FROM ABSTRACT DATA MAPPING TO 3D PHOTOREALISM: UNDERSTANDING EMERGING INTERSECTIONS IN VISUALISATION PRACTICES AND TECHNIQUES

Visualization Research Unit, Birmingham Institute of Art and Design, 19 June 2007

Visualisation within Internet Art: A Sampling of Current Technologies and Practice

by: Michael Takeo Magruder - 2007

Context

Throughout the history of Art, technologies originally developed for non-creative endeavours have been appropriated by artists, thus leading to the emergence of new models for artistic exploration. In the late 20th century, the rapid development of computer and communication systems provided artists with new possibilities for visual aesthetics and theoretical discourse. The rise of this avant-garde field of contemporary arts practice, referred to as New Media, embraced the adoption and repurposing of ubiquitous elements of technoculture, including the Internet.

Internet Art[1] projects are art projects for which the Net is both a sufficient and necessary condition of viewing, expressing and participating. Internet Art can also happen outside the purely technical structure of the Internet, when artists use specific social or cultural traditions from the Internet in a project outside of it. Internet Art is often, but not always, interactive, participatory and based on multimedia in the broadest sense.

- Steve Dietz, curator in New Media

Internet Art embraces numerous forms of creative output, ranging from visual constructs and audio streams to subversive interventions and social networks.[2] This diversity in artistic product is a consequence of artists utilising the Internet's various services, including the Web, e-mail and file sharing, in their working practice.

In terms of visualisation, the Web offers the largest selection of artworks in this genre as the platform has evolved from its text-based origins into a media-rich visual framework. Raster[3] and vector graphics, text files, sound clips, video streams and code are but some of the Web's constituent elements that artists deploy as primary materials in their work.

The following eight artworks demonstrate the creative potentials of 2D and 3D web-based visualisation technologies. Each composition has been selected to showcase a particular mainstream software platform, summarising its aesthetic and conceptual potentials within the artistic process.

[1] Sometimes referred to as Net.Art.

[2] Two of the largest public portals for Internet Art are Rhizome (http://www.rhizome.org/) and Turbulence (http://www.turbulence.org/). Theses international organisations have supported work in this genre for over a decade and host extensive collections of web-based art.

[3] Raster graphics are 2D images files that are based on a grid (i.e. pixel) system.

2D Web-based Technologies

Stop Motion Studies : David Crawford, 2002-3 : Flash

Adobe Flash[4] is the Internet's ubiquitous plug-in. The software package combines native support for nearly all web-based media types and provides key-frame animation[5] and extensive scripting facilities. Although Flash is a common design instrument for commercial websites and advertisements, it's feature set and large user base[6] have led to its wide-spread adoption within the digital arts community.

The *Stop Motion Studies*[7] series, by American artist David Crawford, extends concepts and techniques of Photography by augmenting traditional photographic processes with computational media. Crawford utilises the inbuilt animation capabilities of Flash to explore non-verbal human communication and behaviour through an analysis of movement and gesture. Employing an algorithmic montage technique, the artwork recombines sets of sequentially captured still images to create a moving-image aesthetic that is reminiscent of early card-based cinematic devices.[8]

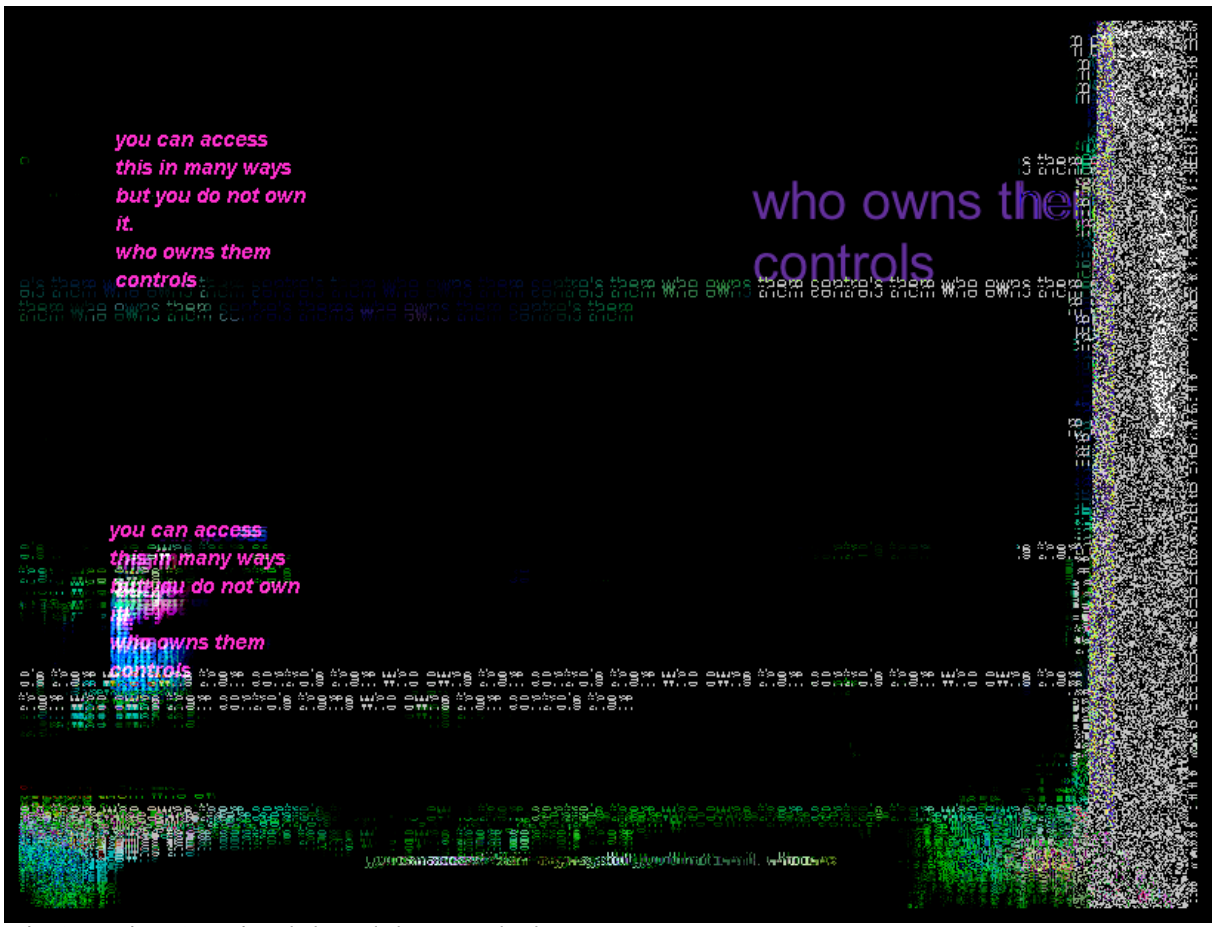
[4] Formerly known as Macromedia Flash, version 1.0 was released in December 1996.

[5] Key-frame animation refers to a method of generating smooth motion transitions between two distinct (start and end) points.

[6] By 2001 the Flash plug-in was installed on 92% of all Internet users' systems. (source: wikipedia.org)

[7] *Stop Motion Studies*, http://www.stopmotionstudies.net/, David Crawford, 2002-3.

[8] Such as flip books and the mutoscope.



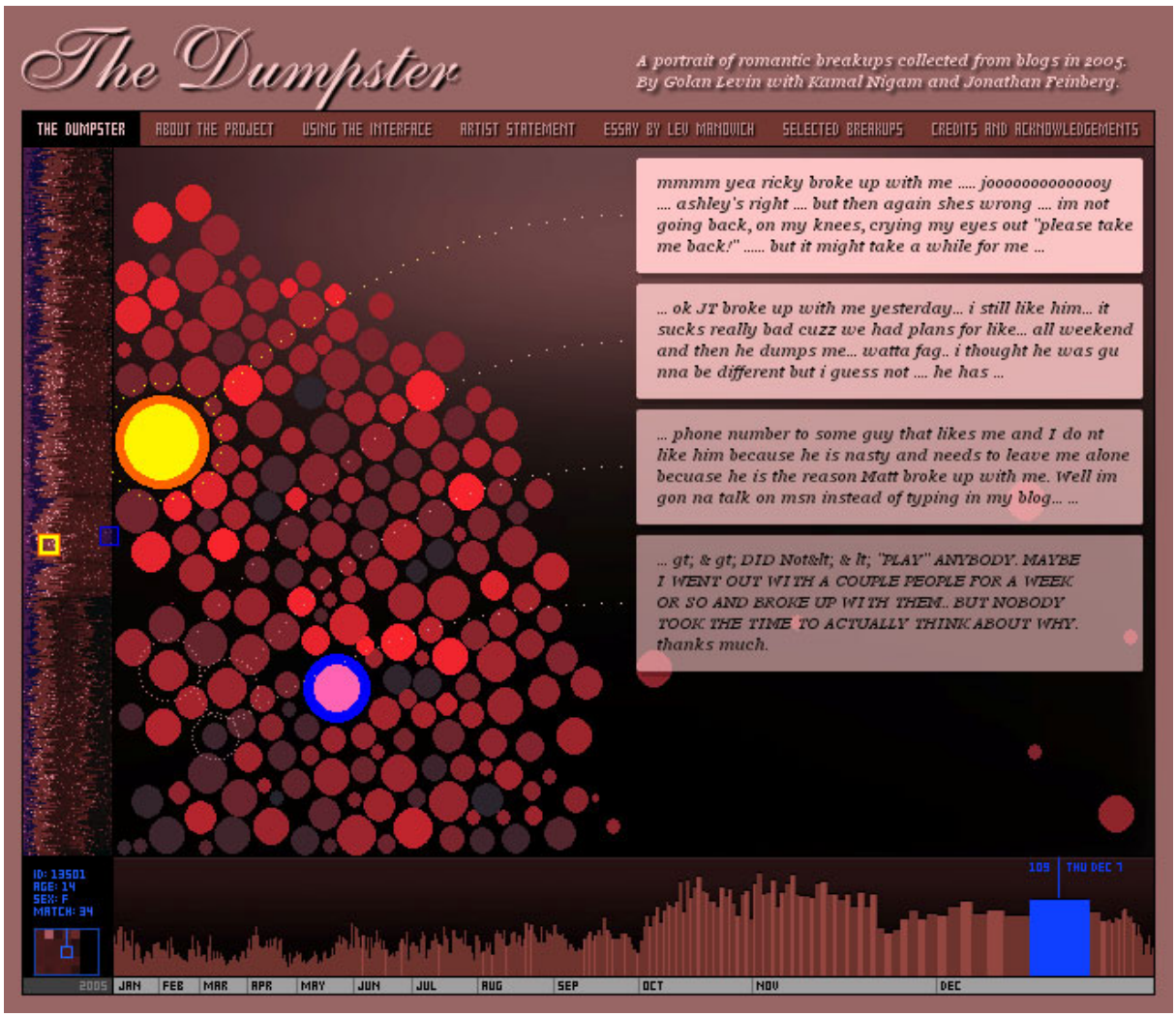
Who Owns Them Controls : Glorious Ninth, 2001 : Shockwave

Adobe Shockwave[9] is a popular multimedia plug-in amongst digital content creators. Originally developed for online movie and animation authoring, the technology is now utilised across a wide-range of creative initiatives, most notably within the emerging genre of free online interactive games. The software provides a combination of multimedia features and scripting support, and has been used as a platform for digital arts since the mid-1990s.

Who Owns Them Controls[10], by British duo Glorious Ninth, is concerned with ownership of and access to new technologies. The Shockwave engine generates the artwork in real-time from a pool of media elements that are directed by the artists' code and spectator interaction with the work. Text and sound are aesthetically combined into a hybrid form that is both data-painting and sound-scape.

[9] Formerly known as Macromedia Shockwave

[10] *Who Owns Them Controls*, http://www.gloriousninth.com/who_owns_them_controls.html, Glorious Ninth, 2001.



The Dumpster : Golan Levin with Kamal Nigam and Jonathan Feinberg, 2006 : Processing

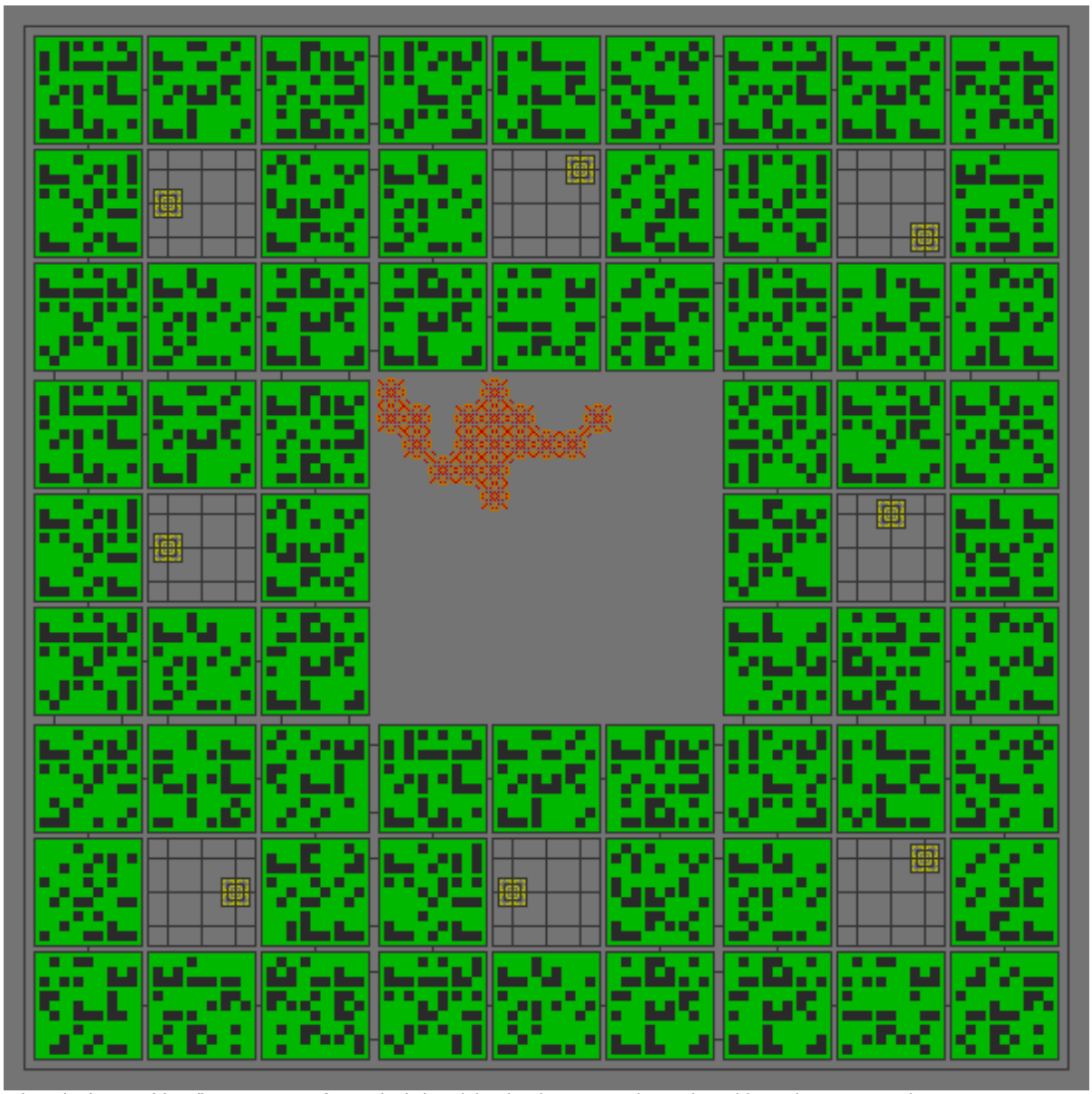
Processing[11] is an open source programming language and integrated development environment that is derived from the graphical aspects of Java. Initiated by Casey Reas and Benjamin Fry in 2001, the stated aim of the software's developers is to provide a highly-visual programming platform for the electronic arts and visual design communities. Processing allows for the programming of complex images, animations and interactions and is deployed by artists for a variety of functions, ranging from professional production tool to "software sketchbook".

The Dumpster,[12] by American artist Golan Levin, is an interactive online artwork that reflects upon the intimate lives of others in the Internet age. The source material for the composition is a selection of 20,000 blog[13] posts collected during 2005 that contain people's stories and feelings about their romantic break-ups. *The Dumpster*'s graphical interface, developed in Processing, accesses this collection of information and allows the viewer to sift though the various recollections, noting similarities and differences between the selected break-ups.

[11] http://www.processing.org/

[12] *The Dumpster*, http://www.tate.org.uk/netart/bvs/thedumpster.htm, Golan Levin with K. Nigam and J. Feinberg, 2006.

[13] A colloquial term for 'web log'.



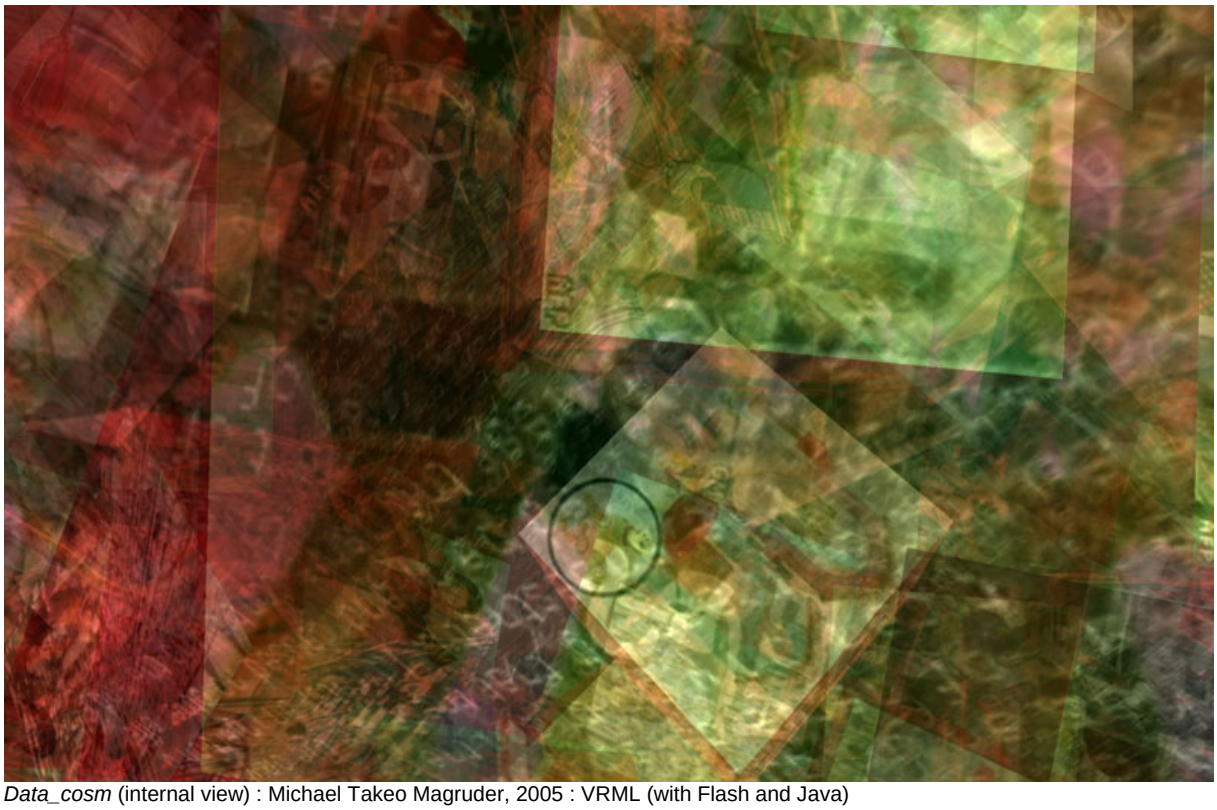
Ghost in the Machine (i. precursors of complexity) : Michael Takeo Magruder and David Steele, 2007 : Web 2.0

The Web 2.0 paradigm refers to the evolution of the Internet into a platform that enables a user and provider to exchange content via an application-based environment. Although Web 2.0 production is not aligned to a single technology set, it is characterised by the transition of standard web functionality to complex systems of exchange that embody traditional software facilities and services. Common examples of Web 2.0 implementation are wikis, online media-sharing repositories and social networking sites. As methodologies for Web 2.0 production are both technically complex and still rapidly evolving, artists are only now beginning to implement these frameworks in their creative productions.

Ghost in the Machine (i. precursors of complexity)[14] is an example of an artwork constructed within the Web 2.0 mindset utilising the AJAX[15] technique. The artwork is composed solely of eight interrelated segments of program code that have been translated into a visual form (while remaining machine-readable) and arranged into a simple logical structure. The resulting framework mimics a biological system by recombining a small number of building blocks to express nearly infinite outcomes. The artwork considers the aesthetic manifestations that arise as a result of these permutations.

[14] *Ghost in the Machine (i. precursors of complexity)*, http://www.truelogic.com/work/ghost/01/, M. Takeo + D. Steele, 2007.

[15] AJAX (Asynchronous JavaScript and XML) is a web development methodology in which only small amounts of data are exchanged between the client system and the host server, thus creating a user experience that is self-contained and does require web-page refreshes.

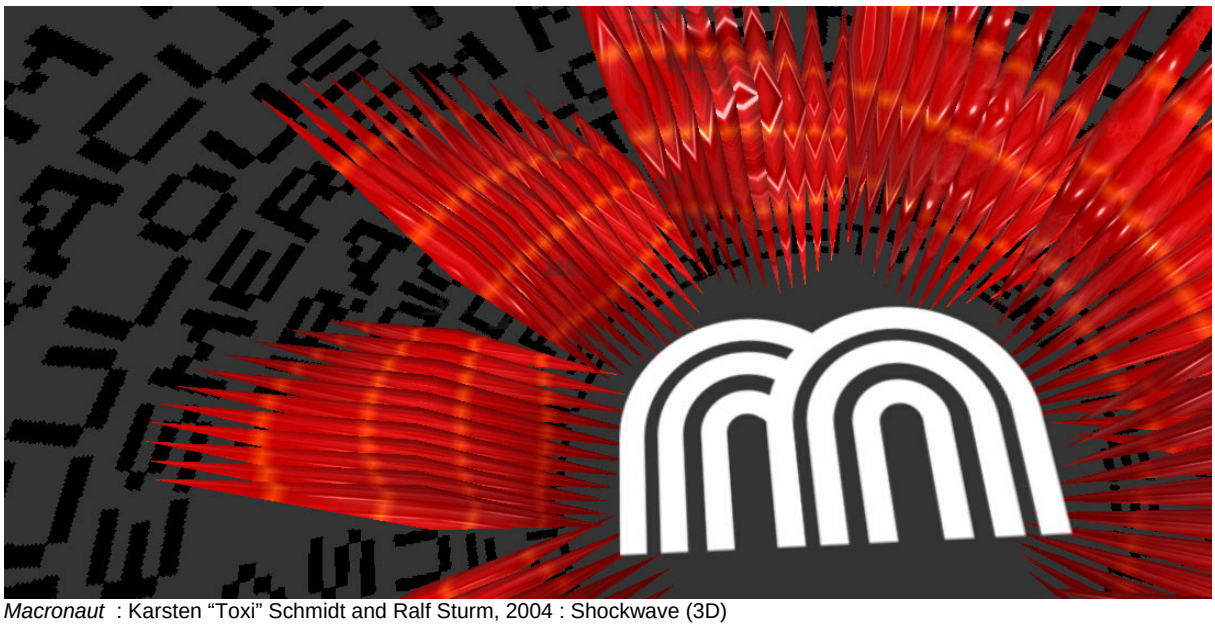


Data_cosm (internal view) : Michael Takeo Magruder, 2005 : VRML (with Flash and Java)

VRML (Virtual Reality Modeling Language) was the first wide-spread programming language capable of generating true 3D content for the Web. Released in 1994, the specification utilises a text file format to define a virtual space through properties such as geometry, texture, animation, sound, lighting and interaction. As an open standard, VRML is supported in all major web browsers through numerous third-party plug-in solutions. Its recent successor, X3D, incorporates feature extensions and XML syntax support to the language.

Data_cosm[16] is an examination of the chronological archives generated by news media and of the information structures that mediate this process. The artwork is a dynamic 3D construct created though a hybridisation of VRML, Flash and Java code-sets. The core 'world' is defined via a morphing VRML structure with embedded Flash textures. These elements populate the virtual space with data generated by a Java program that deconstructs the BBC's Internet news service in real-time.

[16] *Data_cosm*, http://www.takeo.org/nspace/ns015/, Michael Takeo Magruder, 2005.

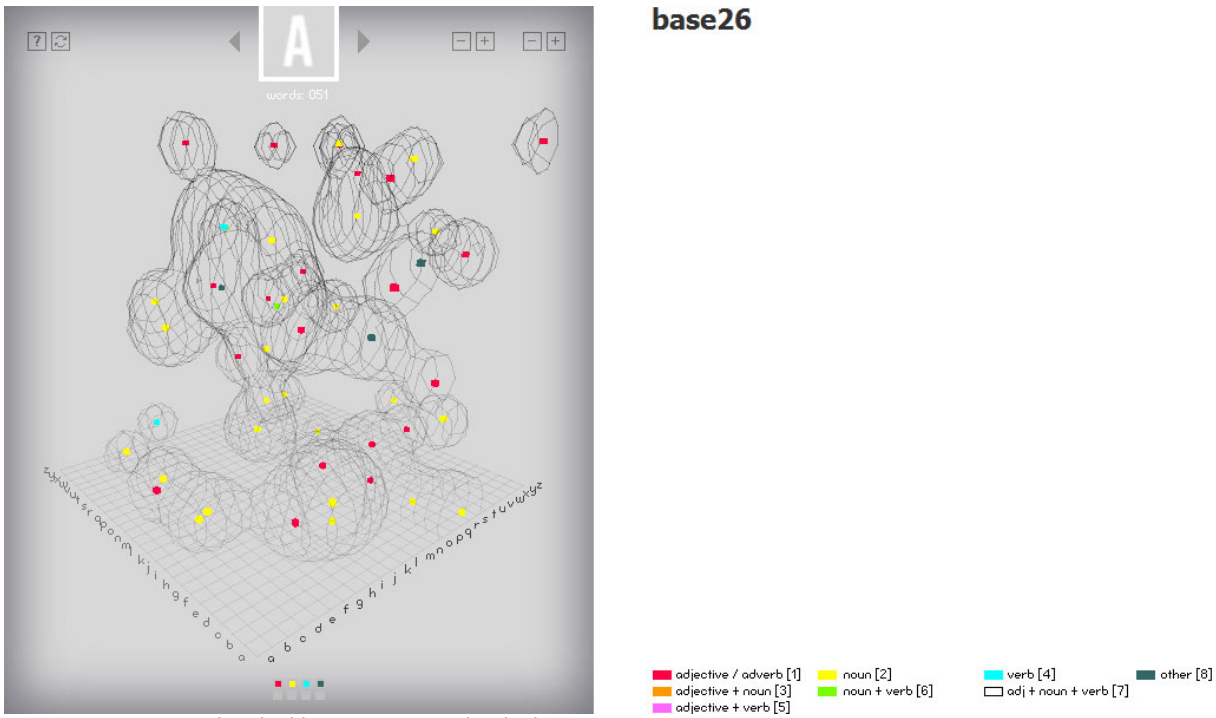


Macronaut : Karsten “Toxi” Schmidt and Ralf Sturm, 2004 : Shockwave (3D)

Adobe Shockwave was originally designed to author 2D multimedia projects, but new facilities to the software were introduced as popularity of the platform increased. One such functionality extension that was immediately adopted by the creative community was hardware-accelerated 3D graphics. Although Shockwave 3D is deployed primarily for the creation of online interactive games, artists have effectively utilised the toolset for the creation of 3D artworks.

Macronaut[17], by Karsten “Toxi” Schmidt and Ralf Sturm, is an audio-visual artwork created in the tradition of music video. Authored in the Shockwave environment, the composition consists of a looping musical score and twelve code modules that generate real-time 3D structures based upon classic principles of physics and mathematics. Each viewing of the piece is unique as numerous cuepoints embedded within the audio stream initiate randomisation of the artwork’s visual sequence.

[17] *Macronaut*, http://www.toxi.co.uk/macronaut/, Karsten “Toxi” Schmidt and Ralf Sturm, 2004.



Base26 : Karsten "Toxi" Schmidt, 2004 : Processing (3D)

Processing, like Shockwave, is capable of generating both 2D and 3D real-time graphics. However, as 3D rendering is natively supported by the Java plug-in, no additional software add-ons are required for viewing. Processing has also been deployed in the creative visualisation of complex data-sets, and as a consequence, artists have developed methods to represent multi-dimensional characteristics within the software environment.

Base26[18], by the German artist Karsten "Toxi" Schmidt, explores abstract relationships among four-letter words in the English language. The artwork translates the entire collection of 1,650+ words into a multi-dimensional visualisation that is navigable by the user. In this scenario, the first letter of each word defines its sub-group (a to z), while the second, third and fourth letters are translated into x, y and z coordinates. Two additional layers of information are incorporated into the work, as each word's function within the language (noun, verb, adjective/adverb, etc.) and frequency of letter combinations are represented by a colour and a sculptural wireframe.

[18] *Base26*, http://www.toxi.co.uk/p5/base26/, Karsten "Toxi" Schmidt, 2004.

Rhythmic Spaces (time-lapse image sequence) : M. Takeo Magruder with R. Beacham and D. Baker, 2007 : Second Life

Second Life (SL) is a synthetic 3D universe created by Linden Lab in 2003. The virtual realm is accessed via a downloadable client program that allows its users, referred to as "residents", to exist and interact with each other in real-time. SL is based upon the notion of a metaverse,[19] in which its residents are encouraged to freely explore, create and consume in a manner reflective of existence in the real world. The open and user-centric nature of SL has made the platform a popular virtual environment within the artistic community.

Rhythmic Spaces[20] is an interdisciplinary work embracing the fields of contemporary art, modern theatre history and 3D visualisation. The artwork is based upon two original rhythmic space designs[21] by Adolphe Appia[22] that have been translated into SL and augmented with the inherent qualities of the virtual environment. The work is an artistic re-consideration of Appia's investigations into the principles of time, space and movement.

[19] A term devised by the author Neal Stephenson in his 1992 novel *Snow Crash*, metaverse refers to an immersive 3D virtual space that although is metaphorically based on the real world is not constrained by its physical limitations.

[20] *Rhythmic Spaces*, Michael Takeo Magruder with Richard Beacham and Drew Baker, 2007, Second Life.

[21] "*Orpheus' Descent into the Underworld"* (1912) and "*The Staircase"* (1909).

[22] Adolphe Appia (1862-1928) was a Swiss theorist and pioneer of modern theatre.

About the Author

Michael Takeo Magruder is an American artist based in the UK working with New and Technological Media within Contemporary Arts practice. He graduated from the University of Virginia in 1996 receiving a BA (Hons) in Biological Science. He is a long-standing member of King's Visualisation Lab in the Centre for Computing in Humanities, King's College London.

His artworks have been showcased in over 180 exhibitions and 30 countries, including venues such as the Courtauld Institute of Art, London, EAST International 2005, Georges Pompidou Center, Tokyo Metropolitan Museum of Photography and Trans-Media-Akademie Hellerau. His works are regular inclusions in international New Media festivals, such as Cybersonica, CYNETart, FILE, Filmwinter, SeNef, Siggraph, Split, VAD and WRO. His artistic practice has been funded directly by the Esmée Fairbairn Foundation, Arts Council England, The National Endowment for the Arts, USA and numerous public galleries both within the UK and abroad. He is also recognised for his on-line arts practice and has been commissioned by leading portals for Internet Art such as Turbulence.org and Soundtoys.net.

His current interests concern the simultaneous utilisation and dissection of new technology as a means to explore the formal structures and conceptual paradigms of the digital realm. He seeks to create artworks in which there are no divisions between technologies, aesthetics, and concepts.

For further information visit: www.takeo.org.