

A more immersive presentation of programmed interactive video

A case study in mappings between scientific invention and artistic inspiration for the project The Hunt for Submarines in Classical Art



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Introduction

This report stems from a project which aimed to produce a series of mappings between advanced imaging information and communications technologies (ICT) and needs within visual arts research. A secondary aim was to demonstrate the feasibility of a structured approach to establishing such mappings.

The project was carried out over 2006, from January to December, by the visual arts centre of the Arts and Humanities Data Service (AHDS Visual Arts).¹ It was funded by the Arts and Humanities Research Council (AHRC) as one of the Strategy Projects run under the aegis of its ICT in Arts and Humanities Research programme. The programme, which runs from October 2003 until September 2008, aims 'to develop, promote and monitor the AHRC's ICT strategy, and to build capacity nationwide in the use of ICT for arts and humanities research'.² As part of this, the Strategy Projects were intended to contribute to the programme in two ways: knowledge gathering projects would inform the programme's Fundamental Strategic Review of ICT, conducted for the AHRC in the second half of 2006, focusing 'on critical strategic issues such as e-science and peer - review of digital resources'. Resource development projects would 'build tools and resources of broad relevance across the range of the AHRC's academic subject disciplines'.³ This project fell into the knowledge gathering strand.

The project ran under the leadership of Dr Mike Pringle, Director, AHDS Visual Arts, and the day to day management of Polly Christie, Projects Manager, AHDS Visual Arts. The research was carried out by Dr Rupert Shepherd.

The project fell into five sections:

- Definition of methods
- Analysis leading to the definition of a number of clearly defined ICT needs for visual arts research
- Survey of relevant scientific research into advanced ICT
- Exercise in mapping needs to technologies
- Investigation of exemplary case studies resulting from the mapping of technologies to needs

The project's outputs comprise:

- 1 A report outlining the methods employed, the findings of the survey and analysis, and the mapping between the results of the two main strands
- 2 A database containing the information gathered during the survey and analysis, and facilitating the mapping between the two
- 3 Reports on the exemplary case studies

This case study forms one part of the third of these outputs. The report and database can be obtained from the project website at

¹<http://www.ahds.ac.uk/visualarts/> ²<http://www.ahrbict.rdg.ac.uk/>, consulted 18 July 2006. ³http://www.ahrbict.rdg.ac.uk/activities/strategy_projects/, consulted 18 July 2006.

Artistic needs⁴

The artist: Emmanuelle Waeckerle

Emmanuelle Waeckerle was born in Rabat and grew up in Morocco, before moving to France and then to England, where she has lived for the past 22 years. She studied photography at the City of London Polytechnic (Sir John Cass), receiving a DADS diploma in 1991, followed by a Cert.Ed. in Art and Design at the University of Greenwich in 1993 and an MA in Fine Art and Media at the Slade in 1996. She is now a fractional senior lecturer in visual communication at the University College for the Creative Arts at Canterbury, Epsom, Farnham, Maidstone and Rochester.

Her work is interdisciplinary, encompassing performance, video, audio recording, installation, drawing, photography and artists books. Often, projects manifest themselves in several of these forms at various times, and many include site specific outcomes. Her work has always incorporated notions of fluidity and flux in identity and space, possibly due to her mixed cultural background. She has described how her gender, appearance and profession provoke comparisons with Frida Kahlo; her first name produces instant cinematic associations; how her surname name is German in origin, yet unpronounceable in any language; and that she speaks English with a French accent, and French with an English accent, so that she seems not to be a native speaker in either country: she refers to herself, following Derrida, as a 'neither/nor', an 'undecidable'. Perhaps understandably, she is currently particularly concerned with the performative intersections between sound, language and the body.

The work: VINST

Waeckerle's interest in these areas has, over the past few years, developed into an exploration of the possibilities of nonverbal vocal communication: she is investigating the expressive potential of the human voice when used without words. She is also exploring ways in which the body can be considered as language.

These concerns have led to the development of an ongoing practice led research project called VINST: The Word Made Flesh Again, centred around a musical instrument using nonverbal vocal sounds played by interaction with a moving digital image of Waeckerle's body.⁵ 'Touching' different parts of VINST's 'body' produces different sounds. As Waeckerle describes the piece,

⁴This section of the report has been drawn from a number of sources: information kindly provided by Emmanuelle Waeckerle; Waeckerle 2006; <http://ewaeckerle.com>, particularly <http://ewaeckerle.com/statement/>, <http://ewaeckerle.com/current/vinst>, <http://ewaeckerle.com/installation/vinst>, <http://ewaeckerle.com/vinstvideo/voc/>, <http://ewaeckerle.com/video/vinstexpo966>, <http://ewaeckerle.com/performance/thebirthofvinst>, <http://ewaeckerle.com/books/birthofvinst>, and <http://ewaeckerle.com/performance/bouchebee>; and http://soundtoys.net/collection/legacy/2005/e_waeckerle/vinstewaeckerle.pdf. All sites consulted 16 February 2007. ⁵VINST: The Word Made Flesh Again, a project by Emmanuelle Waeckerle, funded by the University College for the Creative Arts at Farnham Research Fund and Arts Council London. Programmed in Max/MSP and Jitter by Sebastian Lexer.

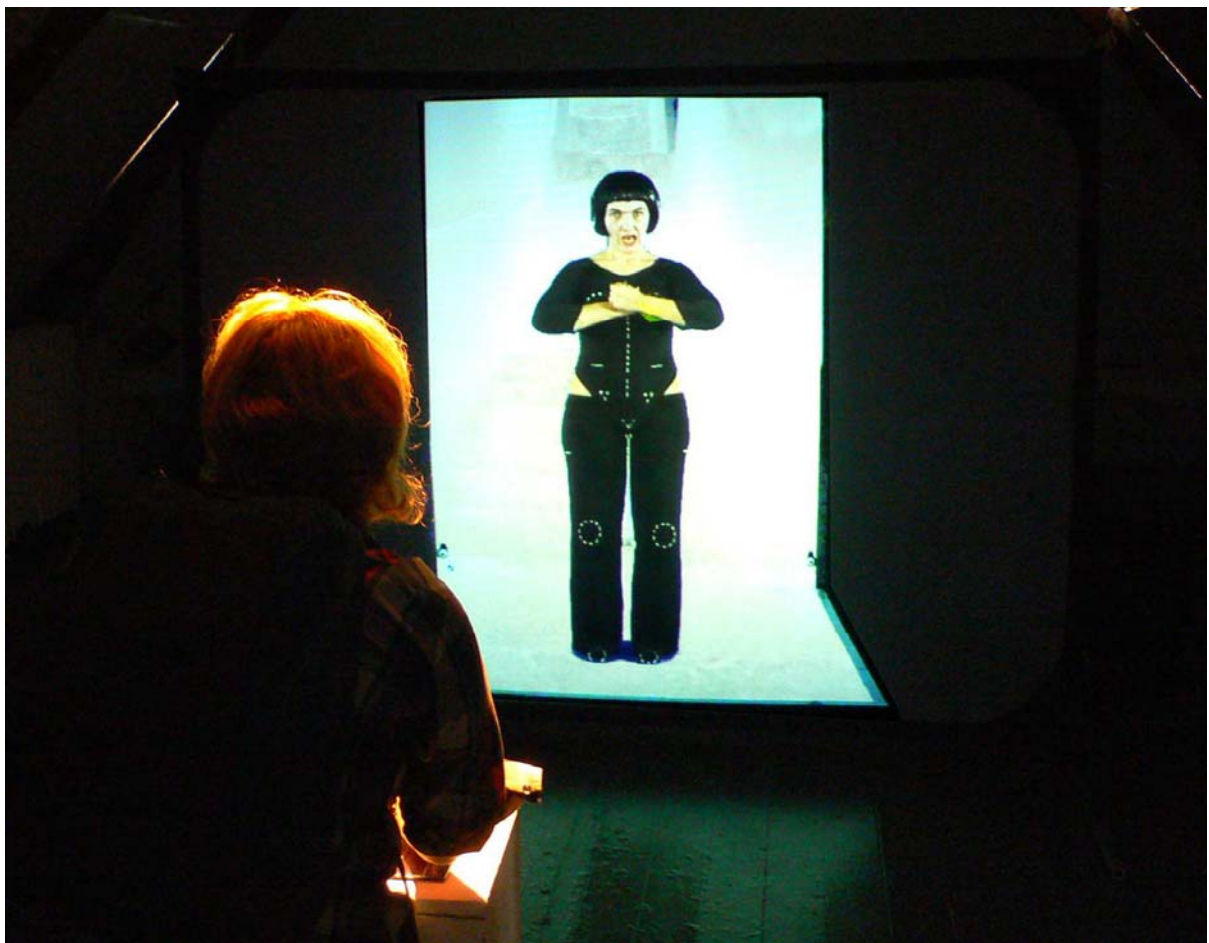
VINST is a video installation and interactive sound performance enabling real time control of both sonic and visual representation of my voice – thus creating an extraordinary fusion of human body sound and video.

VINST is a highly sensitive vocal instrument consisting of my body image displaying points of sonic sensitivity that can be played by all. Applied pressure (gentle or hard, continuous or staccato) via a pressure sensitive pen, triggers appropriate sonic and bodily reactions and various real time sound and video effects.

The sounds are preor nonlinguistic, and are based on how the body reacts to touch and how it produces sound. If you touch VINST's body lightly, you get pure tones. If you press a bit more, you are tickling and get laughing; if you prod even more, you generate pain, but there are pleasurable sounds too.

This vocabulary of around 50 sounds is in evolution, as is its accompanying system of annotation.

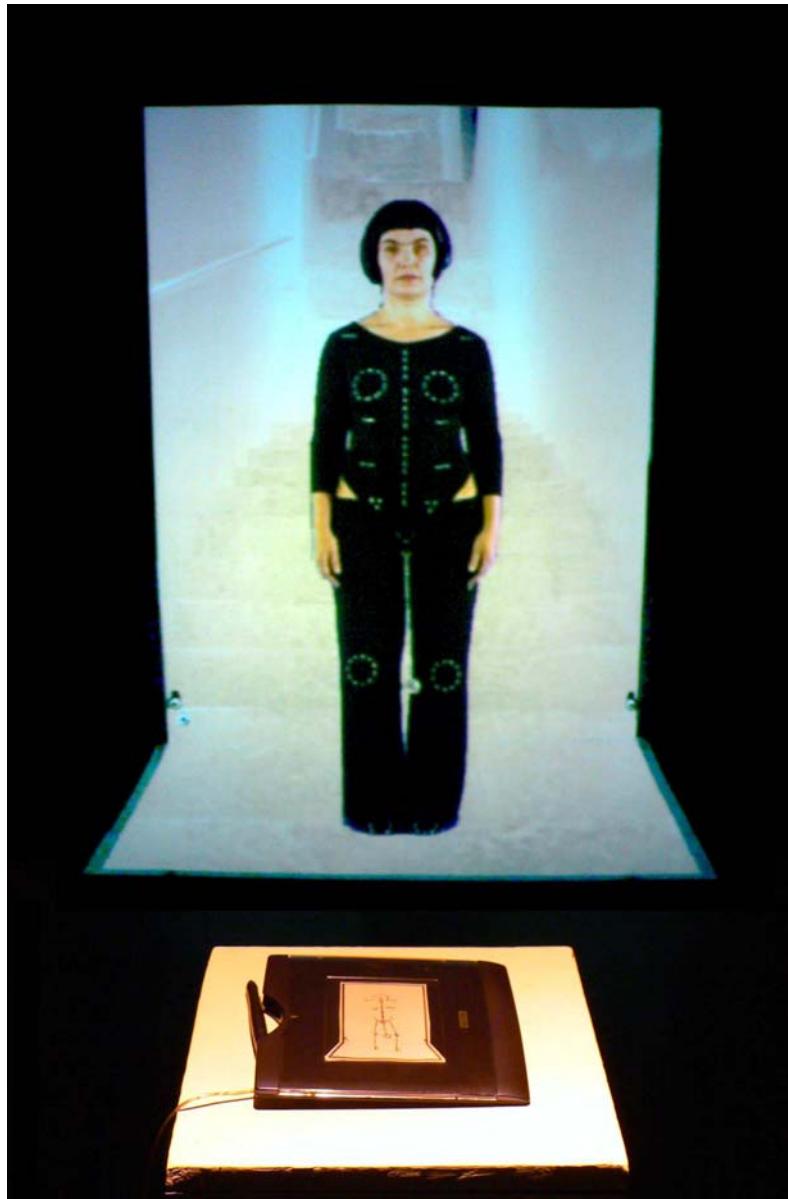
Performing VINST can be an intimate, moving, cathartic, playful and sensual experience as my instrumental body responds to touch, but also to mood and sensibility (mine and yours). I personally derive as much pleasure playing (with) my virtual self as from watching others doing so.⁶



VINST has had a long development, being the result of 12 years' gestation and another 3 of evolution. It has seen four different incarnations, each 'born' in a separate performance.⁷ Each incarnation has marked a change in the interface or the underlying

⁶<http://ewaeckerle.com/current/vinst>, consulted 16 January 2007. ⁷VINST I, November 2004, Toynbee Studios, London; VINST II, March 2005, Metropolitan University, London; VINST III, December 2005, Trampoline Platform for Media Art, Nottingham; VINST IV, January 2006, Mindplay Conference, Metropolitan University, London.

system, most notably between VINST I and VINST II, when the original instrument (sometimes called, by its creator, Vinstenstein), programmed in Macromedia Director – an unsatisfactory choice for many reasons – was replaced by a version created using the signal processing software Max/MSP together with Jitter, a plugin for processing video signals which is popular with VJs. The new version of VINST, and its successors, were programmed by Sebastian Lexer, himself a practising electronic musician working towards a Ph.D. on the application of live electronics to musical improvisation and performance. It has only been with the involvement of a sympathetic and talented programmer that the piece has been able to fulfil its potential.



In its current form, VINST is an installation, usually placed in a 'black box' studio space. The instrument's 'body' is projected onto a screen, usually more or less lifesize. Participants play the image by using a graphics tablet and pen placed on a podium before the screen to 'press' parts of the 'body', which then moves and emits a sound through concealed speakers. The moving images, rather than being animations, are in fact video

clips. The pressure of the touch modulates the sound further, as does dragging the pen around the tablet.



As with much of Waeckerle's practice, VINST exists in a number of different forms:

- As VINST installations
- As performance lectures (Birth of VINST)
- As a DVD video, recording one particular installation (VINST @ expo 966)
- As an artist's book (Birth of VINST)

As a print and series of drawings mapping the locations of the different sounds using a newly developed system of annotation specific to VINST (VINSTMAP) VINST has also influenced the broader project of which it is a part, investigating forms of non-verbal vocal communication. Thus, the system of vocalisations evolved for VINST has also been the basis of a performance piece called Bouche Bée (the French for 'gob-smacked'), where Waeckerle and the acoustic guitarist and electronic musician Petri Huurinainen improvise around the VINST sounds.⁸

⁸Performed at Spring Studios opening, London, February 2006; Lagerhaus Neufelden, April 2006; Interlace improvised music series, Goldsmiths College, London, June 2006; Theatre Museum, London, September 2006.

Needs

VINST continues to develop, and Waeckerle is seeking to expand the piece beyond the limitations caused by the twodimensional image on a projected screen, and the obviously computermediated interface provided by a graphics tablet and pen. She hopes to develop a system where VINST can react to sound and movements created by the player, resulting in a less mediated and more equal interaction between the instrument and the player. She has contemplated a number of possible solutions:

- use of sensors and/or haptic interfaces to control VINST
- projection onto evanescent surfaces
- threedimensional modelling
- programmable digital models

Imaging technologies

Serious gaming

The principle of games ‘modding’ is now well established: players gain access to the underlying code of the game and alter it, perhaps to introduce new characters, equipment, environments or scenarios, or more drastically to alter the whole basis of the game. Several games engines are now available as open source products, enabling modders to create their own games more or less from scratch; other games developers release software which allows modders to reconfigure the games and, often, share the results amongst other players of the game.

As with many aspects of digital culture, games modding has attracted the attention of artists, who have exploited its potential in a number of ways.⁹ It has also attracted the attention of those veterans of the virtual reality boom of the 1990s interested in exploiting virtual environments for instructional or educational purposes, usually in the form of simulators – an area often referred to as ‘serious gaming’.¹⁰ Such interests are not new – the US army’s Bradley Trainer, developed for the crew of the Bradley armoured fighting vehicle in the early 1980s, with effectively a mod of the Atari game Battlezone. More recently, the hugely popular America’s Army game was built using Epic’s Unreal game engine, whilst the UK DIVE (Dismounted Infantry Virtual Environment) provides a training simulator for infantry soldiers based upon the Half Life and Half Life 2 engines.

These developments keep relatively close to the games’ initial forms, but more recent developments are much more focussed on specific tasks and tend to be further removed from the original games on which they are based. For example, a training tool was developed for helicopter voice marshals – the crew in the rear cabin of a helicopter whose job is to guide the pilot towards a target during rescue or when delivering a load – combining a modified entertainment motion simulator with graphics developed using Microsoft’s Flight Simulator 2004. The Interactive Trauma Trainer has been developed with the games company Blitz as a proof of concept trainer for trauma surgeons, presenting them with an incoming casualty and assessing their prioritisation of the immediate tasks required to save its life. Both examples were developed by Birmingham University’s Human Interface Technologies Team, a member of the Commercial Off-The-Shelf Evaluation Unit (COTSEU) hosted by QinetiQ (formerly part of the Defence Evaluation and Research Agency) – an institutional context which illustrates the seriousness with which these technologies are regarded in certain sectors. This is largely a result of the ease with which sophisticated, task-based, interactive models can be produced by modding games.

Threedimensional modelling and display

This is a large area, based around a series of technologies, many of which were significantly advanced during the heyday of virtual reality in the 1990s. They revolve

⁹For an introduction to the subject, see Cannon 2006. ¹⁰For a brief introduction to the field, from which the following account is drawn, see Stone 2005.

around the creation of three-dimensional digital models and their display, also in three dimensions.

Three-dimensional modelling lies at the root of many modern computer games (see above) as well as the computer-generated imagery (CGI) which is commonplace in modern cinema; but three-dimensional models are also generated routinely for medical purposes using technologies such as computed tomography (CT scanning) and magnetic resonance imaging (MRI), as well as being constructed using computer-aided design (CAD) software as a standard part of engineering and production processes. In short, three-dimensional modelling pervades many areas of entertainment, science and technology.

Software is widely available to create and animate three-dimensional models 'by hand'; they can also be captured using a variety of methods, including the medical imaging techniques mentioned above. In the scientific arena, laser scanning is widespread, including the technique developed by Arius3D which is described in the other case study produced for this project.¹¹

Display techniques vary, but tend to focus on stereoscopic images, delivered using either coloured or polarised eyeglasses.¹² In more sophisticated systems, liquid crystal displays are used in eyeglasses to alternately obstruct the left and right eyes. When synchronised with a display which shows the left and right-eye view of a stereoscopic pair of images in rapid succession, the illusion is given of a three-dimensional scene. These techniques can be used with monitors, but are often combined with large-scale digital projection to provide large-scale, high-resolution three-dimensional models. The basic hardware is readily available, however, and many higher-end video cards are capable of driving three-dimensional displays of various kinds. When combined with motion-tracking devices, the three-dimensional models can be rendered interactive.

Evanescent displays¹³

The image that appears to hover in mid-air has long been a goal of developers of display and projection technologies. Two suppliers of this kind of display have come to our attention: FogScreen, whose technology is based on a thin screen of water vapour held in a laminar,

nonturbulent airflow. The screens work with standard data projectors, can be opaque or translucent, require no additives in the water, and do not feel wet. FogScreen produce two models: the Inia has a fixed screen size of 2 x 1.5 m; the One has a fixed size of 1.5 x 1 m, but is modular and so several units can be combined into a much larger display.¹⁴

¹¹ Pringle & Shepherd 2007b. ¹² Another form of three-dimensional display, less relevant in this context, is the volumetric display: see the entry in the main Hunt for Submarines report, Pringle & Shepherd 2007a, appendix 2.10.8. ¹³ This section is extracted from Shepherd & Pringle 2007a, appendix 2.10.7. ¹⁴ http://www.fogscreen.com/index.php?option=com_content&task=view&id=9&Itemid=14, consulted 28 November 2006.

IO2 Technology, whose Heliodyisplay combines a multimedia projector with a 'screen' which they describe only as 'transformed air'. The device offers a 30" screen and a maximum native resolution of 1024 x 768 pixels (SXGA). However, the display is susceptible to waviness caused by disturbances in the projection 'screen', and the manufacturers note that it works best with bold graphics.¹⁵ Both technologies now enable viewers to interact with the display, effectively using their finger or hand as a mouse. Although both will work with ambient light, they are more effective when placed against a dark background.

Mapping between needs and technologies

These technologies have the potential to meet some of Waeckerle's needs as she develops VINST further. Specifically:

Threedimensional modelling ↔ Threedimensional modelling and display

Waeckerle's wish to replace the video clips in VINST with a full threedimensional model could be met by these basic technologies without too much difficulty: there are several techniques which could be used to create or capture the basic model, whilst the various threedimensional display and projection technologies discussed above could be used to present the model in three dimensions. However, the requirement that many of these technologies require users to wear glasses might be seen as something of a drawback if the aim is to present a work which appears as unmediated as possible.

Programmable digital models ↔ Serious gaming

Once a threedimensional model has been created, it needs to be programmed to react to stimuli – in the case of VINST, the stimuli take the form of virtual physical interactions – prods and pokes, tickles and caresses. The technology for programming physical interactions between digital models exist in games engines, and the strong interest taken by different communities in modding and 'serious gaming' indicates the ease with which these engines can be repurposed for a variety of uses.

Projection onto evanescent surfaces ↔ Evanescent displays

Evanescent displays – notably of the kind produced by FogScreen – have been produced to meet needs identical to those expressed by Waeckerle, for an image apparently unmediated by any technical structure.

Conclusion

It should be clear from this case study that the needs expressed by Emmanuelle Waeckerle as she develops VINST can potentially be met by a range of technologies. However, her experience with the early genesis of the work should sound a cautionary note: sympathetic and talented collaborators and developers are also crucial to the evolution of complex digital works. But, as Waeckerle has noted in discussions with the authors, their employment creates its own problems: they need to be paid and managed, and so the artist has to take on the role of fundraiser and project manager as well as providing the creative impetus behind the project.

Finally, it must be remembered that practice led researchers are not always aware of the technological developments which may meet their needs: they can move in very different worlds from the scientists and engineers whose developments they might exploit. It is the main aim of *The Hunt for Submarines in Classical Art* to make mappings and create connections between these two disparate communities, to the mutual benefit of both.

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Illustrations

All illustrations in this report show the installation of VINST exhibited at the Digital Resources for the Humanities and Arts (DRHA) 2006 conference at Dartington Hall, 36 September 2006. Photography © E. Waeckerle.

