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Touch and Go is published in collaboration with Watermans and Goldsmiths College in occasion of the Watermans' International Festival of Digital Art, 2012, which coincides with the Olympics and Paralympics in London. The issue explores the impact of technology in art as well as the meaning, possibilities and issues around human interaction and engagement. *Touch and Go* investigates interactivity and participation, as well as light art and new media approaches to the public space as tools that foster engagement and shared forms of participation.



TOUCH AND GO

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LEONARDO ELECTRONIC ALMANAC, VOLUME 18 ISSUE 3

Touch and Go

VOLUME EDITORS

LANFRANCO ACETI, JANIS JEFFERIES, IRINI PAPADIMITRIOU

EDITORS

JONATHAN MUNRO, ÖZDEN ŞAHİN

Watermans International Festival of Digital Art, 2012

Touch and Go is a title that I chose together with Irini Papadimitriou for this LEA special issue. On my part with this title I wanted to stress several aspects that characterize that branch of contemporary art in love with interaction, be it delivered by allowing the audience to touch the art object or by becoming part of a complex electronic sensory experience in which the artwork may somehow respond and touch back in return.

With the above statement, I wanted to deliberately avoid the terminology 'interactive art' in order to not fall in the trap of characterizing art that has an element of interaction as principally defined by the word interactive; as if this were the only way to describe contemporary art that elicits interactions and responses between the artist, the audience and the art objects.

I remember when I was at Central Saint Martins writing a paper on the sub-distinctions within contemporary media arts and tracing the debates that distinguished between electronic art, robotic art, new media art, digital art, computer art, computer based art, internet art, web art... At some point of that analysis and argument I realized that the common thread that characterized all of these sub-genres of aesthetic representations was the word art and it did not matter (at least not that much in my opinion) if the manifestation was material or immaterial, conceptual or physical, electronic or painterly, analogue or digital.

I increasingly felt that this rejection of the technical component would be necessary in order for the electronic-robotic-new-media-digital-computer-based-internet art object to re-gain entry within the field of fine art. Mine was a reaction to an hyper-fragmented

and indeed extensive and in-depth taxonomy that seemed to have as its main effect that of pushing these experimental and innovative art forms – through the emphasis of their technological characterization – away from the fine arts and into a ghetto of isolation and self-reference. Steve Dietz's question – *Why Have There Been No Great Net Artists?*¹ – remains unanswered, but I believe that there are changes that are happening – albeit slowly – that will see the sensorial and technical elements become important parts of the aesthetic aspects of the art object as much as the brush technique of Vincent Willem van Gogh or the sculptural fluidity of Henry Moore.

Hence the substitution in the title of this special issue of the word interactivity with the word touch, with the desire of looking at the artwork as something that can be touched in material and immaterial ways, interfered with, interacted with and 'touched and reprocessed' with the help of media tools but that can also 'touch' us back in return, both individually and collectively. I also wanted to stress the fast interrelation between the art object and the consumer in a commodified relationship that is based on immediate engagement and fast disengagement, touch and go. But a fast food approach is perhaps incorrect if we consider as part of the interactivity equation the viewers' mediated processes of consumption and memorization of both the image and the public experience.

Nevertheless, the problems and issues that interactivity and its multiple definitions and interpretations in the 20th and 21st century raise cannot be overlooked, as much as cannot be dismissed the complex set of emotive and digital interactions that can be set in motion by artworks that reach and engage large groups of people within the public space. These interactions

generate public shows in which the space of the city becomes the background to an experiential event that is characterized by impermanence and memorization. It is a process in which thousands of people engage, capture data, memorize and at times memorialize the event and re-process, mash-up, re-disseminate and re-contextualize the images within multiple media contexts.

The possibility of capturing, viewing and understanding the entire mass of data produced by these aesthetic sensory experiences becomes an impossible task due to easy access to an unprecedented amount of media and an unprecedented multiplication of data, as Lev Manovich argues.²

In *Digital Baroque: New Media Art and Cinematic Folds* Timothy Murray writes that "the retrospective nature of repetition and digital coding—how initial images, forms, and narratives are refigured through their contemplative re-citation and re-presentation—consistently inscribes the new media in the memory and memorization of its antecedents, cinema and video."³

The difference between memorization and memorialization may be one of the further aspects in which the interaction evolves – beyond the artwork but still linked to it. The memory of the event with its happening and performative elements, its traces and records both official and unofficial, the re-processing and mash-ups; all of these elements become part of and contribute to a collective narrative and pattern of engagement and interaction.

These are issues and problems that the artists and writers of this LEA special issue have analyzed from a variety of perspectives and backgrounds, offering to the reader the opportunity of a glimpse into the complexity of today's art interactions within the contemporary social and cultural media landscapes.

Touch and Go is one of those issues that are truly born from a collaborative effort and in which all editors have contributed and worked hard in order to

deliver a documentation of contemporary art research, thought and aesthetic able to stand on the international scene.

For this reason I wish to thank Prof. Janis Jefferies and Irini Papadimitriou together with Jonathan Munro and Özden Şahin for their efforts. The design is by Deniz Cem Önduygu who as LEA's Art Director continues to deliver brilliantly designed issues.

Lanfranco Aceti

Editor in Chief, *Leonardo Electronic Almanac*
Director, Kasa Gallery



1. "Nevertheless, there is this constant apparently inherent need to try and categorize and classify. In *Beyond Interface*, an exhibition I organized in 1998, I 'datamined' ten categories: net.art, storytelling, socio-cultural, biographical, tools, performance, analog-hybrid, interactive art, interfacers + artificers. David Ross, in his lecture here at the CAD-RE Laboratory for New Media, suggested 21 characteristics of net art. Stephen Wilson, a pioneering practitioner, has a virtual – albeit well-ordered – jungle of categories. Rhizome has developed a list of dozens of keyword categories for its ArtBase. Lev Manovich, in his *Computing Culture: Defining New Media Genres* symposium focused on the categories of database, interface, spatialization, and navigation. To my mind, there is no question that such categorization is useful, especially in a distributed system like the Internet. But, in truth, to paraphrase Barnett Newman, "ornithology is for the birds what categorization is for the artist." Perhaps especially at a time of rapid change and explosive growth of the underlying infrastructure and toolsets, it is critical that description follow practice and not vice versa." Steve Dietz, *Why Have There Been No Great Net Artists? Web Walker Daily* 28, April 4, 2000, <http://bit.ly/QJEWIY> (accessed July 1, 2012).
2. This link to a Google+ conversation is an example of this argument on massive data and multiple media engagements across diverse platforms: <http://bit.ly/pGgDsS> (accessed July 1, 2012).
3. Timothy Murray, *Digital Baroque: New Media Art and Cinematic Folds* (Minneapolis: University of Minnesota Press, 2008), 138.

Touch and Go: The Magic Touch Of Contemporary Art

It is with some excitement that I write this preface to Watermans International Festival of Digital Art, 2012. It has been a monumental achievement by the curator Irini Papadimitriou to pull together 6 groundbreaking installations exploring interactivity, viewer participation, collaboration and the use or importance of new and emerging technologies in Media and Digital Art.

From an initial call in December 2010 over 500 submissions arrived in our inboxes in March 2011. It was rather an overwhelming and daunting task to review, look and encounter a diverse range of submissions that were additionally asked to reflect on the London 2012 Olympic and Paralympic Games. Submissions came from all over the world, from Africa and Korea, Austria and Australia, China and the UK, Latvia and Canada and ranged from the spectacularly complicated to the imaginatively humorous. Of course each selector, me, onedotzero, London's leading digital media innovation organization, the curatorial team at Athens Video Art Festival and Irini herself, had particular favorites and attachments but the final grouping I believe does reflect a sense of the challenges and opportunities that such an open competition offers. It is though a significant move on behalf of the curator that each work is given the Watermans space for 6 weeks which enables people to take part in the cultural activities surrounding each installation, fulfilling, promoting and incorporating the Cultural Olympiad themes and values 'inspiration, participation and creativity.'

Some, like Gail Pearce's *Going with the Flow* was made because rowing at the 2012 Olympics will be held near Egham and it was an opportunity to respond and create an installation offering the public a more interactive way of rowing, while remaining on dry land, not only watching but also participating and having an effect on the images by their actions. On the other hand, Michele Barker and Anna Munster's collaborative *Hocus Pocus* will be a 3-screen interactive artwork that uses illusionistic and performative aspects of magical tricks to explore human perception, senses and movement. As they have suggested, "Magic – like interactivity – relies on shifting the perceptual relations between vision and movement, focusing and diverting attention at key moments. Participants will become aware of this relation as their perception catches up with the audiovisual illusion(s)" (artists statement, February 2011). Ugochukwu-Smooth Nzewi and Emeka Ogbob are artists who also work collaboratively and working under name of One-Room Shack. *UNITY* is built like a navigable labyrinth to reflect the idea of unity in diversity that the Games signify. In an increasingly globalized world they are interested in the ways in which the discourse of globalization opens up and closes off discursive space whereas Suguru Goto is a musician who creates real spaces that are both metaphysical and spiritual. *Cymatics* is a kinetic sculpture and sound installation. Wave patterns are created on liquid as a result of sound vibrations generated by visitors. Another sound work is Phoebe Hui's *Granular Graph*, a sound instrument about musical gesture and its notation.

Audiences are invited to become a living pendulum. The apparatus itself can create geometric images to represent harmonies and intervals in musical scales. Finally, Joseph Farbrook's *Strata-caster* explores the topography of power, prestige, and position through an art installation, which exists in the virtual world of Second Life, a place populated by over 50,000 people at any given moment.

Goldsmiths, as the leading academic partner, has been working closely with Watermans in developing a series of seminars and events to coincide with the 2012 Festival. I am the artistic director of Goldsmiths Digital Studios (GDS), which is dedicated to multi-disciplinary research and practice across arts, technologies and cultural studies. GDS engages in a number of research projects and provides its own postgraduate teaching through the PhD in Arts and Computational Technology, the MFA in Computational Studio Arts and the MA in Computational Art. Irini is also an alumni of the MFA in *Curating* (Goldsmiths, University of London) and it has been an exceptional pleasure working with her generating ideas and platforms that can form an artistic legacy long after the Games and the Festival have ended. The catalogue and detailed blogging/documentation and social networking will be one of our responsibilities but another of mine is to ensure that the next generation of practitioners test the conventions of the white cube gallery, reconsider and reevaluate artistic productions, their information structure and significance; engage in the museum sector whilst at the same time challenging the spaces for the reception of 'public' art. In addition those who wish to increase an audience's interaction and enjoyment of their work have a firm grounding in artistic practice and computing skills.

Consequently, I am particularly excited that the 2012 Festival Watermans will introduce a mentoring scheme for students interested in participatory interactive digital / new media work. The mentoring scheme involves video interviews with the 6 selected artists and their work, briefly introduced earlier in this preface, and discussions initiated by the student. As so often debated in our seminars at Goldsmiths and

elsewhere, what are the expectations of the audience, the viewer, the spectator, and the engager? How do exhibitions and festival celebrations revisit the traditional roles of performer/artist and audiences? Can they facilitate collaborative approaches to creativity? How do sound works get curated in exhibitions that include interactive objects, physical performances and screens? What are the issues around technical support? How are the ways of working online and off, including collaboration and social networking, affecting physical forms of display and publishing?

As I write this in Wollongong during the wettest New South Wales summer for 50 years, I want to end with a quote used by the Australia, Sydney based conjurers Michele Barker and Anna Munster

Illusions occur when the physical reality does not match the perception. 

The world is upside down in so many alarming ways but perhaps 2012 at Watermans will offer some momentary ideas of unity in diversity that the Games signify and *UNITY* proposes. Such anticipation and such promise!

Janis Jefferies

*Professor of Visual Arts
Goldsmiths
University of London, UK*

23rd Dec 2011, University of Wollongong, NSW, Australia

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1. Stephen L. Malnik and Susana Martinez-Conde, *Sleights of Mind: What the Neuroscience of Magic Reveals about our Everyday Deceptions* (New York: Henry Holt and Company, 2010), 8.

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BODY, BIOLOGICAL MEDIA, AND COMPUTING SYSTEMS

In his seminal work *What is Biomedica?*, Eugene Thacker underlines the informative character of biological media when he notes that “not only can everything be understood as information, but information is everything, in that everything as a ‘source code.’”¹ Information Technology (IT) and defense industries have not overlooked the instrumental potential of this model. NEC, a Japanese IT giant, has tested digital walls that depend on a custom facial recognition system to gather information about passers-by and serve real time, physiologically and demographically targeted ads.² In the United States a program named FAST has been started by the Department of Homeland Security’s Science & Technology Directorate.³ The program investigates the use of sensor arrays to covertly conduct surveillance on individuals that are not yet suspected of a crime. In an attempt to pre-know the advent of criminal activities, the system describes the criminal potential of a subject by secretly observing and storing a diverse range of data among which “cardiovascular signals, pheromones, electrodermal activity, and respiratory measurements.”⁴ On

the other hand, the unparalleled heterogeneity of the body’s biological potentials, along with its inherent inadequacies have inspired artists and researchers to deploy the body as a biotechnological construct,⁵ a brain-computer interface,⁶ an electric spatial controller,⁷ and in the case of my own work, a self-enclosed musical instrument.⁸

Machines seamlessly infiltrate a body to track down electrical pulses of neurons, cellular reactions, and palpitations of the flesh. An organized yet unpredictable system is revealed; a networked order of integrated agents capable of learning, reasoning, reacting, and interacting in conjunction with other entities. In other words, the body is shown in its inherent form, an actual *technology*. Here the meaning of technology is to be understood as a complex, emergent system of rules and living matter, rather than a situated, deterministic automaton. Its complexity and unpredictability make the body technology rather difficult to fully integrate with the machine technology. Thinking about music, the integration between body and machines suffers of

a heavily mediated relationship, which too often resolves around either the ‘disappearance’ of the former, or the celebration of the latter. Since the ‘70s music devices sensitive to biological signals are being used in an attempt to virtually portrait the processes behind human affect.⁹ The aim is not to subject the body to a sort of biodata-mining¹⁰ as corporations and governments do, but rather to envision unexplored musical strategies; the artistic and academic communities strive for informing the body and the mind with ‘digital prosthesis’ and augmented sound environments. This idea is embodied in the development of what can be called Biosensing Digital Musical Instruments (BDMI).¹¹ These are electronic music systems that use computers to mediate between the potentials of the inner body and a virtual sonic universe.

Being a music performer with an obsessive attraction for everything carnal, the contemporary ontology of a body that becomes informatic and ephemeral is something I am truly concerned with. When designing BDMI, and the way one performs with it, the questions are in which ways can we avoid the deceptive fascination of a merely quantitative analysis of the physical body? How can we keep safe the natural expressivity of the body technology when its endogenous mechanisms are mediated with the ‘disinterested’ circuitry of a computer?¹²

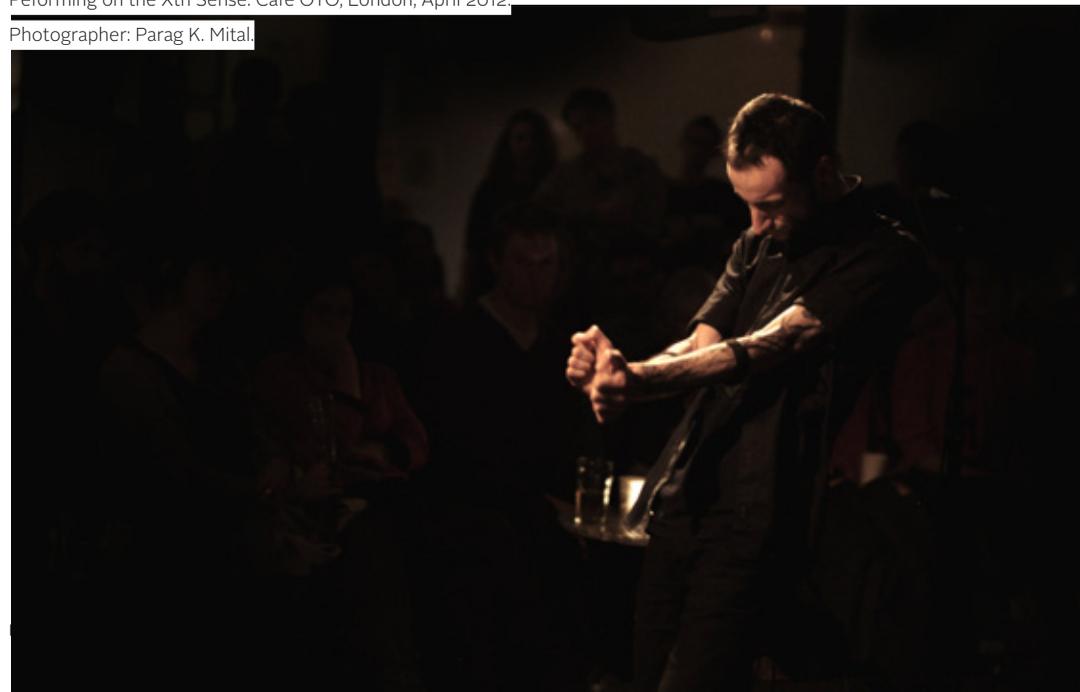
To tackle these issues, it may be useful to discuss the elements that characterize the gesture of a BDMI performer, and thus understand the role of the body in this context.

AGENCY, EFFORT AND METAPHOR AS FUNCTIONS OF EXPRESSIVITY

At the onset of this brief digression on the nature of a biologically informed musical gesture, I shall put forth a multidimensional model, which has recently surfaced in my thoughts. The model takes in account some largely discussed factors such as agency, effort and metaphor, but it makes exclusive distinctions concerning their qualities. This model is elaborated below, and will be recalled in the text to gain a better contextualization of my own work. Although the analysis could possibly embrace digital musical instruments in general, I wish to constrain these observations to the realm of BDMI performance.¹³

Tanaka refers to the characterization of expressivity by researchers such as Cadoz and Camurri,¹⁴ in contrast with the intuitive approach of performers like Ryan, so to identify the key to full expressivity “not just in the effectiveness of communication, but also in the sense of agency that the system gives back to the performer.” The relation between expressivity and agency is also asserted by Waters¹⁵ who insists that “the constraints and constructs upon which music depends are... to be found... in the algorithms which operate in this particular piece of warm wet meat” (i.e. the player). Agency however is not only *experienced* by the performer, but at the same time, it is *perceived* by the audience. Although contemporary audiences of computer music have well familiarized with the notions of digitally synthesized sound, virtual instruments and dissociation of gesture and sound,¹⁶ agency remains a critical factor in BDMI music performance, for the medium left with the challenge to deliver an exciting

Performing on the Xth Sense. Cafe OTO, London, April 2012.
Photographer: Parag K. Mital.



Agency

experienced (by the performer)

perceived (by the audience)

Effort

integrated

instrumental

Metaphor

embodied

syncretic

sound experience is the sole body. A gesture exhibiting a weak sense of agency undermines the listener's interpretation of a performance; the player's physical body becomes immaterialized within and disconnected from the virtual sound world s/he creates.¹⁷ Here lies the expressive gap that sometimes creates that uncanny feel of *disbelief* in a performance.

In turn, the feeling of agency in a musical gesture depends on a large degree on the apparent effort exhibited by the player while mastering its instrument. Norman, Waisvisz and Ryan¹⁸ convincingly describe how “[a] singer's effort in reaching a particular note is precisely what gives that note its beauty and expressiveness. The effort that it takes and the risk of missing that note forms the metaphor for something that is both indescribable and the essence of music.” I believe the same applies to biosensing music performance, although there is a crucial distinction to be done. According to each specific BDM, we can say that gestural effort can be *integrated* or *instrumental*. The integrated effort is intended as a bodily impulse which is either directly mapped to continuous control parameters, or the actual source of sound. As for instruments based on muscle tension and muscle sounds,

the outward sonic form is directly proportioned to the apparent effort of the gesture. The continuity of musicianship and musicality is made transparent throughout the performance; what you see is what you get. In its instrumental form instead, effort is primarily cognitive. This is the case of the Brain-Computer Interfaces (BCI), that require the player to control his/her heartbeat rate to achieve a pre-determined physiological state, which eventually triggers musical patterns. The effort is physical too, but it is not easily discernible, nor its effect on the music are. In this case, the audience is required to decode the performance to fully appreciate the music.

Metaphor is another key to the audience's understanding of the music being played. With or without the performer's willingness, each musical gesture con-

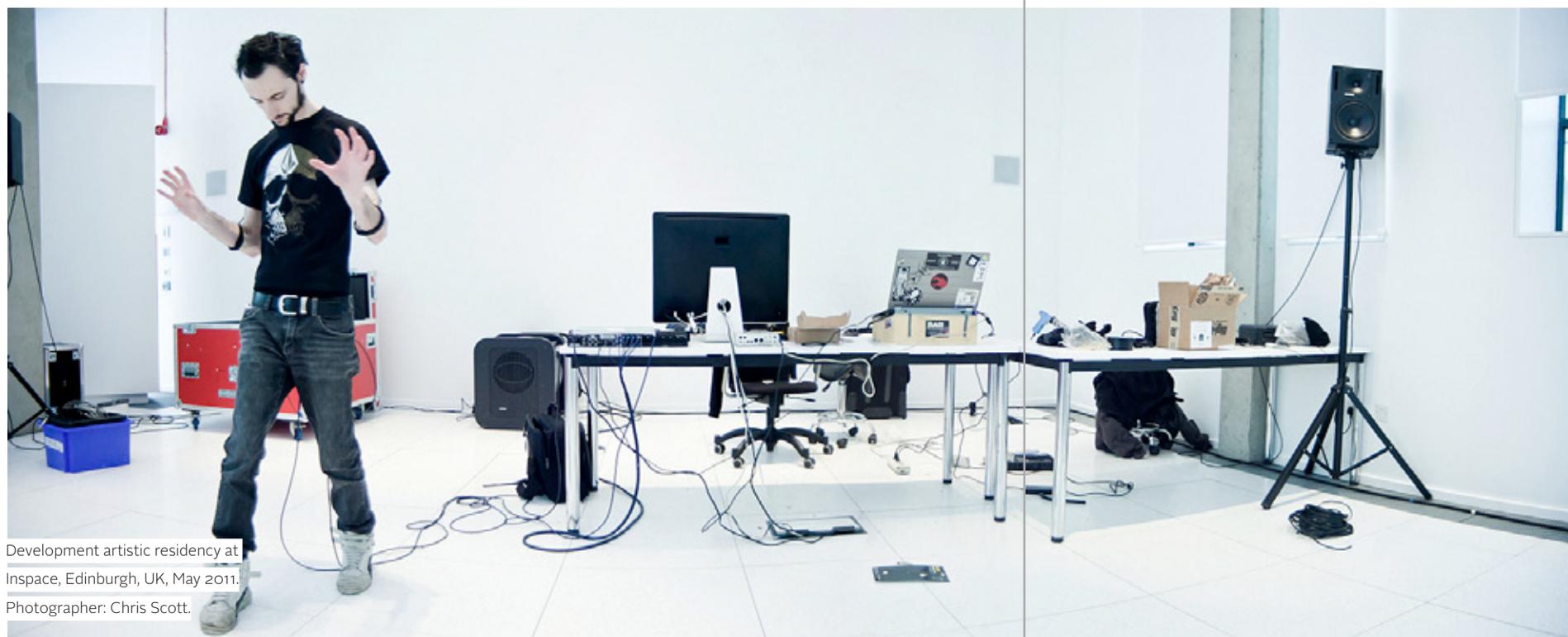
tributes in the real time construction of sonic metaphors that invade the listener's mind. The metaphor is a key element in the study of BDM and digital musical instruments in general as it “enables device designers, players and audience to refer to elements that are ‘common knowledge’ or cultural bases... Through metaphor, transparency increases, making the device more expressive.”¹⁹ However, metaphor can emerge in different ways. When a metaphor comes in the form of a tangible and evident quality, it becomes *embodied*. Imagine a performer slowly increasing the frequency and loudness of a sine wave by lifting her arms towards the ceiling. In contrast, a *syncretic* metaphor is one in which two different or even contradictory elements are coupled within a gesture. For instance, a player that sits still while a growling sound appears abruptly in the sonic field.

Each diverse combination of these dimensions can produce a different answer to the questions advanced above. Far from wanting to elaborate all the possibilities that come into play in this scenario, I shall frame now the performance of BDM within the context of my own practice. Driven by the idea of approaching the biological body as a self-contained musical entity, the interaction I investigate is one in which a high degree of experienced and perceived agency is critical, the effort is integrated within the musical system, and metaphors are embodied in every musical gesture. Such approach led me to move away from bioelectric controllers, and prompted the conception and implementation of an original biologically informed music, what I term *biophysical music*.

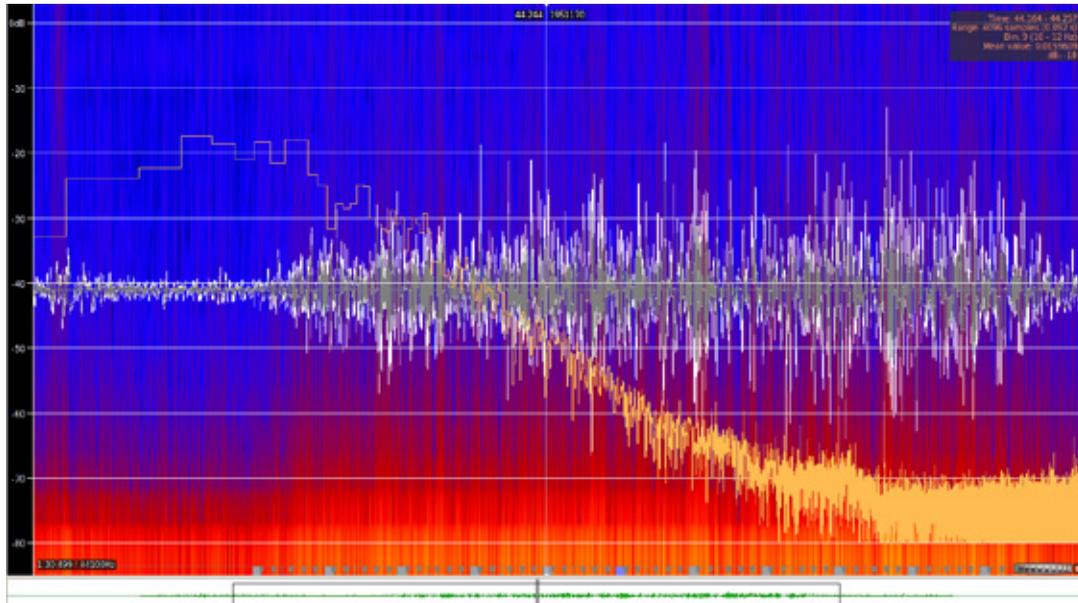
PERFORMING INCARNATED SOUND

The foundations of the biophysical music model are to be found in the collision of interactive music performance, biomedical engineering and musical embodiment. The model depends on the *muscle sounds* (also called mechanomyogram or MMG): evanescent, low frequency sound waves produced by muscular contractions. Muscle sounds are acoustic vibrations released by the body in the exact moment in which the chemical material of the muscle tissues is transformed into kinetic energy to exert movement. Although the systematic study of muscle sounds started around the 1980s,²⁰ so far it had found actual applications only in the medical field.

A naked ear will find difficult to hear them because of their low amplitude and frequency response; yet, they can be captured, amplified and heard through loudspeakers or headphones. This is how I started this musical journey; after few listening sessions in



Development artistic residency at Inspace, Edinburgh, UK, May 2011. Photographer: Chris Scott.



MMG of a sustained contraction: spectrogram (in the background); waveform (white in the foreground); and logarithmic spectrum (yellow outline).

which I would use some rudimentary custom sensors to amplify the sound produced by the flexion of an arm, it became clear that those little, yet detailed vibrations would have served well in a musical context. Ever since I have been developing the free and open project Xth Sense (XS), a novel biophysical system for interactive music performance and responsive milieu.²¹ The instrument is composed of custom wearable sensors and an ad hoc computational engine.

The performative paradigm of the XS can be better grasped in the frame of Music for Flesh II (MFI), the first of a series of pieces for biophysical music composed in March 2011.²²

In MFI two XS biosensors are placed on my forearms; the hardware is composed of a custom microphone sensor that captures the MMG sound wave, avoiding direct contact with the skin. Then the audio stream is sent to a computer provided with the relevant software. By extracting a number of characteristics (i.e. features) of the MMG the computer develops an understanding of my kinetic behavior. The different contractions and frictions of my muscles not only provide acoustic sounds, but also variations on continuous parameters that process the same audio stream. Simply put, the inner sound of my body is live sampled and played back through loudspeakers. Once it becomes a tangible sound wave in the concert space, it violates the outer world to reach for the listener's tympanic membrane. Eventually, I find my *self* embodied in a corporeal soundscape, that I can dynamically shape into diverse forms. Being that the effort required by



The Xth Sense biophysical, wearable sensors. Edinburgh, UK, May 2011.
Photographer: Chris Scott.

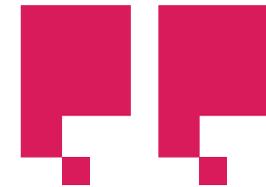
the gesture is integral to the generation and manipulation of sound, a high degree of agency is transparently perceivable.

SOUND-GESTURE AND VISCERAL EMBODIMENT

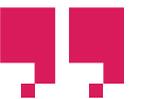
While performing MFI the body physio-somatic behavior and the computer extended circuitry become intertwined; the interrelation of player's interpretation and machine computing capabilities seeks to be sophisticated in form and color; an embodied metaphor. Nonetheless, to achieve a satisfying musical richness, biological data are not enough on their own. The visceral coupling of player and machine that the XS puts forth is exemplified by a compounded interpretation model, which I term *sound-gesture* (SG). The basic foundation of the SG model can be understood through the wise words of Winkler, who in 1995 noted that "The composer's job... is not only to map movement data to musical parameters, but to interpret these numbers to produce musically satisfying results."²³ Turning back at the BDM field, the logic is the same: a mere quantitative analysis does not alone ensure the musical success of a piece of music; also the qualities of the biological media needs to be considered to unveil the full potential of BDM performance.

The signal analysis and processing operated by the XS software is designed to seamlessly enhance the inherent interactions that bond the player's kinesis and the muscle sounds. By nature, a sudden and strong flexion/extension of the limb produces a loud sound with a sharp attack and a very short release. Strength of the contraction and perceived loudness of the MMG are tightly related, therefore a specific mapping technique can extend that relationship by adding multiple dimension to it. The dynamics of each MMG sound is used as a continuous event to manipulate the qualities of the resulting sound. In order to ensure a fair amount of complexity and richness, up to 8 simultaneous sampling dimensions are available to the player.

It is clear now that a SG is not constituted by the mere empty-handed gesture on its own; it is in first place the enactment of an endogenous neural impulse, that generates a given muscular excitement (i.e. a specific MMG sound). On the flipside, the SG would completely



Once it becomes a tangible sound wave in the concert space, it violates the outer world to reach for the listener's tympanic membrane. Eventually, I find my self embodied in a corporeal soundscape, that I can dynamically shape into diverse forms.



lack of effectiveness and expressiveness if it could not rely on a set of sound design and mapping definitions that live inside the circuits of the computer. Hence, the SG can be seen as a techno-epistemic enactment of a dormant sonic capability of the body system.

Before diving into the nature of a SG, I would recommend to view the video recording of a performance of *MFI*, which is available on-line.²⁴ The video can be a useful reference while reading the next paragraphs.

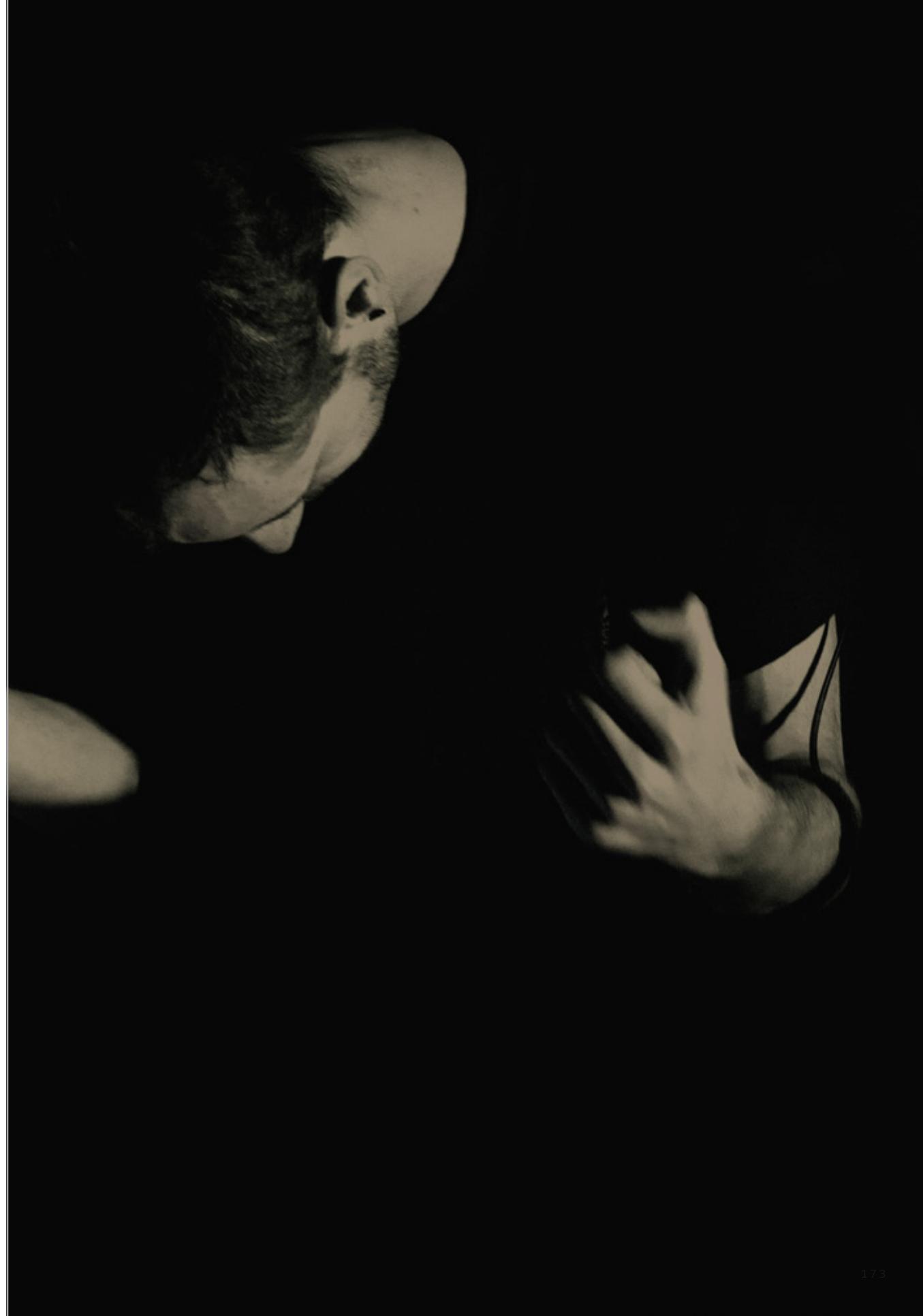
A SG performed within the context of the XS is an extended and anomalous *instrumental gesture*.²⁵ Wanderley and Cadoz exclude the empty-handed gesture from the instrumental category, for it owns only the *semiotic* function of the human gestural channel; that of communicating information toward the environment. They explain that this kind of gesture lacks of the *ergodic* and the *epistemic* functions; respectively, the existence of a direct contact with the instrument, and the performer's use of his/her "tactile-kinaesthetic perception" to play the instrument. However, in the case of the XS, the instrument that a performer manipulates is not an external object, but the muscle fibre of his/her own body. The basic capability of the XS to deploy musically the muscle sounds produced by a performer challenges the nature of an instrumental gesture; the player does not act upon the external environment, but rather within his/her own intimate, bodily milieu. One can therefore observe that a performer can produce "specific (physical) phenomena" by mastering the tension of his/her own body (the

ergodic function), while experiencing the enactment of a higher muscular and articulatory sensitivity (the *epistemic* function).

Although it is during the composition of a piece that a SG vocabulary is established, such musical and symbolic jargon is not static during a performance; in fact, different SG definitions can be loaded into the XS software at a given time, providing a compelling set of musical behaviors. For instance, during the fourth movement of *MFI* strong and wide contractions of my left forearm consistently repeated for more than 30 seconds prompt the computer to playback the muscle sound in its purest form: that of a deep, low frequency vibration between 3Hz and 40Hz. At the same (logical) time, the machine samples the nascent muscle sound and slightly transposes it up to 60Hz so to enhance its auditive impact; finally, according to the dynamic features of my physio-somatic behavior the computer recodes the MMG audio sample through granular synthesis, delay lines and pitch bending. The subcutaneous, low rumble of my flesh is amplified and made audible through subwoofers; simultaneously, a new textural layer appears: the grave, muscular sound wave mutates in high pitched grains that I can scatter and spatialize by nervously contracting my wrist. Then, I suddenly stop for about ten seconds; the break allows the machine to enter a condition of stand-by. In a couple of seconds I reach the required concentration to release my muscles completely, avoiding involuntary tension. At this point, all control values gradually fall down to 0, triggering a drastic, yet con-

On the right: Still of a sound-gesture in the fourth section of *Music for Flesh II*. Edinburgh, UK, 2011.

Photographer: Dimitris Patrikios.



tinuous change in the duration of the granular delay lines. With the next contraction I begin to mangle the sound grains, I deform their aural image until a harsh and glassy bundle of mid high frequencies emerges, rapidly moving over a wide stereo field. The sustained exertion of my limbs, causes the machine to steadily increase the loudness and density of the sound output, until my body stands still once again, and finally, no sound is produced.

The border between physical and virtual body is blurred and dissolved. By harvesting pure kinetic energy from corporeal sounds, incarnated gesture and concrete vibrations, the piece actualizes before the audience a visceral and cognitively challenging territory. ²⁶ ■

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