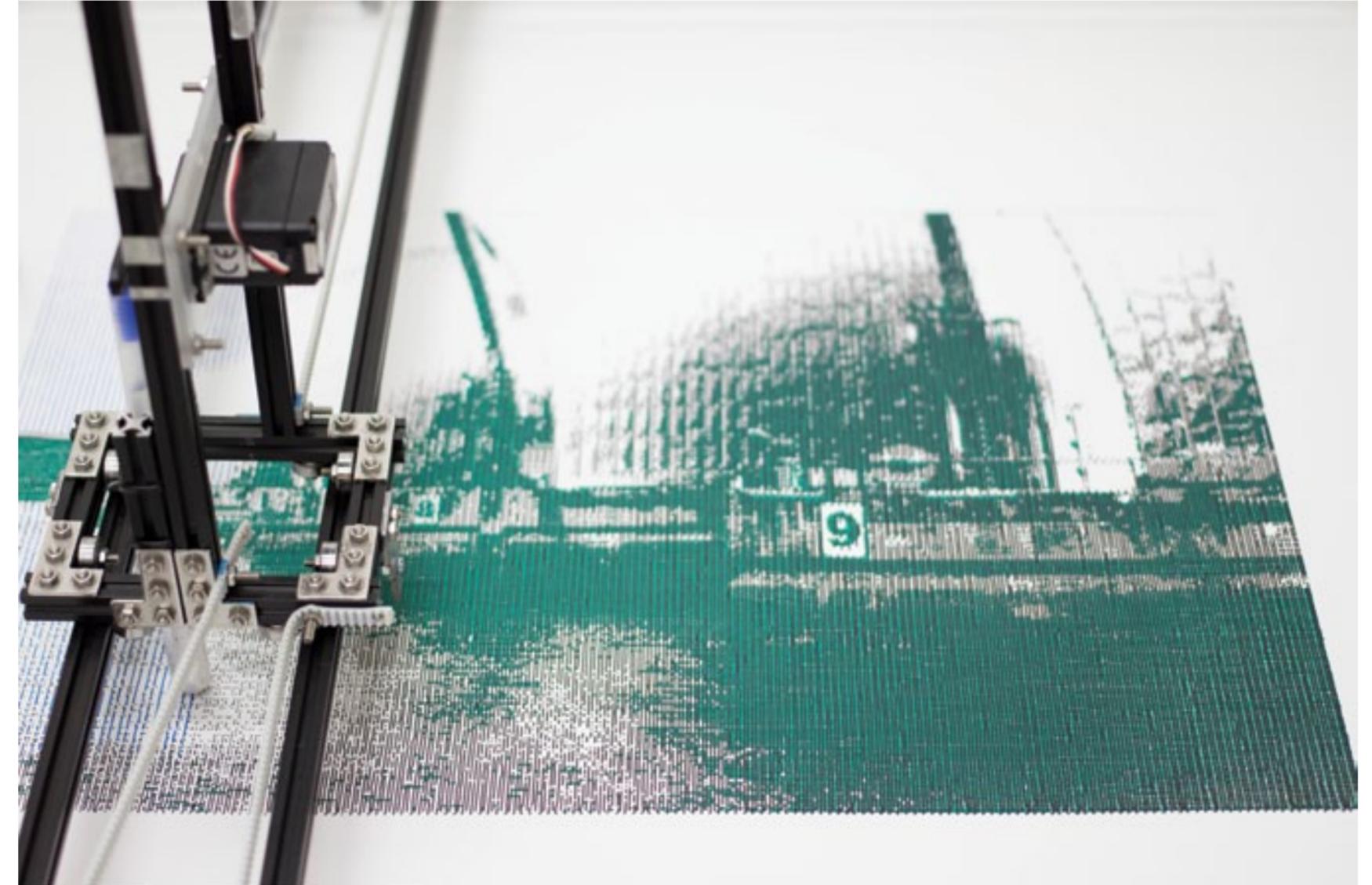
A small version of the Drawing Machine was created earlier this year, based on the CoreXY principles by Ilan E. Moyer at MIT. The machine quickly developed to its current state.

According to the artist, the Drawing Machine is still in its infancy. Even though the machine and code are still primitive, Borowik currently wants to capture the aesthetics of their inner workings and translate them into the artwork they create.

In the Expanding Square drawings, the machine's performance is being tested while creating a simple shape through 4 basic actions. The two motors controlling the motion are going backwards and forwards in turn, while the distance travelled by the pen is increased at the end of each cycle.

In the figurative drawings, Borowik has carefully taken photographs which he then simplifies to capture the essence of the subject matter through light, shape and texture, which he then extrapolates through the idiosyncrasies of the machine.

Borowik has launched a crowd funding campaign to further develop his project, aiming to let the audience create their own drawings with the machine, and to allow him to carry on investigate the machine through code and technology. More info at <http://indiegogo.com/projects/drawing-machine>



PAUL BROWN

Paul Brown is an artist and writer who has specialised in art, science & technology since the late 1960's and in computational & generative art since the mid 1970's. His early work included creating large-scale lighting works for musicians and performance groups like Meredith Monk, Music Electronica Viva, Pink Floyd, etc. and he has an international exhibition record dating to the late 1960's that includes the creation of both permanent and temporary public artworks. He has participated in shows at major international venues like the TATE, Victoria & Albert and ICA in the UK, the Adelaide Festival, ARCO in Spain, the Substation in Singapore and the Venice Biennale. His work is represented in public, corporate and private collections in Australia, Asia, Europe, Russia and the USA.

From 1992 to 1999 he edited fineArt forum, one of the Internet's first art 'zines and is currently editor of *PAGE* – the bulletin of the Computer Arts Society.

During 2000/2001 he was a New Media Arts Fellow of the Australia Council when he spent 2000 as artist-in-residence at the Centre for Computational Neuroscience and Robotics (CCNR) at the University of Sussex in Brighton, England. From 2002-05 he was a visiting fellow in the School of History of Art, Film and Visual Media at Birkbeck College, University of London, where he worked on the CACHe (Computer Arts, Contexts, Histories, etc.) project and since 2005 he has been a visiting professor and artist-in-residence at the CCNR, Dept. of Informatics at the University of Sussex.

Untitled, Computer Assisted Drawing

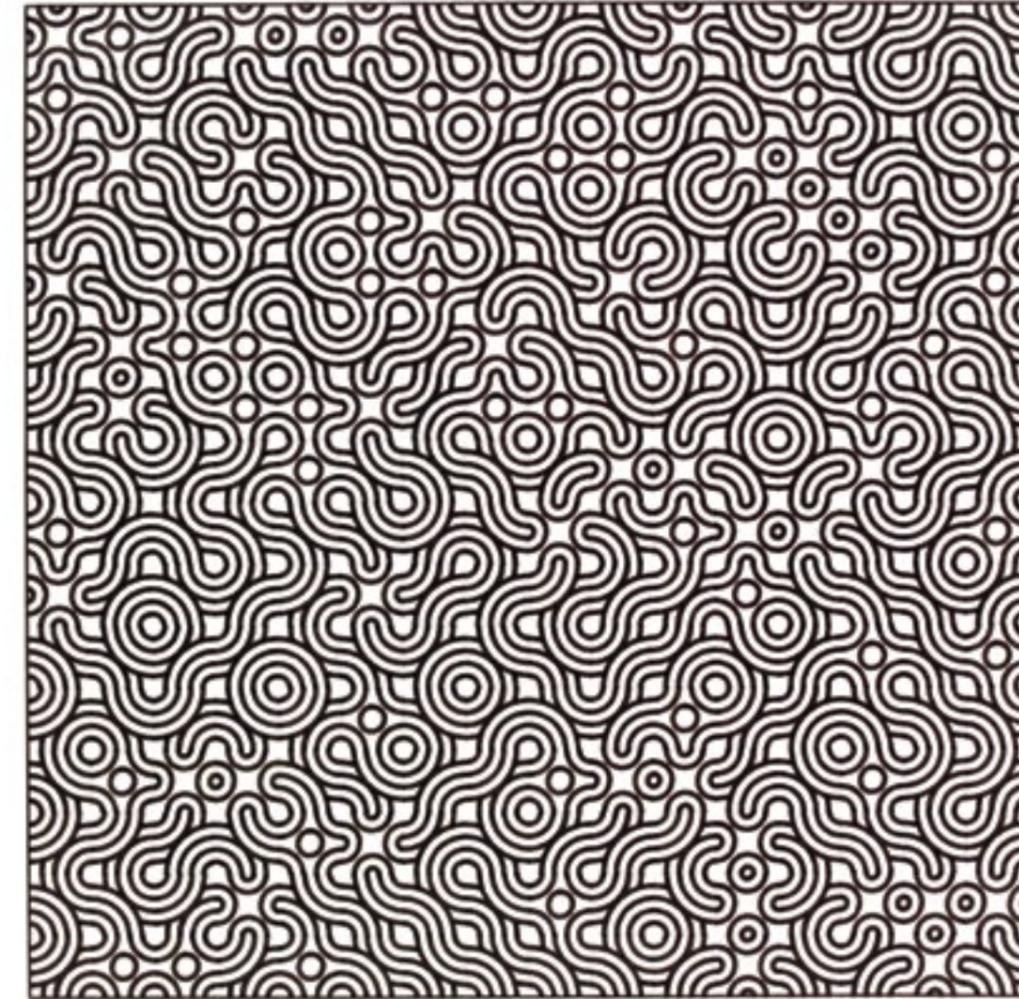
I discovered computers as an art medium when I saw *Cybernetic Serendipity* at the ICA in 1968. I was immediately attracted but it wasn't until 1974 that I was able to start using computer systems as a central part of my practice. After a period learning programming I began to produce works and *Untitled, Computer Assisted Drawing* is one of my earliest computational artworks and was made in 1975. It was produced by a FORTRAN programme run from punch cards on an ICL 1903A Mainframe Computer at Liverpool Polytechnic (now John Moore's University). The programme produced a paper tape that controlled an offline Calcomp pen plotter. The entire process from conception to production of a drawing took around 2 weeks depending on the number of errors in the original programme. At that time there were no 'apps' and very little support software so I had to write all the necessary code (including things like device drivers) myself.

My early works like this used random numbers to distribute and orientate a set of square tiles. I also increasingly adopted an early artificial life technique called Cellular Automata that I had discovered in a Scientific American article in 1969. A-life methodologies like this have become a central part of my practice and I am now recognised as a pioneer of this kind of work.

Early influences included the work of Kenneth and Mary Martin, the members of the UK's System's Group, the pan-European systems art movement and US conceptualists like Sol Lewitt and Dan Flavin. They showed me that art could be a process, or system, and that art production could be a 'hand's off' process. In the decades since I have become interested in the concept of 'art that makes itself' and the potential of artificial intelligences that can produce art autonomously without the need for human input or intervention.

In 1976 I began to use stand-alone minicomputers (like the DEC PDP8 and DG Nova 2) to produced time-based works that are computed dynamically and are shown on screens. The first of these – *Builder/Eater, 1977* – used a 96 by 96 pixel monochrome frame store displayed on a 9in CRT monitor. A recreation of this work was included in the Digital Archaeology section of the Digital Revolution Show at the Barbican earlier this year and is now on international tour.

Early in my career I had to carry around boxes of punched cards and then 10-inch tapes. Then there were boxes of floppy disks. Now almost everything I have ever done fits easily on a high-capacity USB stick and, of course, is in the Cloud. My early works used to take weeks and sometimes months of work on expensive and hard to access computers using difficult programming languages like Assembler. Now tools like Processing and systems like the Raspberry Pi make it so much easier and cheaper to get involved.



The first computer-generated drawing, 1975

BROCK CRAFT

Brock Craft is a Lecturer in Physical Computing at Goldsmiths, University of London in the Department of Computing and has lectured at the Royal College of Art. He was co-director of *TinkerLondon*, the first Internet-of-Things design studio in London, which produced work for international corporate clients and exhibited at the seminal *Talk To Me* exhibition at the New York Museum of Modern Art. Brock is the author of *Arduino Projects for Dummies*, and co-authored the forthcoming *Raspberry Pi Projects for Dummies*. He was a member of the post-punk studio band, the Christal Methodists, which produced culture-jamming electronic music that was almost unlistenable. Brock produces work which explores the use of sensor data as an expressive medium, and writes about himself in the third person.

Transformation Banner

A new site-specific work, which shows a large sculptural LED screen curtain showing digital transformations, driven by video input and coded animating data structures. The work references flags and traditional ceremonial banners in churches, cathedrals and ancient buildings but is juxtaposed with the large scale LED technology now commonly used in retail, outdoor advertising, concerts and nightclubs. In terms of content it includes a frontal pixelated spiral structure endlessly forming as an animated tapestry form. The content for this LED Banner was developed in collaboration with William Latham and Stephen Todd and Peter Todd.



SIMON COLTON

Simon Colton is a part-time Professor of Computational Creativity at Goldsmiths, ERA Chair of Digital Games Technology at Falmouth University and an EPSRC Leadership Fellow. Along with the Computational Creativity Group at Goldsmiths (ccg.doc.gold.ac.uk), he investigates how to write software to take on creative responsibilities in arts and science projects, and the philosophical implications of the existence of autonomously creative software systems. He is particularly known for *the Painting Fool* project (www.thepaintingfool.com), where the aim is for the software to be taken seriously as a creative artist in its own right, one day. Artwork from the software has been shown in group exhibitions in London, Lisbon and Brussels, and last year a solo exhibition called 'You Can't Know my Mind' featuring pieces from *the Painting Fool* and live portrait painting (if the software was in a good mood) was held in Paris. Along with other Computational Creativity projects with applications to pure mathematics, graphic design, the visual arts, creative language and video game design, Prof. Colton has taken a holistic view of what it means for software to create and co-create in our technology-led society. Projects with *the Painting Fool* have raised philosophical issues of autonomy, intentionality and imagination in software, and have been designed to challenge current assumptions of software as mere tools. These have led to formal models of progress in building creative systems, challenges to the use of Turing-style tests in assessing software, and the introduction of philosophical notions such as the 'humanity gap', highlighting that creativity is in part a celebration of humanity.

The Dancing Salesman Problem & Chair #17

What does it mean for software to be truly, independently creative? Through much scientific and artistic exploration, members of the Computational Creativity research community have identified that software has to be seen to be creative, in addition to producing artefacts of high value and innovating in technique, aesthetic judgement and imaginative reasoning. If it is to have any chance of earning the description 'creative', software needs to show genuine skill, appreciation, imagination, learning, accountability and intentionality in creative endeavours. With *the Painting Fool* project – described at www.thepaintingfool.com – we are implementing software which can reasonably be described as having abilities that exhibit these behaviours. Gaining feedback from artistic communities has always been part of the process of building *the Painting Fool*, and criticisms of its processes and products have regularly led to changes in its code and advances in its sophistication. Our latest project, for instance, was driven by criticisms of a lack of intentionality in the software. In the *You Can't Know my Mind* exhibition in Paris, 2013, we addressed this issue by having the software paint portraits driven by a simulated mood that it gained through reading newspaper articles. In a terrible mood, the software told sitters to go away, with an explanation of its reasons for doing so. In better moods, it used the sitter as a source material for portraiture designed to inform it about its own painting styles. To this end, it used machine vision methods to tell whether it had achieved an image which was appropriate to its mood, and machine learning techniques to learn to be better at this in the future.

The Dancing Salesman Problem was produced by for an exhibition entitled *No Photos Harmed* in Paris, 2011. The name of the piece reflects the classic computer science problem where a Travelling Salesman has to drive from town to town without returning to one previously visited. Mapping towns onto colour regions and driving onto brush strokes, *the Painting Fool* produced these dynamic pieces with swoops representing large distances driven to find the next unvisited town. Each figure was generated with a context-free design grammar, showing that fully-automatically produced pieces can be representational rather than abstract, without requiring photographic input, hence no photos being harmed.

Chair #17 is a virtual painting by a virtual artist of a 3D chair in a virtual world, exhibited in La Maison Rouge, Paris in 2011. In the Furniture series from which this comes, *the Painting Fool* arranged objects in a 3D world, chose lighting and vantage points and then took an image from which 2D paintings were produced. The series had a very high curation coefficient, with around 80% of the images deemed to be of exhibition quality. This particular piece was chosen for exhibition due to the surprising nature of how much it contrasted with the other pieces in the series: *The Painting Fool* had free rein to choose colour palettes and simulated painting techniques in this series, and this piece was unique in being greyscale and showing a painting style which can bring much poignancy to the viewing experience.



ANNA DUMITRIU

Anna Dumitriu's work is at the forefront of art and science collaborative practice, with a strong interest in the ethical issues raised by emerging technologies. Her installations, interventions and performances use a range of biological, digital, and traditional media including live bacteria, robotics, interactive media, and textiles. She has a strong international exhibition profile, having exhibited at the Picasso Museum in Barcelona, the Science Gallery in Dublin, the Museum of Contemporary Art (MOCA) Taipei and the V & A Museum in London. She is a Visiting Research Fellow: Artist in Residence with Department of Computer Science at the University of Hertfordshire and Artist in Residence on the Modernising Medical Microbiology Project at the University of Oxford. She is currently working on a new project called *Sequence* which investigates the technologies behind whole genome sequencing of bacteria, funded by Arts Council England.

ALEX MAY

Alex May is an artist working with video projection, projection mapping, software programming, interaction, real-time audio analysis, performance, and robotics to explore the boundaries between human perception and digital technologies.

Alex has performed art at Tate Modern and Watermans, and exhibited internationally including at the V&A, Science Museum, Bletchley Park, the Museum of Contemporary Art in Caracas, the Science Gallery in Dublin, and the Grande Halle de la Villette in Paris. He is a Visiting Research Fellow: Artist in Residence with the Department of Computer Science at the University of Hertfordshire and a Digital Media Arts MA sessional lecturer at University of Brighton.

My Robot Companion (HARR1)

My Robot Companion is an ongoing project developed by Anna Dumitriu and Alex May in their role as artists in residence in the Department of Computer Science at the University of Hertfordshire. They worked in collaboration with Professor Kerstin Dautenhahn and Dr Michael L Walters from the Adaptive Systems Research Group to investigate their research into social robotics and to ask the questions, do we want and need robot companions? And, if so, what kind of robot companions do we, as a society, want?

HARR1 (Humanoid Art Research Robot 1) has been designed to be a customizable robot for artistic research created by the team. The artists are using the robot to investigate human/robot interaction from a cultural and ethical perspective, playing with touch, movement, vision, and appearance. The robot can even exhibit signs of boredom, body language, or demonstrate 'caring' actions such as putting its arm around someone.

In *The Creative Machine* HARR1 is seeking out things that are interesting in the exhibition space and those things will catch its attention, though it may soon become bored and drift off to its own 'thoughts' or processes. It fidgets constantly and unlike other robots is rarely still.

The team use art and performance techniques as a means of intervening within the scientific research process itself and the project won an AISB Award for Public Understanding of Artificial Intelligence in 2012.

Funded by Arts Council England and The University of Hertfordshire.

For more information on the project see <http://www.myrobotcompanion.com>



My Robot Companion (HARR1), 2014

Humanoid robot with computer hardware (hacked shop mannequin, servos, motherboard, web cam)

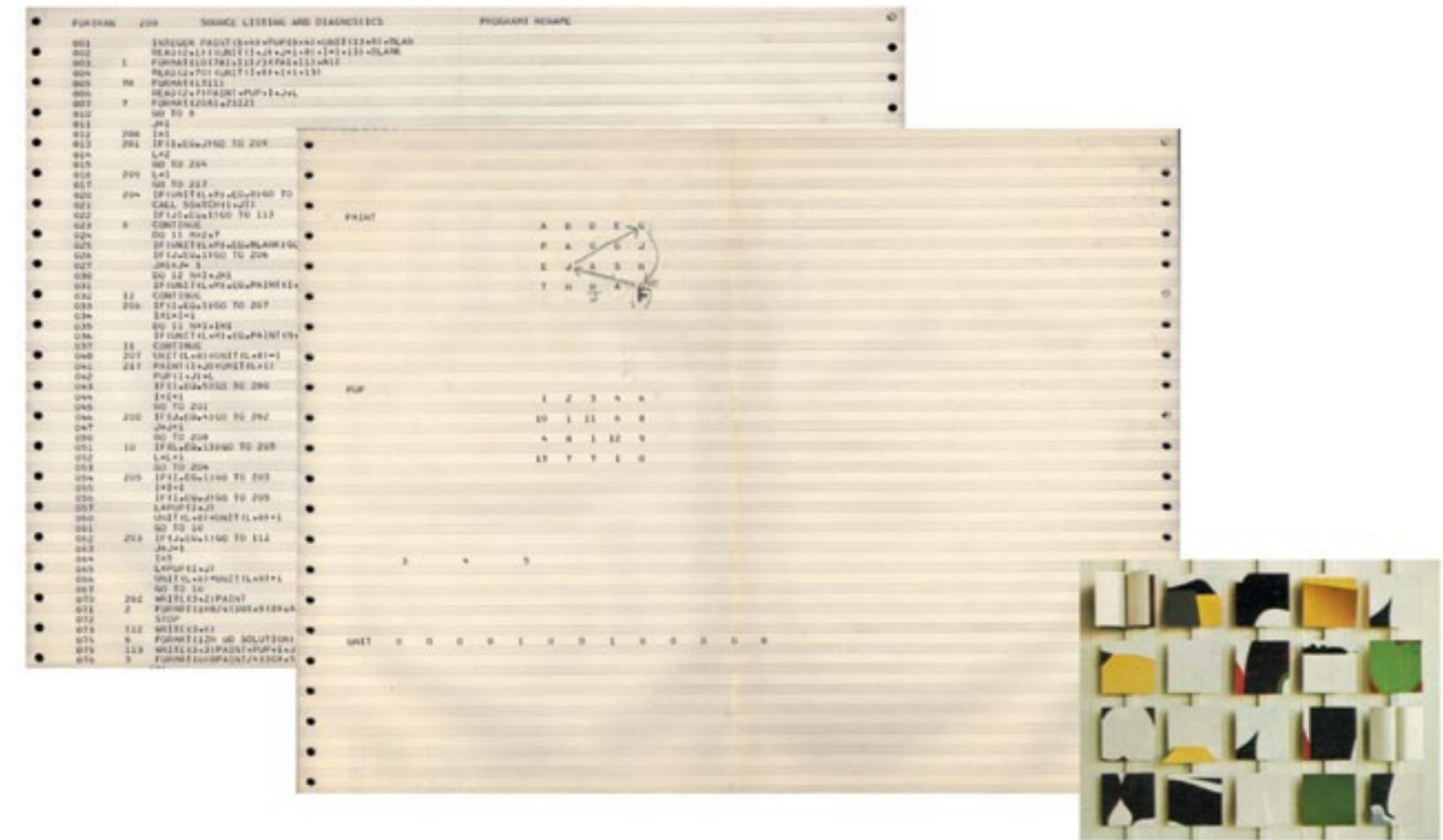
ERNEST EDMONDS

Ernest Edmonds (born in London, 1942) lives and works in Hathersage, UK and Sydney, Australia. He trained in Mathematics, Philosophy and Logic. His art explores colour, time and interaction in the context of colour field painting and systems art. It extends the Constructivist tradition into the digital age. He first showed an interactive artwork with Stroud Cornock in 1970 and first exhibited a generative time-based computer work in London in 1985 at Exhibiting Space. He has recently exhibited in Sheffield (solo exhibition entitled Light Logic) as well as in Sydney, Berlin, Riga, Olomouc and London. He is Professor of Computation and Creative Media at the University of Technology, Sydney, Professor of Computational Art at De Montfort University, Leicester and Editor-in-Chief of Transactions in the journal, Leonardo. Recent books include: On New Constructs in Art, Artists Bookworks, UK (2005) and, with Linda Candy, Interacting: Art, Research and the Creative Practitioner, Libri Publishing, UK (2011).

Notes on Nineteen

The *Notes* series of prints are based on archive material relating to each of a number of critical steps in my work. They are, perhaps, part digital collage and part concrete poem. Shown on the right in this one is the construction that I made in 1968 and 1969 called *Nineteen*. Whilst computers had nothing to do with any of the square elements that made the piece up, I used a computer program to help me determine which piece went where. On the left is part of that program, written in the computer language Fortran. I specified a set of conditions that should (or should not) be met, such as that two particular pieces should not be on the same row or column, and the program searched all possibilities for a solution that satisfied my requirement. In fact, in the three hours of computer time available to me (it was 1968) a solution was not found, although the computer came close. In the centre is a print out of the near solution with my pencil notes on how I could see a full solution by slightly modifying what the computer program had produced. In that way, a computer program, with a little help from me, solved the problem that I had set myself in completing *Nineteen*.

So this *Note* print represents where I started writing computer programs as part of my art, beginning with the single mainframe computer that Leicester Polytechnic, where I worked, owned at that time. Arranging the elements of the 20-part relief by writing a program I realized that the systems that I, and others, used in our art could be described in computer programming languages. Once programming became used in art, the form of art now known as 'Generative' appeared. It is important to point out that art made by computer programming is not to be equated with Digital Art in general. The latter includes all kinds of ways of making artworks that involve computers, the Internet or digital data and may not involve the artist in writing programs at all. When a program is the medium, the artist is encapsulating rules and procedures in a formal description and arranging for a computer to act out the consequences. This makes programming an obvious extension to the methods used in the art of the British Systems Group, for example. In this sense, the constructive tradition might be said to continue to break new ground through artists writing computer programs.



IAN W. GOULDSTONE

Ian W. Gouldstone is a BAFTA winning artist and filmmaker, whose work incorporates games, animation and new media. He is a member of the Goldsmiths Computational Creativity Group and a founder of the collective Pachinko Pictures.

He graduated from Harvard University with a degree in mathematics before studying animation at the Royal College of Art, and is now completing his PhD in Arts and Computational Technology at Goldsmiths. His research explores the practical and theoretical implications of queer video game forms.

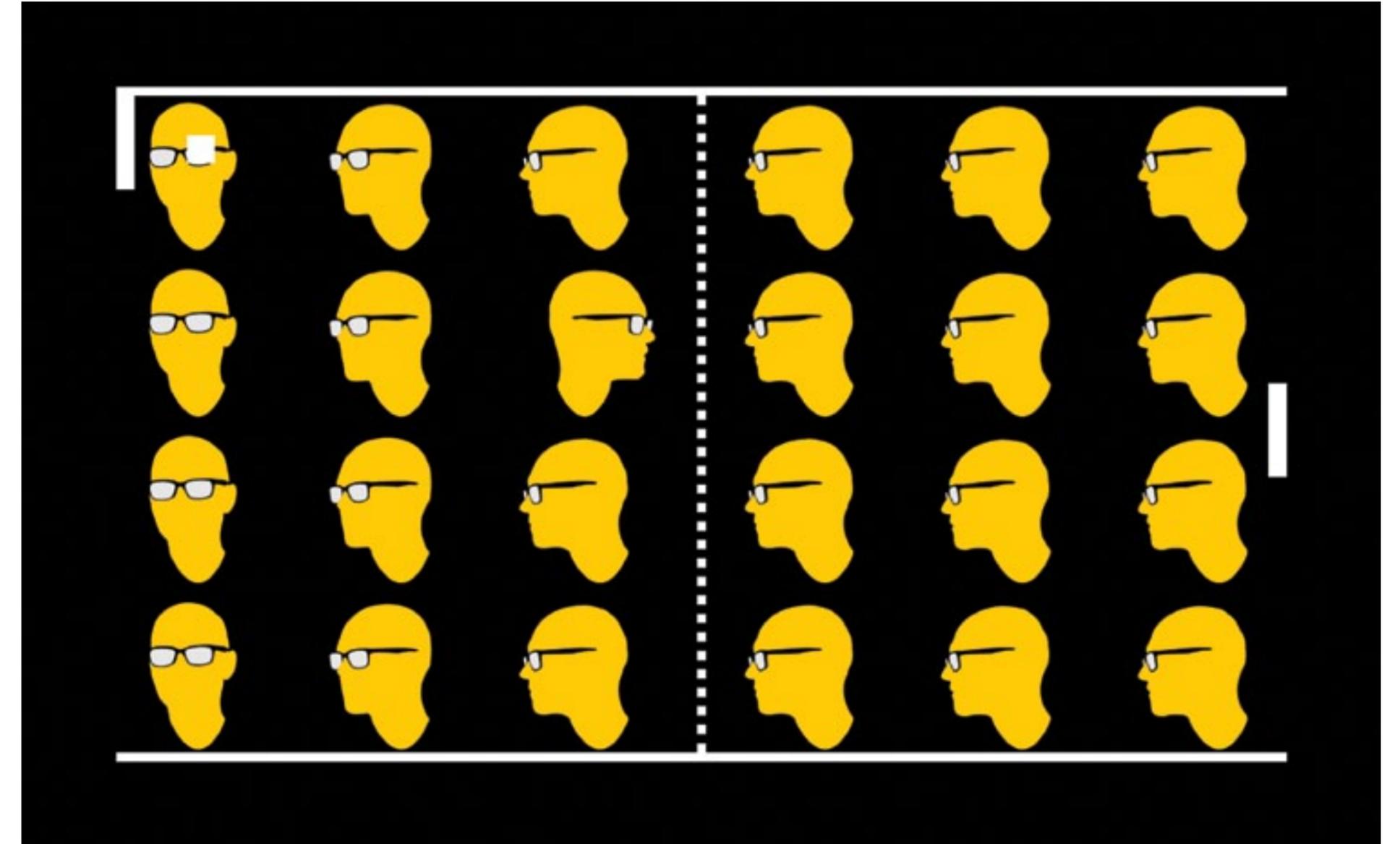
Recent works include *Sunshine*, an experimental game created for LA Game Space, and *Take a Walk*, an interactive music video created for American indie-electronica band Passion Pit.

www.iwgouldstone.com

Love Love

Love Love is an endless game of digital tennis where the computer perfectly controls both players and the human controls the gaze of a single member of the audience.

Presented in a similar manner to Atari's 1972 arcade game Pong, Love Love looks at player assumptions in video games, particularly expectations of agency. It sits within Ian W. Gouldstone's larger body of artistic and scholarly work, which explores queer media forms.



YOICHIRO KAWAGUCHI

Born in Tanegashima Island. Kawaguchi has been working on Computer Graphics since 1975, and has been recognized as a pioneer and a world-class authority of CG art by his unique style. Using his 'GROWTH Model', a self-organising procedural modeling algorithm, he has been creating various artificial complex life forms.

Recent work includes development of CG expression of natural beauty based on physical basic model, 8K Ultra High Definition CG art, creation of new traditional art-form incorporating traditional craftsmanship and advanced IT-based expression, creation of artistic and primitive robot for planet exploration, development of 'Gemotion' (Gene, Growth + emotion) 3D Bumpy display, which reacts with emotion like living beings.

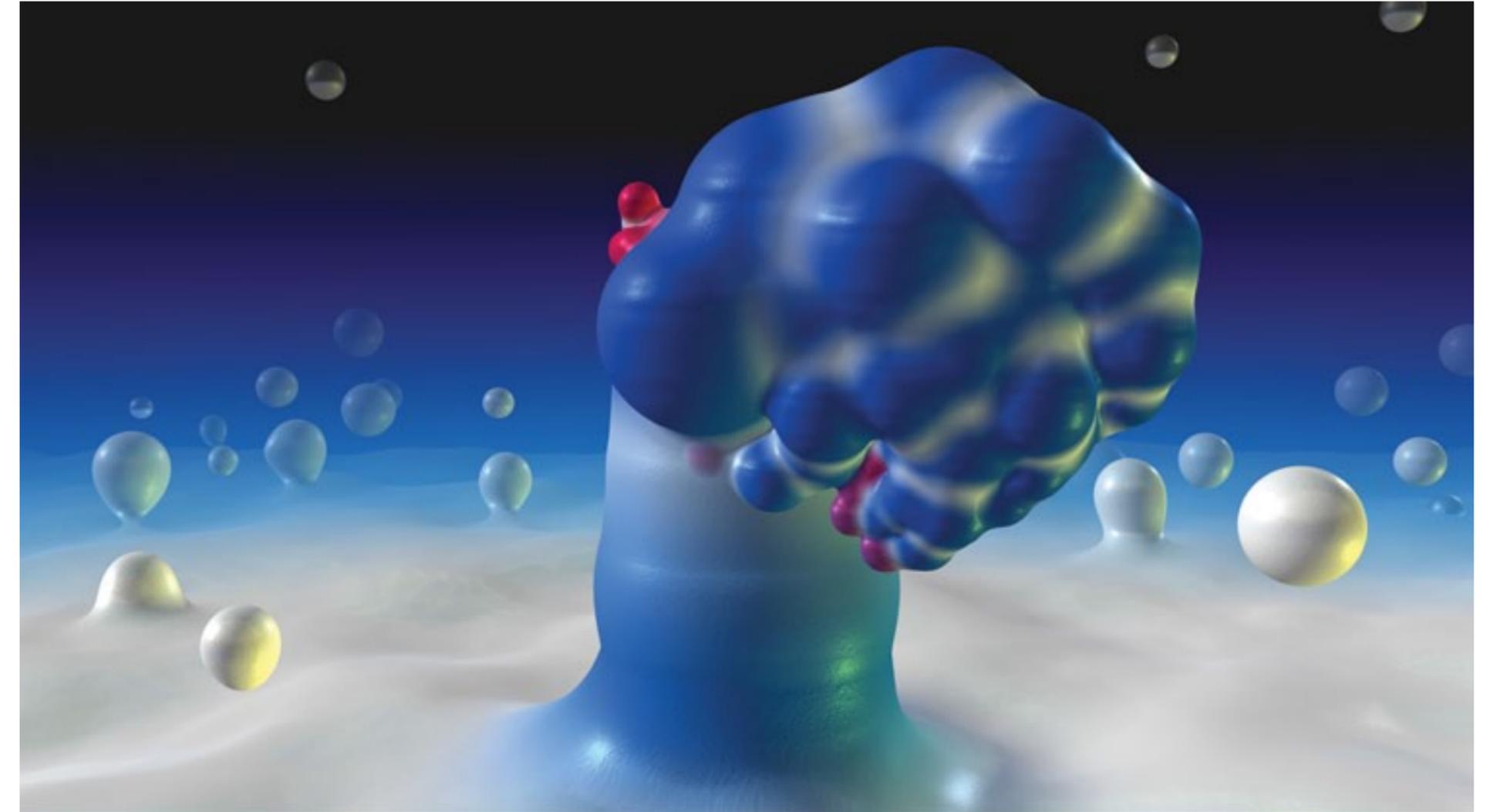
He won 'ACM SIGGRAPH Distinguished Artist Award for Lifetime Achievement' in 2010 for creative and innovative artistry, giving life to a stunning aesthetic derived from his dedicated research in computer technology, biological forms, and contemporary artistic practice. In 2013, He received the Award from the Ministry of Education in the Art Encouragement Prizes and Medal with Purple Ribbon.

Growth: Mysterious Galaxy

GROWTH: Mysterious Galaxy was first presented at the SIGGRAPH'83.

Many organic objects found in nature, such as, seashells, horns, claws, fangs and spiraling plants, exhibit a repetitive pattern in both coloring and form.

They are formed when self-similar figures go through repeated and complex re-partitioning. The formation process of molded things from the natural world is based and materialized in a natural technique scope principle. And I have been trying to apply that algorithm as an artistic method.



WILLIAM LATHAM

Originally trained as an artist at The Ruskin School of Drawing (Oxford University) and at the Royal College of Art, Latham moved into the computing industry and became a Research Fellow at The IBM UK Scientific Centre in Winchester in 1987. Between 1994 and 2003, Latham founded and led the leading games developer Computer Artworks Ltd which produced popular games such as *The THING* (Playstation2, Xbox and PC) for Universal Studios, which became a Number 1 hit in the UK and Germany. In 2007, he was appointed Professor of Computer Art at Goldsmiths (University of London) where his research projects with collaborator Prof Frederic Leymarie include a joint project with Imperial College on gamification and protein docking. Latham was co-author with Stephen Todd of the book *Evolutionary Art and Computers* published by Academic Press which is still recognised as a key work in this area.

Latham's considerable career also encompasses national and international exhibitions. *The Conquest of Form* toured to over ten galleries between 1987-1991 including the Arnolfini Gallery in Bristol, (1987) the Natural History Museum, London (1991) as well as the Cultural History Museum, Magdeburg, Germany (1991). In 1991 he presented work in the group show *Computer Art* at Centre George Pompidou, Paris, France and in 1993 *Mutation Room* at the British Council Show in Hong Kong. More recently, Latham's solo exhibition *Mutator 1 + 2: Evolutionary Art* at Phoenix Brighton was part of Brighton Digital Festival in 2013 and toured to the iMAL Gallery in Brussels in 2014.

He is Co-Director of SoftV Ltd involving gamification and neuroscience, collaborating with UCL (University College London).

Mutation Space

Mutation Space is a new computer / video Installation developed in 2014.

Using software modelled on the processes of evolution, it blends organic imagery and computer animation. The work includes large-scale printed translucent curtains and printed metal floor tiles which create a visually rich 3D design space within which human and machine interact.

Through computer touch screens and Kinect input, viewers are able to shape and mutate vibrant mutating organic forms in real time on a large projection screen and on small computer screens. Starting with a simple horn-like form, the Mutator2 code introduces random 'mutations' in order to generate increasingly complex three-dimensional creations that resemble fantastical, futuristic organisms, by a process that Latham describes as "evolution driven by aesthetics". These creations, like the Rorschach ink blot test, are open to multiple interpretations, as the viewer perceives content emerging from the endlessly mutating variations, some forms resembling Giger-eque ancient fossils, some looking like protein molecules, others like heavy metal structures and others resembling Escher-like alien spaceships. The installation includes very recent work with Stephen and Peter Todd and Lorenzo Ciciani in which the computer generates mutated variants which are then automatically culled by the computer based on aesthetic rules that are mathematically defined, removing the need for the artist or public viewer to steer the evolution. The work reflects the artist's long-term interest in harnessing basic evolutionary processes for creative ends.

The work is a result of William's long-term collaboration with Stephen and Peter Todd since the late 80s and includes very recent work on Fractal Mutation and aesthetic rules by his postgraduate student Lorenzo Ciciani. Darren Cleary worked on textiles and tile production.



ANDY LOMAS

Andy Lomas is a mathematician, digital artist and Emmy award winning supervisor of computer generated effects. *Cellular Forms* is the latest part of Morphogenetic Creations, a series of work which explores how complex organic structures, such as those seen in nature, can be the emergent generative products of growth processes.

He has had art work exhibited in over 40 joint and solo exhibitions, including SIGGRAPH 2005, 2006 and 2007, the 9th and 10th Japan Media Arts Festivals, the Ars Electronica Festival 2006 and 2014, the Los Angeles Center for Digital Art, Bios 4 at the Centro Andaluz de Arte Contemporaneo, the D'Arcy Thompson Art Fund Collection, and was selected by Saatchi Online to contribute to a special exhibition in the Zoo Art Fair at the Royal Academy of Arts.

His production credits include *Walking With Dinosaurs*, *Matrix: Revolutions*, *Matrix: Reloaded*, *Over the Hedge*, *The Tale of Despereaux* and *Avatar*.

Cellular Forms

Inspired by the work of Alan Turing, Ernst Haeckel and D'Arcy Wentworth Thompson, *Cellular Forms* uses a simplified biological model of morphogenesis to explore the generation of complex three dimensional structures.

Each form starts with a small initial ball of cells which is incrementally developed over time, adding iterative layers of complexity to the structure. The aim is to create forms emergently from the interactions between individual cells, exploring generic similarities between many different shapes in nature rather than emulating any particular organism. The process reveals universal archetypal forms that can come from growth-like processes rather than top-down externally engineered design.

Cell division is controlled by accumulated nutrient levels. When the level in a cell exceeds a given threshold the cell divides, and various parameters control how both the parent and daughter cells re-connect to their immediate neighbours. Rules can also be adjusted for how nutrient is created, such as by being randomly uniformly created by each cell, or by incident light rays creating nutrient in cells hit by photons. Nutrient can also be allowed to flow to adjacent cells. The simulation process is repeated over thousands of iterations and millions of particles, with typical final structures having over fifty million cells.

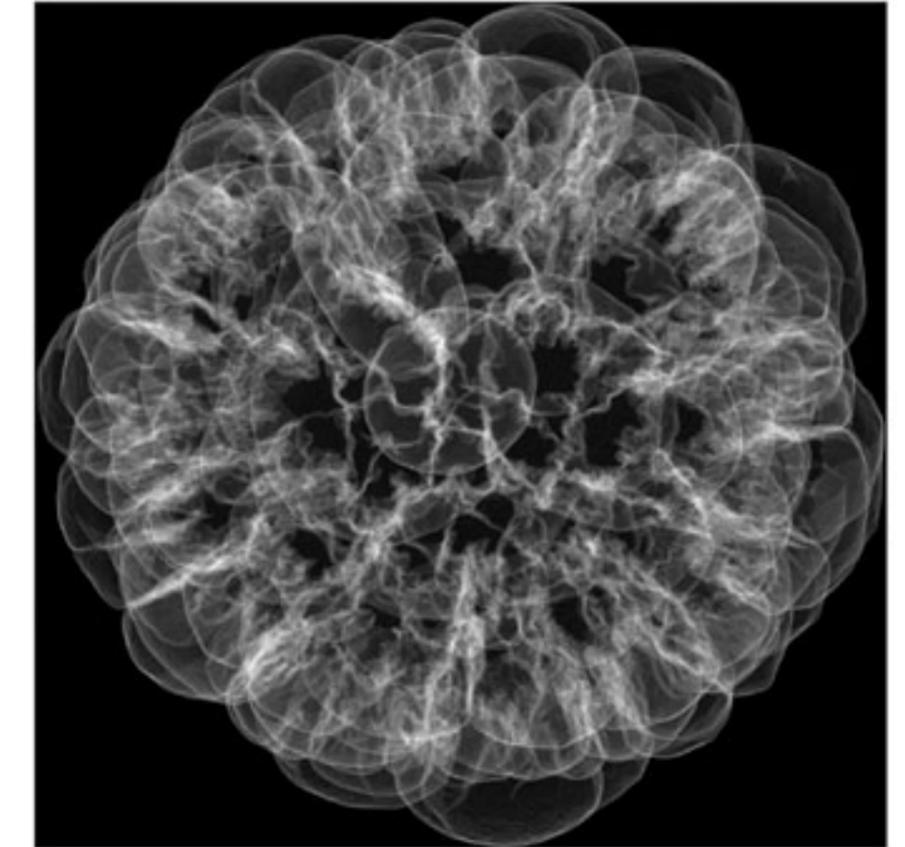
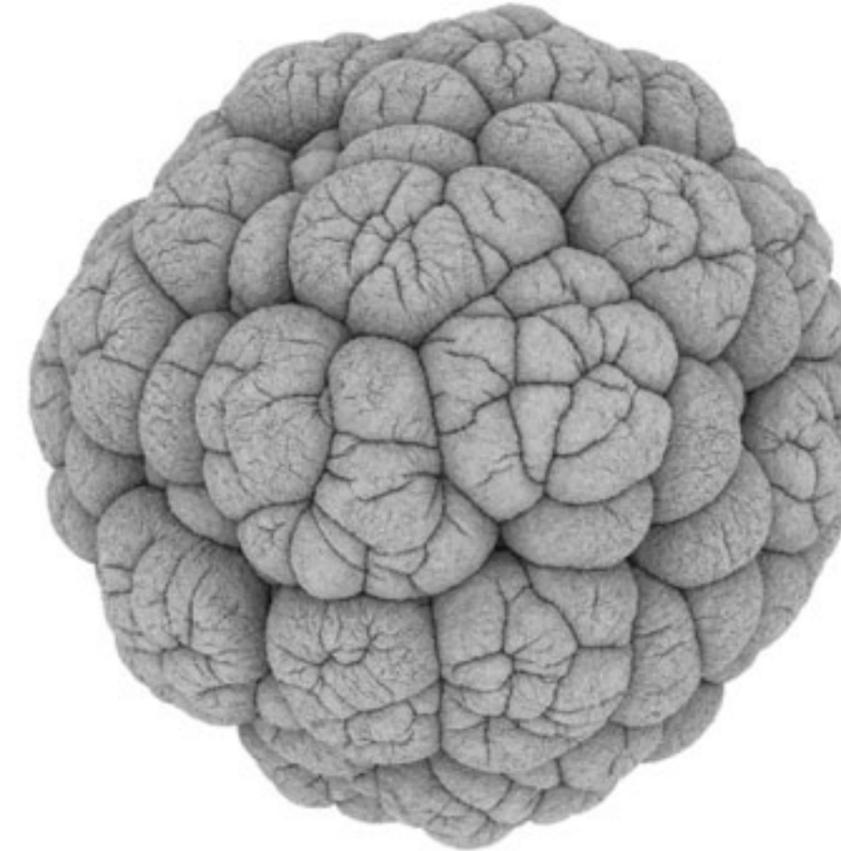
A number of internal forces affect the structures, including linear and torsion springs between connected cells. Additional forces repel cells that are in close proximity but are not directly connected. This creates tensions within the structures that induce them to change shape dynamically, with surfaces naturally folding into complex organic forms.

A wide set of variations arise from small changes to the rules governing the systems, with selection of forms based on aesthetic considerations rather than optimizing a conventional fitness function. All resultant motion as well as shape is genuinely emergent, since the simulation rules only dictate interactions between adjacent cells.

Two complementary rendering methods are applied to the simulation data to visualize the generated data and reveal different aspects of the forms.

The first shows the cells as sphere primitives illuminated with a diffuse light from all directions, revealing the three-dimensional shape of the forms through self-shadowing of the surface.

The second uses a density accumulation map, with each cell represented as a sphere of equal density. This digital emulation of an X-Ray reveals internal details of the structures that may not be apparent from the external surface.



MANU LUKSCH

Manu Luksch is intermedia artist whose practice interrogates conceptions of progress through the devising of tools and frameworks and the instigation of processes, with a strong emphasis on research and and collaboration – often with groups whose experience and expertise is under-recognised. She is founding director of ambientTV.NET, a crucible for independent, interdisciplinary projects at the intersection of art, technology and social criticism.

Her focus is on the effects of emerging technologies on daily life, social relations, urban space, and political structures – specifically, possible futures of infrastructures, the thresholds and constraints of public space, and the traces of data that accumulate in digital networked societies.

Works are shown at venues and festivals internationally, such as Whitechapel Art Gallery (London 2012), Coreana Museum of Art (Seoul 2011), Norwich Castle Museum (UK 2011), LABoral (Gijon 2010), Hors Piste, Centre Pompidou (Paris 2008, 2009), Ars Electronica (Linz 2013, 2007, 2002), NTT ICC (Tokyo 2006), Witte de With (Rotterdam 2006).

Luksch was awarded the Austrian Media Arts Prize 2012 and the Marianne von Willemer Prize for Digital Arts 2012 (Ars Electronica Centre & City of Linz).

Faceless

The sci-fi film *FACELESS* plays in an eerily familiar city, where the reformed RealTime calendar has dispensed with the past and the future, freeing citizens from guilt and regret, anxiety and fear. Without memory or anticipation, faces have become vestigial – the population is literally faceless. Unimaginable happiness abounds – until a woman recovers her face...

The film was made under the constraints of Luksch's Manifesto for CCTV Filmmakers – images are obtained from existing CCTV systems by the director/protagonist exercising her rights as a 'surveilled person' under data protection legislation. To comply with privacy legislation, CCTV operators are obliged to render other people in the recordings unidentifiable – typically by erasing their faces, hence the 'faceless' world depicted in the film. The scenario of *FACELESS* thus derives from the legal properties of CCTV images: a 'legal readymade'.

There was no traditional shooting script: the plot evolved during the four-year long process of obtaining images. Scenes were planned in particular locations, but the CCTV recordings were not always obtainable, so the story had to be continually rewritten.

The medium, in the sense of 'raw materials that are transformed into artwork', is not adequately described as simply video or even captured light. More accurately, the medium comprises images that exist contingent on particular social and legal circumstances – essentially, images with a legal superstructure. *Faceless* interrogates the laws that govern the video surveillance of society and the codes of communication that articulate their operation, and in both its mode of coming into being and its plot, develops a specific critique.



JON MCCORMACK

Jon McCormack is a researcher in computing and an internationally acclaimed electronic media artist. He is currently an ARC Australian Research Fellow in the Faculty of Information technology at Monash University in Melbourne.

With a background in art, mathematics and computer science, his research seeks to discover new kinds of creativity using computers. This research spans visualisation and virtual environments, evolutionary systems, machine intelligence, human-computer interaction, music composition and sound arts. McCormack has been the recipient of more than 15 international awards for both art and computing research, most recently the 2012 Eureka Prize for Innovation in Computer Science. His artworks have been widely exhibited at leading galleries, museums and symposia, including the Museum of Modern Art (New York, USA), Tate Gallery (Liverpool, UK), ACM SIGGRAPH (USA), Ars Electronica Museum (Austria) and the Australian Centre for the Moving Image (Australia). McCormack's recent book, *Computers and Creativity* (co-edited with Prof. Mark d'Inverno at Goldsmiths) looks at how human creativity is being radically changed by technology and was recently described by the head of Sony research labs in Europe as "required reading for everyone involved in the create arts and interested in the role of technology towards shaping its future".

Niche Constructions

Niche construction is a biological process whereby organisms modify the conditions and resources of their environment to create heritable niches for themselves and their offspring. For example, Beavers build dams which influence river flow and lake formation, creating a niche that changes plant composition and decomposition dynamics in the immediate area of the dam.

In the standard view of evolution, the gene is the main unit of selection in evolving populations of phenotypes. Species develop adaptations to their environment and the responsible alleles proliferate in the gene pool. From a niche construction perspective, organisms modify their environment – and possibly that of other species – creating a heritable environment for offspring. Advocates of niche construction argue that this forms an important feedback process in the natural evolutionary process.

This work is part of a series of experiments where we have applied biologically inspired processes to the development of creative generative systems.

In Niche Constructions, line-drawing agents move over a virtual canvas, leaving a trail of ink as they move. While drawing, they might reproduce, giving birth to new lines with similar drawing behaviour. If an agent intersects with an existing line, it dies. Eventually, all species become extinct; the drawing space fills up, all the agents die off, and the drawing is complete.

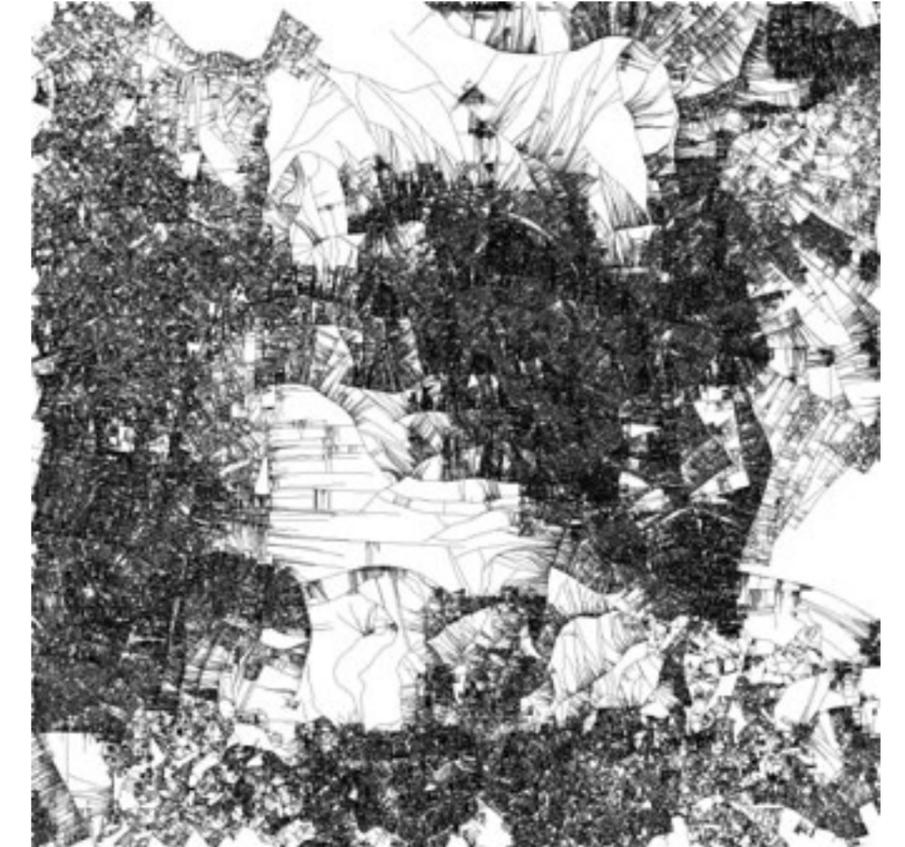
Each agent's genetic structure contains a special gene that represents the optimum image density the each individual and its descendants. The value of this optimum is genetically determined, but can vary between different species of agent.

As the agent moves around the canvas, the density of ink is measured in a small area surrounding the agent's current position. This density measure is used to determine how suited the environment is to the agent's density preference. The closer the match, the more successful the agent is in terms of longevity and reproduction.

Over the life of the drawing, the agents modify the environment to suit their niche preference. Additionally, through evolution, the genetically determined density preference adapts as the drawing fills with lines and becomes more dense.

The niche construction drawings show much greater variation in density and drawing style than the drawings made by agents without this mechanism. Niche construction introduces more complex behavioural dynamics into the drawing process using a relatively simple mechanism. 'Founder' agents often draw large, closed boundaries to protect their low-density children from being invaded by high-density loving invaders, for example.

We often think of creativity as a complex cognitive function that is most developed in humans. Niche Constructions shows how the bottom-up interaction of many simple, low-level processes can result in a system that exhibits creative behaviour.



PARASHKEV NACHEV

Parashkev Nachev is a neurologist and cognitive neuroscientist at UCL and UCLH, who in parallel applies his skill in these disciplines to the problems and possibilities of conceptual art.

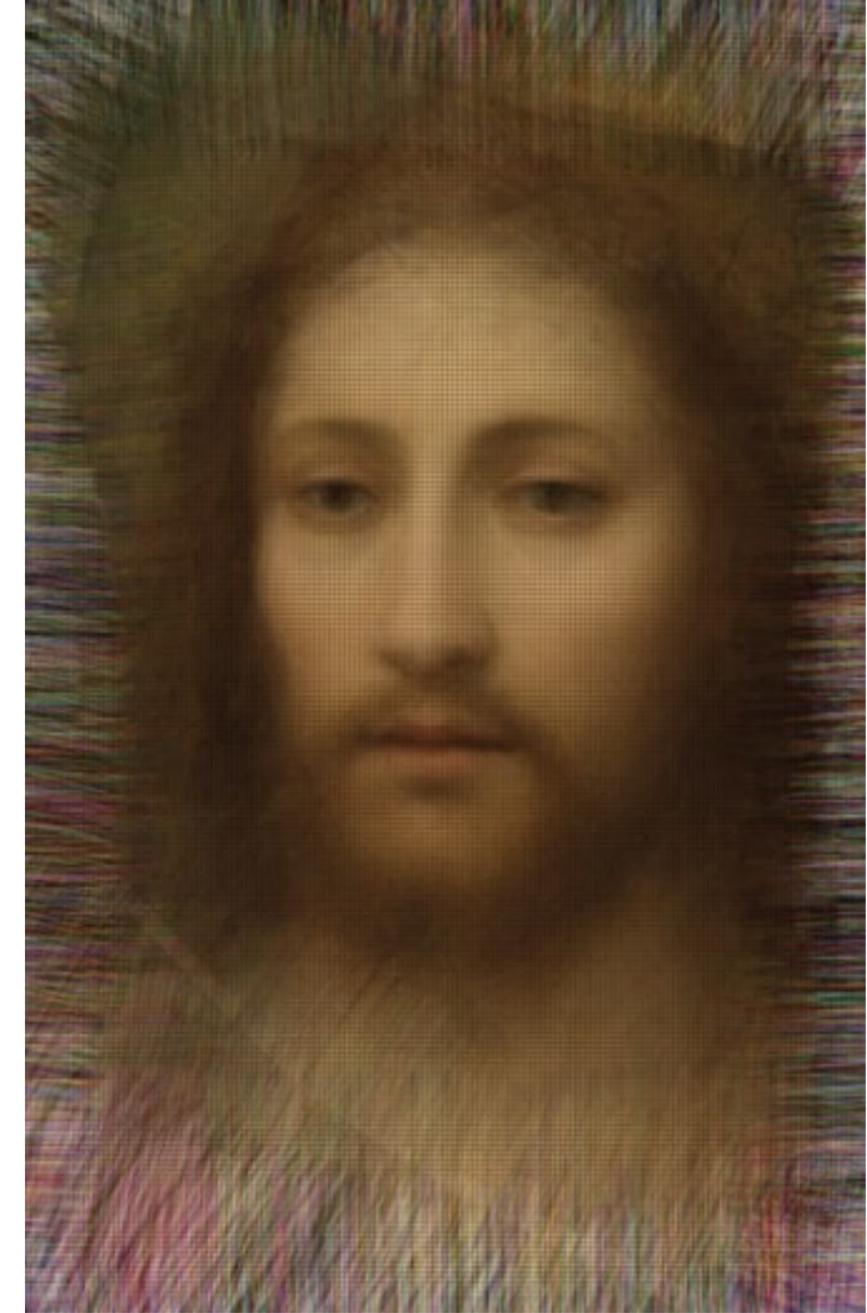
Intentionality in Silico (Sold Christ)

A pervasive source of conceptual anxiety is the notion of intentional in-existence: that something can exist in a mind yet nowhere else. For the reductive theorist it seems an attractive hook on which to hang the distinctiveness of the mental, for it seems both fundamental and unparalleled in the non-human world. Though we had little use for the idea before the scholastics brought it back to defective life, a conceptual attack on it is too deflationary for the current intellectual market. So here instead I turn to empirical, guerilla warfare, by creating a machine that confabulates images that exist nowhere but in its “mind” yet have the reality of that most human of imagined unrels: the inexistent face. Employing deep-learning techniques I have created a new kind of machine, a facievore, that consumes human faces it can find on the internet and extracts canonical, archetypal representations, automatically shaped by “imhomogeneities” in the population, pictorial or categorial. It consumes both face surrogates (photographs, masks) and face representations (painting, sculpture), sometimes confabulating from the real, and sometimes from the human-imagined. Though seemingly part accidental, part reality-driven, its complexity pushes it into territory where the distinction between the stochastic and the deterministic becomes opaque.

Aside from smiling at the implausible reductiveness of dominant ideas in the philosophy of mind, this machine has another, positive aspect.

For it draws on a truth to which machine-learning more potently than any other set of ideas will awake us: that the domains of the human and the physical-biological are one, must be one, and so to understand the biological we must humanise it.

This work supports a Wellcome Trust & Department of Health funded translational research project to develop a clinical system for detecting anomalies in brain scans with the aid of machine-learning (HICF-R9-501).



VESNA PETRESIN

Rubedo (Laurent-Paul Robert and Dr Vesna Petresin Robert) are a London based art practice and think tank exploring relations between aesthetics, complex geometry, acoustics and synaesthesia, through performance, installation and artefact.

The work integrates multiple material supports (sound, space, moving image, narrative) and customised digital and analogue tools.

It takes art out of the 'white cube' to an immersive experience and explores sound in relation to space, time and user interaction. It is supported by cross-modal mapping of data networks, as well as composition techniques based on the aleatory, emergent patterns and particle fields

The practice uses broadcast and physical events as a means of radical theory, as well as composition methods based on ambiguity, chance, emergent patterns and particle fields. Topology becomes a vehicle for conceptualisation, concretisation and symbolic mediation of the work that seeks to merge the dualism of art and science, micro and macro, the intimate and the collective. *Rubedo* are recipients of industry and arts grants (British Council, UK Govt. Department of Innovation, Business and Skills, Arts Council, Crafts Council) and acted as Industry Advisor to Goldsmiths College [Topology Research Unit]. Their work has been awarded a hors-concours Critics Selection at the 44th International Film Festival at Cannes, also contributing to team awards (Oscar, BAFTA, VES, Palme d'or) as well as patents and the first non-commercial satellite.

The work recently featured at Tate Modern, ArtBasel Miami, Royal Academy of Arts, Royal Festival Hall, Venice Biennale, Cannes International Film Festival, Institute of Contemporary Arts London, World Architecture Festival, Sydney Opera House, Beijing Architecture Biennale, Venice Biennale, Kings Place, Paris Photo, Silicon Valley Art Fair and Vienna Secession.

Structure in Flux

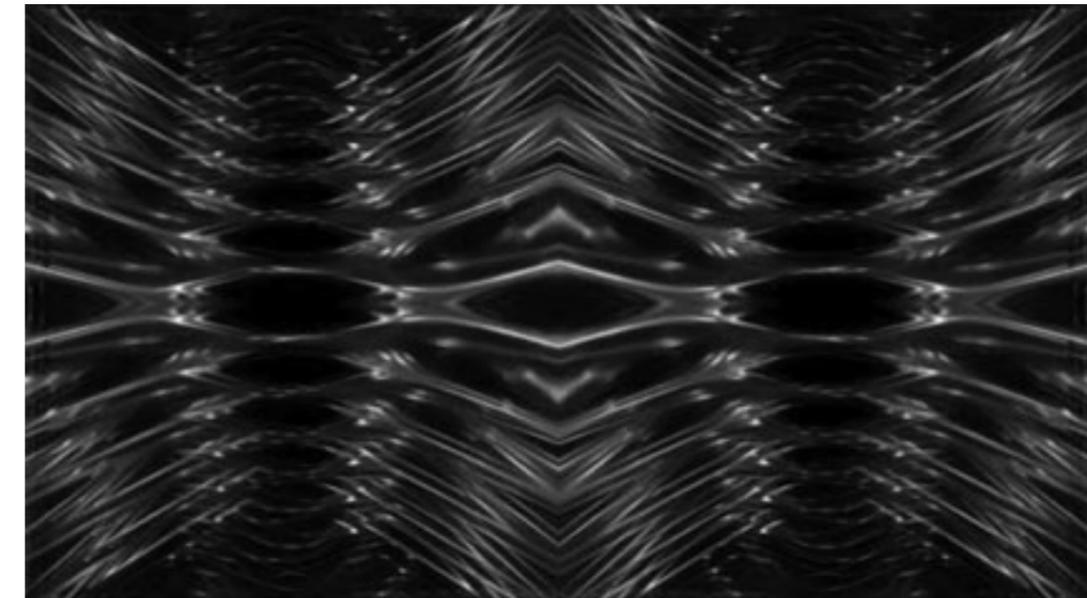
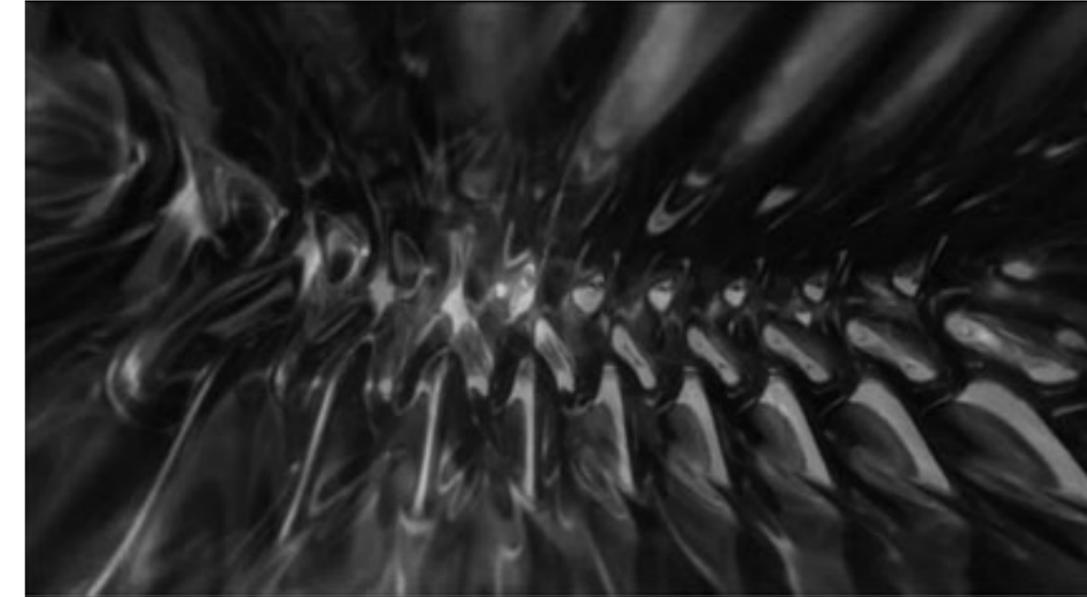
Investigating flow, rhythm and growth, the video piece was generated during a live performance *Structure in Flux (Rubedo, 2010)*. Here, 3D structure is being shaped, in real-time, in response to frequencies, modulations and rhythmical patterns of the sound piece composed and performed during the performance.

3D structures rendered as fluid light react to the acoustic parameters of the music; this creates a constantly-evolving visual experience of the installation.

The outcome is alike a moiré pattern – a figural effect produces by superposing fields of sonic loops and light patterns, with complex behaviours and experiences resulting from a combination of regular, repetitive elements.

This transmediation of sonic to visual organisation makes it possible to create an ecology of sound and light – a system based on its capacity for variation in space and time.

The result is an evolving landscape of light and sound that allows the viewers to discover their own sense of order, and engage with emotions arising from the experience.



QUAYOLA

Regarded for his enigmatic video installations, Quayola creates hybrid spaces of animated painting and sculpture. Engaging a practice of audio-visual performance, drawing, photography and software programming, he explores a fine boundary located between the real and artificial.

Special institutional commissions of Quayola's work have allowed him exceptionally rare access to the art and architecture of churches, theatres and museums in Europe, such as Notre Dame and the Vatican. In his work, original masterpieces and collections become raw canvas, as Quayola anchors a video-based exploration in a conversation about archives, collage, intellectual property and the appreciation of an object. In an age of the Google Art Project, which offers unprecedented access to the literal surface of a painting, Quayola handles the time we spend looking at art as a plastic artifact, something to be sculpted and suspended. The gaze is a place where the logic of a picture unfolds, seemingly excavated from beneath the image.

Iconographies #018 Venus & Adonis' after Rubens

Iconographies is an ongoing project focusing on the analysis of renaissance and baroque paintings via computational methods.

Religious and mythological scenes are transformed into complex abstract formations.

By removing iconographic narratives, the paintings lose their original context to become new objects of contemplation.

Iconographies #018 is a large-scale print inspired by *Venus & Adonis* (1610), a Peter Paul Rubens painting – Museum Kunstpalast, Dusseldorf, Germany.



FÉLIX LUQUE SÁNCHEZ

Félix Luque Sánchez (Oviedo 1976) creates audiovisual and sculptural art-works, for which he develops software / hardware and uses digital fabrication technologies.

He has exhibited his works at Transmediale (Berlin), Ars Electronica (Linz), iMAL (Brussels), LABoral (Gijón), Bozar (Fine Arts Museum Brussels), BIAN (Musée d'art contemporain de Montréal), among others.

He has won the New Technological art awards 2012 by the Liedts-Meesen Fondation (Gent-Belgium). He has also been nominated for major international new media awards like transmediale 2010 (Berlin-Germany) and Ars Electronica 2010 (Linz-Austria), for which he received an Honorary Mention.

From 2001 to 2007, he was a faculty member at IUA, the Audiovisual Institute at the Pompeu Fabra University (UPF) in Barcelona.

He currently lives in Brussels where he works as iMAL's FabLab manager.

Different Ways to Infinity

D.W.I gathers experiments as fictional strategies to generate infinity: the complexity of chaos, the space filling capacity of the rhombic dodecahedron, the replication of motorized mechanical systems as clones, or a machine's effort to raise a pendulum against gravity to find perpetual equilibrium.

The ancient alliance has been destroyed; man knows at last that he is alone in the universe's indifferent immensity out of which he emerged only by chance. – Jacques Monod

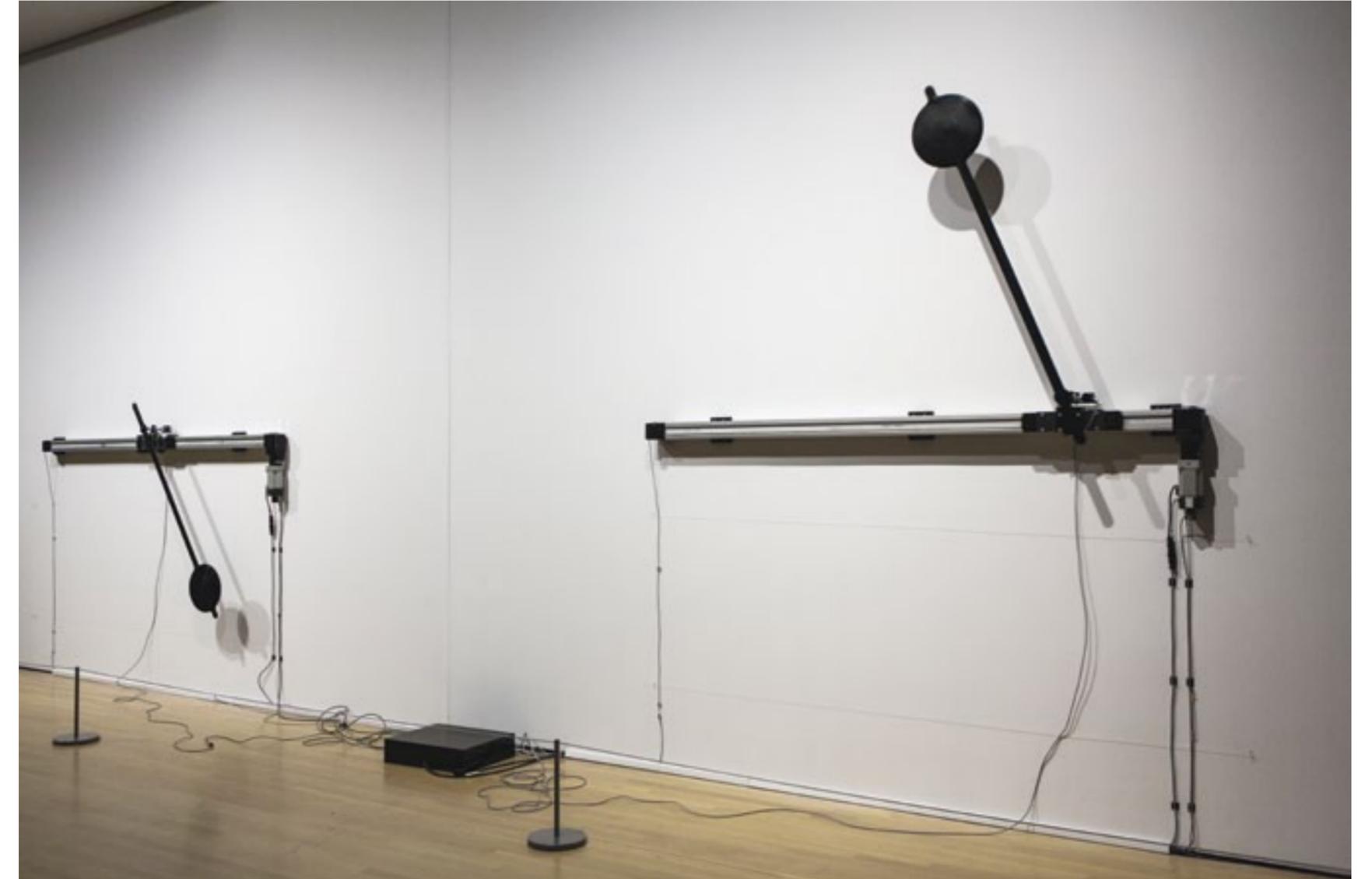
In the late 70's, chaos theory challenged traditional science's mechanistic vision of the universe (*La nouvelle alliance* 1979). Reality became an open system based in change, disorder and entropy.

Following the Prigoginian paradigm, *DWI Chaos* and *DWI Clones*, focuses on those aspects of reality such as disorder, instability, disequilibrium and non-linear relationships. The installation confronts the viewer to the anatomy of nature as an open system: entropy, the metaquantification of complexity, gravity, the control of chaos...

DWI: Clones

Clones are represented as identical mechanical machines (inverted pendulums), that using human behaviors, fuzzy logic, drift to find endlessness equilibrium.

Clones uses two identical inverted pendulums: based in a motorized mechanical system, the pendulums are mounted with the pivot point on a cart that moves horizontally. This movement makes the pendulum swing, and once the pendulum rotates to its inverted vertical point, an algorithm takes control of the movement of the cart and tries to find equilibrium against gravity. The artist explores the expressiveness of the system, using human size heavy pendulums, capable of generating enough inertia to generate self-rotation. He also tries to humanize the system in a game of failures and successes.



PETER TODD

Peter Todd grew up in a household where writing code to generate art was an everyday fact of life, and as such finds nothing unnatural in the idea that the formality of algorithms can have a symbiotic relationship with ostensibly 'freer' creative aesthetic explorations. Son of mathematician Stephen Todd, whose collaboration with artist William Latham at IBM led to the production of pioneering evolutionary computer art, he now pursues similar interests both independently and with Latham's "Mutators Research Group" at Goldsmiths.

Before becoming involved with Goldsmiths, Peter studied Sonic Art at Middlesex and has a continuing interest in the design of novel tools for design, composition and performance of experimental music, sound art and data sonification. While much of his recent work has been purely visual, he has also created the audio element of Latham's contemporary work – the audio processes used being partly based on another iteration of the Feedback Variations.

Peter is most – although not exclusively – interested in creating interactive artefacts that are meant to stand as works of art in their own right rather than composed pieces of music or rendered video. His development practice is starting to make use of live coding techniques, which he anticipates continuing to develop in the context of performance but also crucially as a tool for actively engaging both public and practitioners in creative computer science. He also enjoys fully air and natural sound and light, and hopes to integrate these more fully into his art practice in future.

Feedback Variations

This work is part of an ongoing technical and artistic exploration of feedback-based processes. It represents a refinement of some of these techniques into a form which is minimalistic in its algorithmic structure while – like an early Steve Reich phase piece – beguilingly complex in its perceptual effect.

In contrast to the pervasive feature-creep that can infect software development, much of the process behind this work is concerned with the removal of elements non-essential to the pure expression of the underlying phenomena. As works in their own right, these stand coherent and fully-formed. The starkness of their largely black and white appearance is not a technical limitation, but a facet of the desire to retain clarity as well as a reflection of the underlying simplicity.

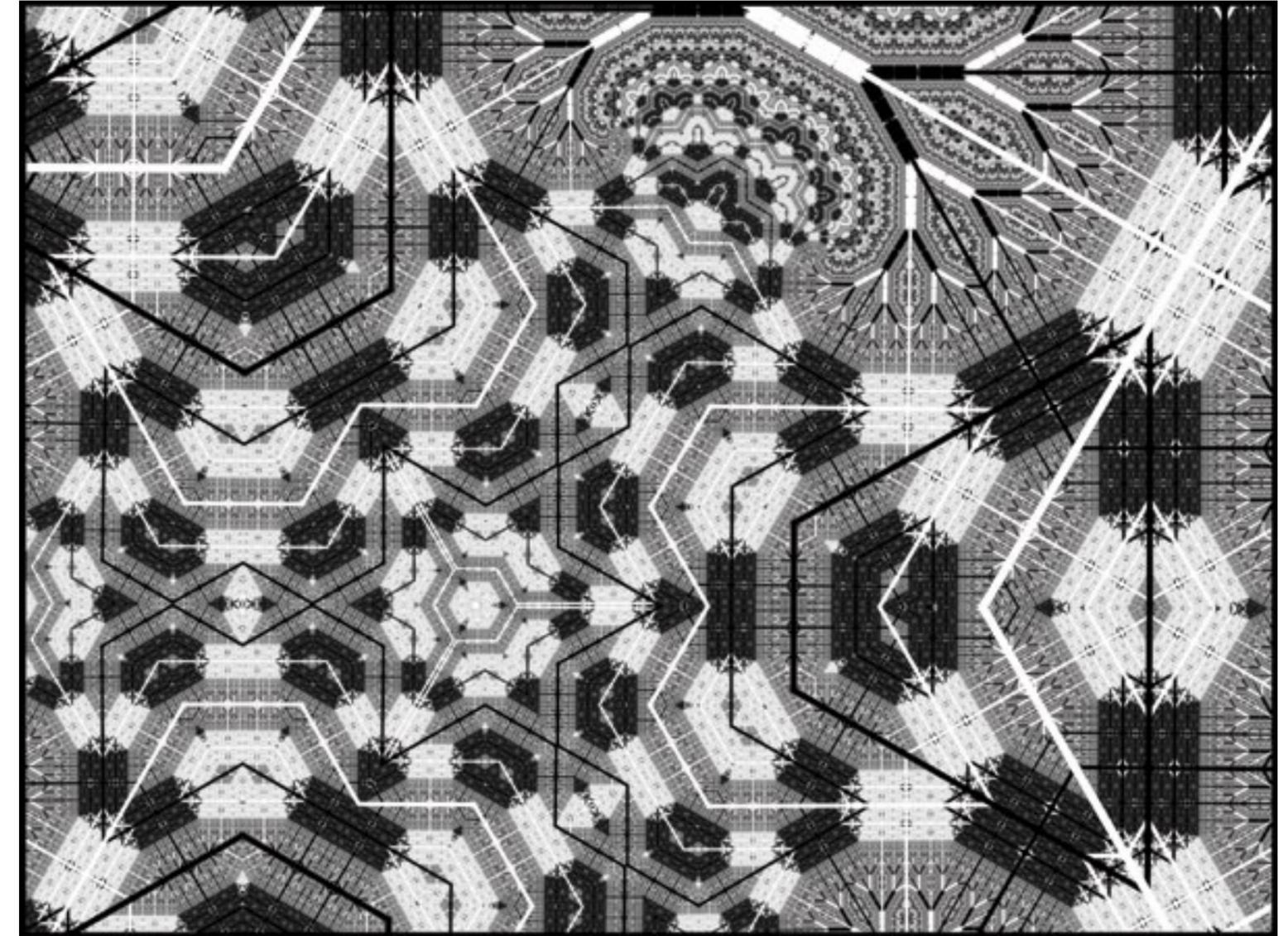
The techniques used need not necessarily have these austere limitations and indeed can – in different variations, not presented here – incorporate rich palettes of colour. Other uses may also complement more complex environments in peculiarly satisfying ways.

In the case of both of the variations displayed here, the process involves video feedback of the form where the results of the previous frame's rendering are used as visual input to each new frame. This colour value is inverted and rendered onto some simple geometry which remains static while the viewer's manipulation of the 'camera' through which it is viewed changes. The use of colour inversion helps to ensure that the results do not tend to 'blow out' or decay excessively as patterns converge or diverge, allowing wide ranging exploration of the space of possible patterns without too often being stranded in featureless deserts.

Also crucial to the design of these variations is the use of solid 'frames' of pure black (or black with a white stripe), which serve to provide the system with a consistent input signal encouraging the formation of stable patterns.

In *Fractaleid* (for iPad, with other platforms pending release at the time of writing), the geometry on which the feedback is rendered is a kaleidoscopic plane. The viewer manipulates a 2d camera with pan, pinch and rotate gestures on the touchscreen corresponding to movement, zooming and rotation. A black rectangular frame on the outside of the rendered image provides a stable graphical input, while subtly coloured dots appear under users' fingers; sometimes changing the entire appearance of the image as they are incorporated into the feedback.

The variation *Cardboard Box Recursion* (Android & Cardboard) explores the synthesis of a unique and compelling virtual reality environment distinct from resource intensive graphics techniques that attempt to produce a realistic, representational view of the world. It uses a 3d environment consisting of a cube, with the viewer placed in the center. The camera through which the feedback loop occurs uses a damped version of the viewer's head movements, opening up an expressive dynamic interaction with the chaotic geometries as they unfurl into endless tunnels and spiralling voids. The 'frame' consists of a black and white stripe along each of the edges of the cube.



Feedback Variations, 2013

Custom application

NAOKO TOSA

Naoko Tosa is an internationally renowned Japanese media artist, born in 1961 in Fukuoka, Japan. After receiving a PhD for Art and Technology Research from the University of Tokyo, she was a fellow at the Centre for Advanced Visual Studies at Massachusetts Institute of Technology (MIT) from 2002 to 2004 and is currently a professor at Kyoto University. She has exhibited her artworks at the Museum of Modern Art, New York, the New York Metropolitan Art Museum and Japan Creative Center at Singapore among many locations worldwide. In 2000, she received a prize from the Interactive Art section in ARS Electronica. Also in 2004 she received 2nd prize for Nabi Digital Storytelling Competition of Intangible Heritage, organized by UNESCO2004. In 2012, Naoko Tosa was asked to create a digital artwork for Yeosu Marine Expo in Korea. In the EXPO Digital Gallery with a LED screen measuring 250 metres by 30 metres, she exhibited a digital artwork called *Four God Fag* symbolizing the idea of Asian traditional four gods connecting Asia. The work was honored by Expo 2012 Committee.

www.naokotosa.com

Space Flower series

Naoko Tosa's new series of works pays homage to Rimpa, one of the major historical schools of Japanese painting that was founded in Kyoto in the 17th century.

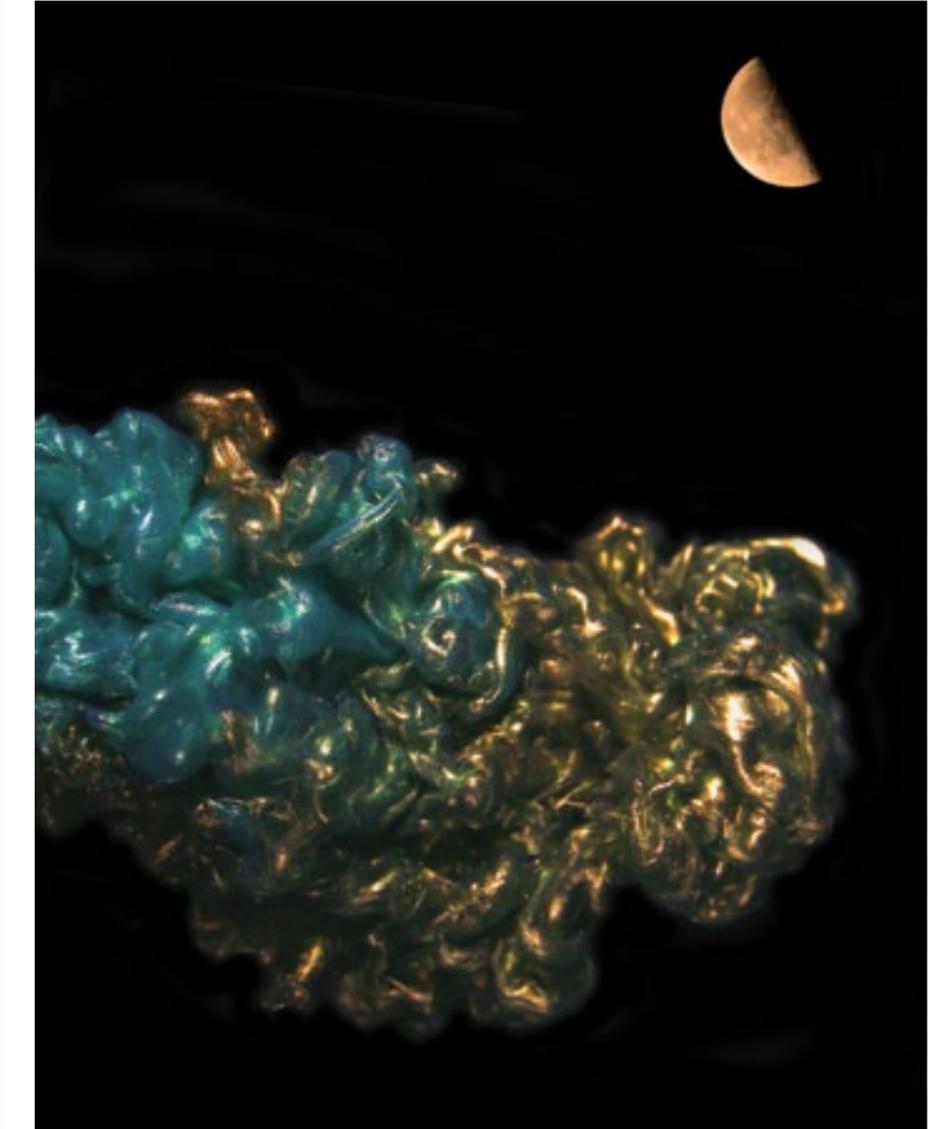
Famed for its usage of luxurious golden colour, one of its key exponents was the artist Korin Ogata, whose paintings of *Wind God* and *Thunder God* have become representative of the style. The fragmentation of flowers by the elements of wind and thunder serves an allegory for the fading of old customs and the beckoning of a new future.

Oiran alludes to the eponymous courtesans popular during the 18th and 19th century; the roses, as though performers in a Kabuki piece, exude a gallant beauty while their fragility evokes a dreamlike presence, at once ephemeral and elusive. A flower blooming in space in Space Flower symbolizes life and refers to one's individual self. Perhaps the act of maturing requires one to reject one's past, an act that inflicts hurt upon one's self, but the individual more often than not comes out stronger. Space Jungle depicts a jungle on a planet far away from ours.

Abundant water and flora abound on the surface while an array of minerals and plants inhabit the underground, navigating the chaos of zero gravity in obliterative spurts of dance. Drawing inspiration from Ogata's painting *Red and White Plum Blossoms*, a national treasure of Japan, Moon Flower considers how red and white plum blossoms would appear on the Moon, presenting a continuous kaleidoscope of exploding moon flowers. The deified characters of Ogata's *Wind God* and *Thunder God* take centre stage with Tosa's reimaginings. *Wind God* shows a figure approaching and unfolding onto the scene before departing while *Thunder God* invokes the Japanese thunder god Susanoo, who remains likeable in spite of his selfish and mischievous personality.



Space Flower series, 2014



Video

PATRICK TRESSET

Patrick Tresset is a French artist and scientist who investigates human artistic activity and our relations with machines, in particular our relations with robotic entities. In the context of his art practice, Patrick uses robotics to create autonomous robotic entities that are evocative representations of the artist, and in a certain manner a representation of himself. His robots are based on research from robotics, computer vision, artificial intelligence and cognitive computing.

Patrick's research led him to join Goldsmiths, University of London, to study for a Master of Sciences in Arts Computing. Until 2013, he co-directed the Alkon-II project with Prof. Frederic Fol Leymarie. The Alkon-II project investigated the observational sketching activity through computational modeling and robotics, and was funded in part with a research grant from the Leverhulme trust. Patrick also established the creative robotics module taught to post-graduate students at Goldsmiths as part of the MFA Computational Arts programme. Patrick is a Senior fellow at the Zukunfts Kolleg, University of Konstanz in Germany and is currently a visiting research fellow at Goldsmiths University of London, United Kingdom.

Patrick's work has been internationally exhibited in solo and group shows, in association with major museums such as Victoria & Albert Museum, Science Museum, Tate Modern, the Pompidou Center, Museum of Israel and events such as Ars Electronica Festival, London Art Fair, Kinetica Art Fair and Istanbul biennial.

Patrick's work has been featured in major media including The Times (UK), The Independent (UK), The Telegraph (UK), Le Monde (FR), New Scientist (UK), El Mundo (SP), L'Oeil (FR), Tank Magazine (UK).

Paul-IX le vaniteux

Paul-IX le vaniteux, passes time by drawing a still life from observation. The ensemble of objects depicted seems reminiscent of a Vanitas of the XVIth century; a type of motif traditionally depicting objects that symbolise different aspects of the futility of human earthly pursuits.

The irony of an artificial agent commenting upon human behaviours, aspirations and mortality is counterbalanced by the knowledge that, just as the Nexus-6 in P. K. Dick's *Do androids dream of electric sheep* the Paul series of robots, if not maintained, have a short life expectancy. Anyway, what is the point for a robot to dedicate its time to criticising human existence rather than be a useful machine as expected of it?

The Paul series of robots are artificial agents obsessively focused on the drawing practice. Paul predecessors were originally developed to palliate a debilitating painter's block and as such can be seen as creative prosthetics or behavioral self-portraits.

Even if the way the Pauls draw is based on Tresset's technique, their style is not a pastiche but rather an interpretation influenced by the robots' characteristics. The software driving the Pauls is based in part on technologies developed by Tresset in the context of Alkon-II, a research project hosted within Goldsmiths College's computing department.

The Alkon-II project investigated the observational sketching activity through computational modeling and robotics, and was co-directed with Frederic Fol Leymarie.



HARWOOD-WRIGHT-YOKOKOJI

The artists Harwood, Richard Wright and Matsuko Yokokoji worked together from 2004 until 2008, firstly as part of 'Mongrel' – an internationally recognised artists collective. Working in a fusion of art, electronic media and street culture, they try to reach beyond the hierarchies of power and knowledge to involve those normally excluded from expression and collaboration. Previous projects include the first online commission from the Tate Gallery, London and work in the permanent collections of the Pompidou Centre Paris and the Centre for Media Arts in Karlsruhe (ZKM).

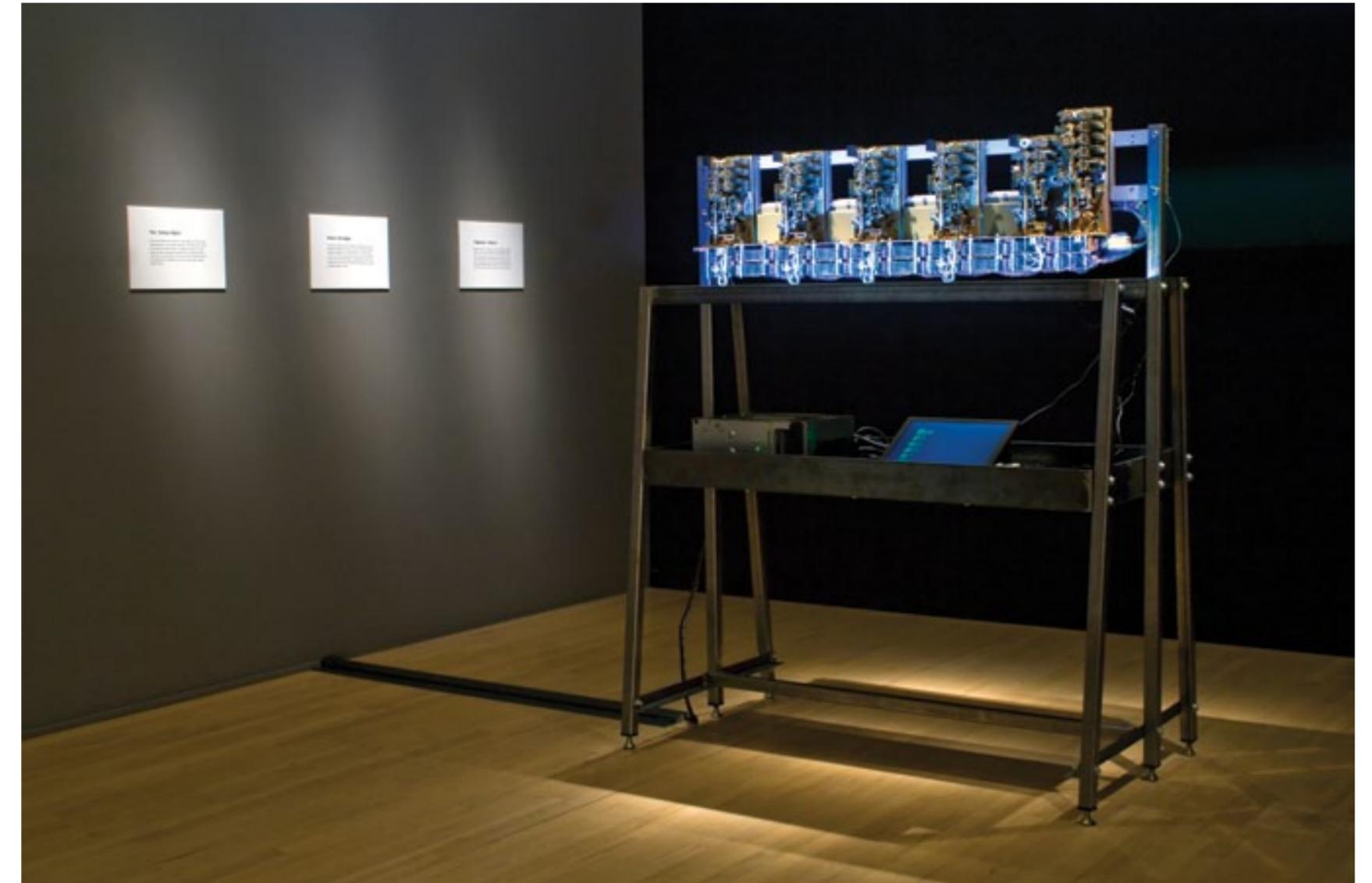
Our approach to media is to set up a series of ways that allow it to become strange to people, to allow it to become a space of fun and experimentation, of expanded thoughts and actions... It is about opening up the implicit meaning of media itself – to mediate not by controlling and ordering what can be said, shown or heard but by providing the means to unblock channels of access, release currents of energy and reveal the margins of what people can feel, sense, reason and imagine.

Richard Wright works as an independent artist/filmmaker/theorist.

Harwood and Yokokoji work under the title of YoHa (yoha.co.uk).

Tantalum Memorial

Tantalum Memorial was produced by Harwood, Wright and Yokokoji between 2006 and 2009. The work is a telephony-based memorial to the people who died as a result of the 'coltan wars' in the Congo from 1998 to the present. Coltan ore is mined for the metal tantalum – an essential component of mobile phones that is now more valuable than gold. The work is constructed from redundant electromechanical Strowger switches – the basis of the previous generation of telephone exchanges. These switches are reanimated by tracking the phone calls from *Telephone Trottoire* – a social telephony network also designed by the artists for the Congolese radio programme Nostalgie Ya Mboka in London. Their precisely poised movements and sounds create a sculptural presence for this otherwise intangible network of circulating conversations and weave together the ambiguities of globalization, transnational migration and the impact of our addiction to constant communication.



LILLEVAN

Lillevan is an animation, video and media artist. He is perhaps best known as founding member of the visual/music group Rechenzentrum (1997-2008).

Lillevan has performed and collaborated with many artists from a wide array of genres, from opera to installation, from minimal electronic experimentalism to dance and classical music; performed and exhibited all over the globe, and at all the major media festivals. He works with Fennesz, Morton Subotnick and many others.

lillevan.com

ADAM PARKINSON

Adam Parkinson is an electronic musician and researcher in EAVI, Goldsmiths. He likes running Pure Data music software on anything he can get his hands on – from mobile phones to single board computers, exploring the possibilities of making “computer music” with things that don’t look like computers.

In his duo with Atau Tanaka, he has performed across Europe and America. As a musician and programmer, he has worked with Arto Lindsay, Caroline Bergvall, Phill Niblock, Rhodri Davies and Kaffe Matthews and released on Entr’acte records.

cargocollective.com/manwithfeathers

The Performance

This is the first time Lillevan and Adam have performed together. They will improvise with a set of prepared materials.

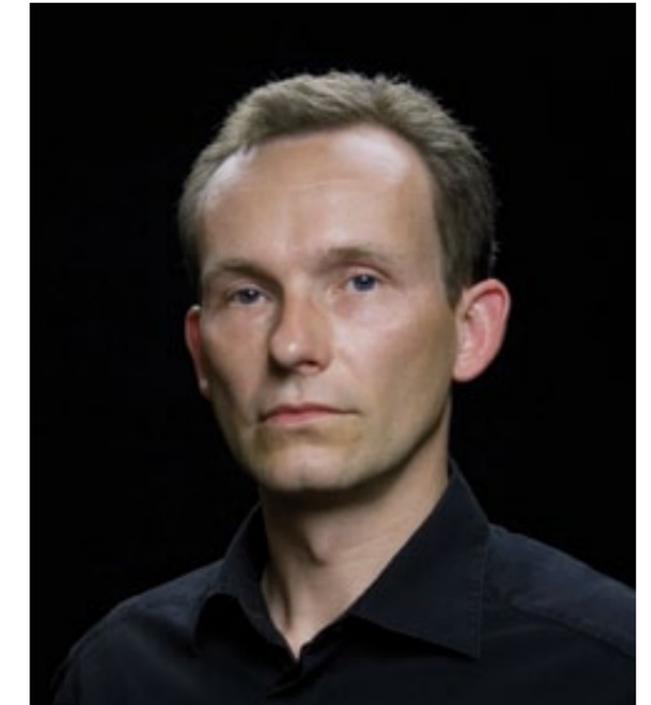
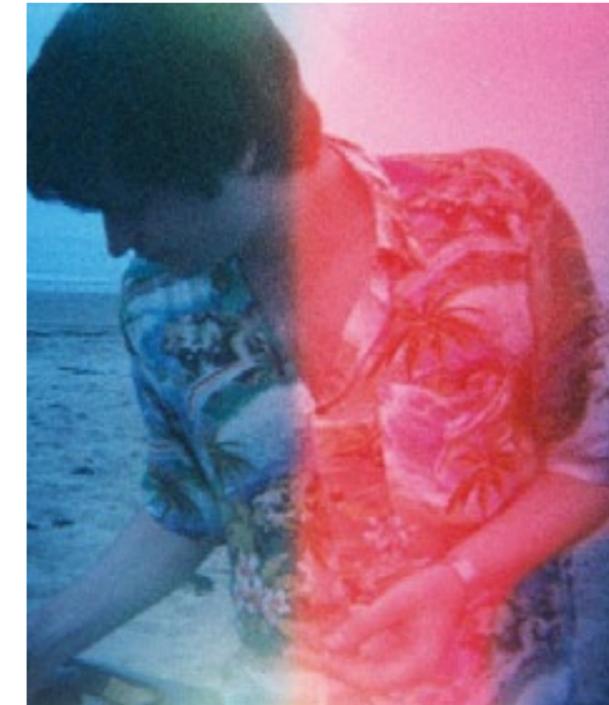
Lillevan’s practice investigates non-narrative facets of film, focusing on the musicality of the imagery, thus defining the moving imagery as an instrument in its own right as opposed to accompanying music. Intensity and texture are more important than narrative and figure. The relationships between the image’s elements and the viewing eye, between the eye, the mind and the soul are explored. The world of media archaeology is of major interest, while questioning viewing habits and manipulative image-creation. Lillevan recontextualises, combines and politicises existing film images and fragments. The images are a communicative medium interacting with the music. The selection of the images can either support the sound, or work against it, the aim being to achieve a dialogue.

Adam will be performing using 3 Beagleboards (single board computers): bare circuit boards which are essentially computers without screens, housing or keyboards, running granular synthesisers and algorithmic, unpredictable sequencers.

A large part of his musical practice involves recontextualising and reappropriating samples, taking sounds from easy listening, hardcore trance and 80s pop and forcing them into unfamiliar combinations, trying to reveal their strange and hidden potentials when placed in new contexts. For this performance he will be working with sine waves and sounds synthesised on an MFB drum machine, sonically occupying the space with a limited sound palette of skeletal techno.

Light sensors mounted on the Beagleboards create unstable connections between Lillevan’s images, reduced to vectors of intensity, and the soundscape, allowing both performers to interact with the sound and find areas of expressivity and conflict.

The performance will take place at the Private View for the Creative Machine exhibition on Thursday 6th November in the SONICS surround audio visual installation in the main exhibition space.



Consciousness and Creativity

J MARK BISHOP

Goldsmiths, University Of London

It is a commonly held view that “there is a crucial barrier between computer models of minds and real minds: the barrier of consciousness” and thus that information– processing and the conscious experience of raw sensations¹ are conceptually distinct [12]. Indeed, Cartesian theories typically describe cognition in terms of its objective and subjective aspects, so breaking down the ‘problem of mind’ into what David Chalmers [7] calls the ‘easy’ problem of perception – the classification, identification and processing of sensory (and concomitant neural) states – and a corresponding ‘hard’ problem, which is the realization of the associated raw phenomenal experience of sensation. The difference between the easy and the hard problems – and the apparent lack of a link between theories of the former and an account of the latter – has been termed the ‘explanatory gap’.

But is conscious experience a necessary prerequisite for the realisation of cognition and genuine mental states

¹ The term ‘consciousness’ can imply many things to different people; in the context of this essay I specifically mean that aspect of consciousness Ned Block terms ‘phenomenal consciousness’ [6] and by this I specifically refer to the first person, subjective phenomenal sensations: pains, smells, the ineffable red of a rose, and so on.

in all entities – both natural and artificial? John Searle suggests that it is, “.. the study of the mind is the study of consciousness, in much the same sense that biology is the study of life” [11] and this observation leads Searle to outline a ‘connection principle’ whereby “... any mental state must be, at least in principle, capable of being brought to conscious awareness’(ibid).

Yet is such conscious experience also necessary for an entity to be considered ‘creative’ and, furthermore, can a mere computing machine (qua computation) ever aspire to realise consciousness, in all its beautiful and terrifying grandeur?

Certainly across the realms of science and science fiction the hope is periodically reignited that a computational system will one day be conscious by virtue of its execution of an appropriate program; thus in 2004 the UK funding body EPSRC awarded a substantial ‘Adventure Fund’ grant to a team of Roboteers and Psychologists at Essex and Bristol led by Owen Holland, with a goal of instantiating consciousness in a humanoid–like robot called Cronos.

But equally, the view that the mere execution of a computer program can bring forth consciousness has not gone unchallenged. Indeed, one argument that I have developed, which questions the very possibility of such a machine consciousness, is the ‘Dancing with Pixies’ (DwP) thought experiment [2], [3], [4] &[5].

Baldly speaking DwP is a simple reductio ad absurdum argument to demonstrate that:

- IF the assumed claim – that an appropriately programmed computer really does instantiate genuine

phenomenal states – is true;

- THEN panpsychism – the view that all matter has consciousness – is true.

However if, against the backdrop of our scientific knowledge of the closed physical world and the corresponding desire to explain everything ultimately in physical terms, we are led to reject panpsychism, then the DwP reductio suggests computational processes cannot instantiate phenomenal consciousness and computational accounts of cognitive processes must, at best, exhibit what John Searle termed weak artificial intelligence; a so called ‘weak AI’.

Weak AI does not aim beyond engineering the mere simulation of [human] intelligent behaviour; strong AI, in contrast, takes seriously the idea that one day machines will be built that really can think (be conscious, have ‘genuine’ understanding and other cognitive states) purely in virtue of their execution of a particular computer program [10].

Furthermore, taken alongside the Chinese Room Argument (CRA)² – Searle’s famous critique of strong AI and machine understanding (ibid) – I suggest the DwP reductio places bounds on the successes of any mere computationally powered creativity project because, if Searle and I are correct, no purely computational engine can ever genuinely feel or understand anything of the world nor, indeed, anything of its own ‘creative response’ to that world (nor the world’s response to it).

² The Chinese Room Argument is John Searle’s (in)famous critique of strong AI and machine under- standing [10]; if correct, Searle has demonstrated that ‘syntax is not sufficient for semantics’ and hence that computational systems can never genuinely ‘understand’ the symbols they so powerfully manipulate.

Thus, echoing Searle’s taxonomy of Artificial Intelligence, Mohammad Majid al-Rifaie and I have suggested a dual taxonomy of ‘computationally creative systems’: a weak notion, which does not go beyond exploring the simulation of [human] creative processes; emphasising that any creativity so exhibited springs forth from the interaction of man and machine (and fundamentally remains the responsibility of the human) and a strong notion, in which the expectation is that the underlying creative system is autonomous, autopoietic and conscious, with ‘genuine understanding’ and other cognitive states [1].

That said, of course there always remains a trivial sense in which every time we run any computer program the machine is in some sense ‘computationally creative’, as symbols and patterns that, perhaps, have not previously been output together (say as a novel image) are cranked forth into the world; as Newell and Simon [9] famously observed back in 1973:

Computer science is an empirical discipline. We would have called it an experimental science, but like astronomy, economics and geology, some of its unique forms of observation and experience do not fit a narrow stereotype of the experimental method. None the less, they are experiments. Each new machine that is built is an experiment. Actually constructing the machine poses a question to nature; and we listen for the answer by observing the machine in operation and analyzing it by all analytical and measurement means available.

However, lacking autonomous teleology, contextualisation and intent, even this modest conception of a [computational] creative process is merely analogous

to a ballistic throw of a dice³, soliciting only the faintest echo of ‘creativity’ as the word is more usually employed.

Viewed under a modern conception of creativity – as a process positioned within a reflective historical lineage – such reflections inexorably prompt us to question in what sense any computational system could ever be seriously described as strongly creative (and not simply as a tool, an accelerator, to its programmers own vivid imaginings).

Indeed, in his recent address to open AISB50 (the 50th anniversary conference of the UK society for Artificial Intelligence and the Simulation of Behaviour), Harold Cohen, the British – born artist well known as the creator of AARON (a computer program often claimed to produce art ‘autonomously’) retreated from this very shibboleth by electing to describe his own work merely in terms of interactive collaborations between man and machine.

Hence, in the light of these concerns – and until the challenges of the CRA and DwP have been fully addressed and the role of the mind’s embodiment strongly engaged – I suggest a note of caution in labelling any computational system as ‘strongly creative’; any creativity displayed therein being simply a projection of its engineer’s intellect, aesthetic judgement and desire.

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³ Tristan Tzara and William S. Burroughs both famously utilised random acts (drawing a series of words from a hat; cutting-up texts and randomly rearranging them, respectively). In the context of this essay it is argued that the creativity here lies more in the artist’s decision to deploy a random processes centrally within the creative act, rather than any Rorschach interpretations these processes eventually invoke.

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