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THE VARIETIES OF USER EXPERIENCE

BRIDGING EMBODIED METHODOLOGIES FROM SOMATICS AND PERFORMANCE TO HUMAN COMPUTER INTERACTION

by

Thecla Henrietta Helena Maria Schiphorst

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DOCTOR OF PHILOSOPHY

Center for Advanced Inquiry in the Integrative Arts (CAiiA)
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Faculty of Technology

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Dedication

to my mother
Helena Johanna Smeets Schiphorst
your memory lifts my gaze
and fills my heart

Thecla Henrietta Helena Maria Schiphorst

THE VARIETIES OF USER EXPERIENCE: BRIDGING EMBODIED METHODOLOGIES FROM SOMATICS AND PERFORMANCE TO HUMAN COMPUTER INTERACTION

Abstract Embodied Interaction continues to gain significance within the field of Human Computer Interaction (HCI). Its growing recognition and value is evidenced in part by a remarkable increase in systems design and publication focusing on various aspects of Embodiment. The enduring need to interact through experience has spawned a variety of interdisciplinary bridging strategies in the hope of gaining deeper understanding of human experience. Along with phenomenology, cognitive science, psychology and the arts, recent interdisciplinary contributions to HCI include the knowledge-rich domains of Somatics and Performance that carry long-standing traditions of embodied practice. The common ground between HCI and the fields of Somatics and Performance is based on the need to understand and model human experience. Yet, Somatics and Performance differ from normative HCI in their epistemological frameworks of embodiment. This is particularly evident in their histories of knowledge construction and representation. The contributions of Somatics and Performance to the history of embodiment are not yet fully understood within HCI. Differing epistemologies and their resulting approaches to experience identify an under-theorized area of research and an opportunity to develop a richer knowledge and practice base. This is examined by comparing theories and practices of embodied experience between HCI and Somatics (Performance) and analyzing influences, values and assumptions underlying epistemological frameworks. The analysis results in a set of design strategies based in embodied practices within Somatics and Performance. The subsequent application of these strategies is examined through a series of interactive art installations that employ embodied interaction as a central expression of technology. Case Studies provide evidence in the form of rigorously documented design processes that illustrate these strategies. This research exemplifies 'Research *through* Art' applied in the context of experience design for tangible, wearable and social interaction.

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AUTHOR'S DECLARATION

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Relevant seminars, conferences and art exhibitions were regularly attended at which work was presented, papers were published and interactive art was exhibited. Artworks and publication credits are included below.

Artworks Credits

My artwork and artistic practice is highly collaborative and interdisciplinary. A list of detailed contributions and credits to the art-works referenced within this thesis are described below. The artworks whisper, exhale and soft(n) are referenced specifically as case studies in Chapters 5, 6 and 7 of this thesis. The artworks Felt Histories and Bodymaps are used as historical examples of my artistic exploration of the sense of touch in Chapter 7. As an artist, I am indebted to notable collaborators such as Susan Kozel, Kristina Andersen, the whisper[s] research group, V2_Lab, and of course the pre-eminent Merce Cunningham.

(soft^n), interactive public art installation, 2005 – 2007

Artist and Creative Concept: Thecla Schiphorst
Artistic Director: Thecla Schiphorst
Original Tactile Interaction Design: Thecla Schiphorst
Supported by V2_ Institute for the Unstable Media
Premiere at the Dutch Electronic Arts Festival *DEAF07: interact or die*, Rotterdam, April 10-29 2007.
Project Dates: September 2005 to April 2007
V2_Lab Manager: Anne Nigten
Project Manager: Siuli Ko Pullan, V2_Lab
Hardware Engineering: Stock, Simon De Bakker, V2_Lab
Software Design: Rui Guerra, Michiel KauwATjoe, V2_Lab
Original Software Design for Tactile Gesture Recognition: Norman Jaffe, Robb Lovell, SFU whispers research group <http://whisper.iat.sfu.ca>
Physical Object Co-Design, Construction: Bonana van Mil
Sound Design: Mark Brady
Passepartout Partners: Frank Nack, CWI, Amsterdam; Lora Aroya, TU/E, Eindhoven University of Technology
Funded by: Passepartout Project EU Dutch Consortium in conjunction with Philips Inc, TU/E, CWI, and V2_Institute for the Unstable Media
Photo Credits: Rui Guerra, Simon De Bakker

exhale: breath between bodies, interactive wearable public art exhibition.

Artistic Director: Thecla Schiphorst
Funding: Canarie, Heritage Canada, SFU, Nokia
Project Dates: 2003 – 2005
In collaboration with *the whisper[s] research group*:
<http://whisper,iat.sfu.ca>
Artistic Director, Concept, Systems Design: Thecla Schiphorst
Performance and Dramaturgical Design: Susan Kozel
Project Manager: Sang Mah
Software Engineering: Rob Lovell, Norm Jaffe
Hardware Engineering: Jan Erkuu, Calvin Chow
Fashion Design and Construction: Gretchen Elsner
Sound Design: Mark Brady
Production and Video: Camille Baker
Production Assistants: Alex Mateesco, Malahat Husseini
Web Design: Adam Marston

whisper: wearable body architectures, interactive wearable public art exhibition.

Artistic Director: Thecla Schiphorst
Artistic + Funding Collaboration: Thecla Schiphorst, Susan Kozel
Funding: Daniel Langlois Fondation for the Arts, Canada Council for the Arts, BC Arts Council, V2_Lab, Future Physical
Project Dates: 2001 – 2003
Artistic Concept, Systems Design: Thecla Schiphorst
Artistic Concept, Dramaturgy: Susan Kozel
Interaction Designer: Kristina Andersen
Project Manager: Sang Mah
Software Design + Engineering: Rob Lovell, Norm Jaffe, Andruid Kerne, Stock V2_Lab
Mathematical Visualization: Julie Tolmie
Hardware Engineering: Stock, V2 _Lab; Jan Erkuu, Calvin Chow, whisper[s] research group
Garment Design: Thecla Schiphorst, Kristina Andersen
Garment Construction: Kristina Andersen, Maryan Schiphorst
Production and Video: Camille Baker

Felt Histories, Interactive Computer Video Art Installation, 1998-2000

Artist, Concept, and Video Director: Thecla Schiphorst
Funding: Canada Council for the Arts, BC Arts Council
Project Dates: 1998 – 2000
Artistic Concept, Systems Design: Thecla Schiphorst
Software: Ken Gregory, Grant Gregson, Norm Jaffe
Sound Design: Ken Gregory
Hardware Engineering: Carlos Vela-Martinez
Sensor Wall Design: Ken Gregory, Carlos Vela_Martinez
Sensor Wall Construction: Carlos Vela-Martinez
Video Director + Editing: Thecla Schiphorst
Woman in Door: Helena Schiphorst
Production Assistant: Bernadette MacGregor
Documentation Video Editing: Lorna Boschmann

Bodymaps: artifacts of Touch, Interactive Video Art Installation, 1995-1997

Artist, Concept and Video Director: Thecla Schiphorst
Funding: Canada Council for the Arts, BC Arts Council
Project Dates: 1995 – 1997
Artistic Concept, Systems Design: Thecla Schiphorst
Software: Ken Gregory, Norm Jaffe, Grant Gregson,
Sound Design: Ken Gregory
Hardware Engineering: Infusion Systems
Table Design: Hanif Jan Mohammed
Table Construction: Ewan McNeil
Video Director and Video Editing: Thecla Schiphorst
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Schiphorst, T. (2001). Siggraph Panel, Siggraph 2001, panel moderator in *Designing Experience: collaborative spaces in art and design,* with Ron Wakkary, Susan Kozel, Steve DiPaola, Alice Mansell and Thecla Schiphorst.

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Exhibitions

(soft^{n}) survival strategies for interaction, interactive public art installation, **PICNIC'07**, Westergasfabriek Amsterdam, The Netherlands, September 25-29th 2007. *PICNIC* Dre Wapenaar, Tent village. Group Exhibition, Artist: Thecla Schiphorst, **PICNIC'07 <**http://www.picnicnetwork.org/artefact-10370-en.html>

exhale: breath between bodies, interactive public art exhibition. National Academy of Sciences, *Speculative Data and the Creative Imaginary: shared visions between art and technology*, Washington D.C., June 4th – August 24th 2007. Curated by Pamela Jennings. Artist: Thecla Schiphorst in collaboration with *The whisper[s] Research Group.* Group Exhibition including Sheldon Brown, Christa Sommerer and Laurant Mignonneau, Nell Breyer and Jonathan Bachrach, Ernest Edmonds, George Legrady, Thecla Schiphorst. <http://www7.nationalacademies.org/arts/Speculative_Data_and_the_Creative_Imaginary.html>

(soft^{n}) survival strategies for interaction, interactive public art installation, commissioned by V2_ Institute for the Unstable Media, for Dutch Electronic Arts Festival *DEAF07: interact or die*, Rotterdam, The Netherlands, April 10th-29th 2007. Group Exhibition, Artist: Thecla Schiphorst. DEAF07 Exhibition: <http://www.deaf07.nl/index.php?option=com_program&act=project&Itemid=17> soft(n)

Bodymaps: artifacts of Touch, interactive art installation. Media Art Exhibition: *Can We Fall in Love with a Machine?* Curated by Murray Horne and Claudia Hart; Wood Street Galleries, Pittsburgh, Pennsylvania, January 2006 – April 2006. Group Show: <www.woodstreetgalleries.org/>. Artist: Thecla Schiphorst.

exhale: breath between bodies, interactive public art exhibition. Digifest Exhibition and Symposium, *Digifest: mods*, Toronto, Harbourfront Centre and Ontario Science Centre, May 9th – 15th 2006. Artist: Thecla Schiphorst in collaboration with *The whisper[s] Research Group.* <http://www.ontariosciencecentre.ca/calendar/default.asp?eventid=486>

move.me smart objects + exhale: breath between bodies, interactive public art installation and demonstration. *Fleshing Out* Exhibition, Symposium + Workshop, V2_Lab, Rotterdam, The Netherlands, November 9th – 10th 2006. Artist and Principle Director for *exhale*: Thecla Schiphorst in collaboration with *The whisper[s] Research Group*. Artist and Principle Director for *move.me*: Thecla Schiphorst in collaboration with V2_Lab. <http://www.virtueelplatform.nl/article-3553-en.html> and <http://www.virtueelplatform.nl/artefact-3047-en.html>

exhale: breath between bodies, interactive public art installation. *Emerging Technologies* and *Art Gallery* Exhibition, Siggraph 2005, Los Angeles Convention Center, July 31st - August 4th, 2005, Artist and Principle Director: Thecla Schiphorst in collaboration with *The whisper[s] Research Group*. <http://www.siggraph.org/s2005/main.php?f=conference&p=etech&s=etech15> Group Exhibition.

<*between bodies*>*,* interactive wearable public art presentation and exhibition, *New Forms Festival, Technography,* Vancouver, Roundhouse Centre, Oct 15-22 2004, Artist and Principle Director: Thecla Schiphorst in collaboration with Susan Kozel and *The whisper[s] Research Group*. Group Exhibition. <http://www.newformsfestival.com/nff04/>

<*between bodies*>*,* interactive wearable public art presentation and exhibition, *Ciberarts Festival*, Bilboa, Spain, Apr 20-30th 2004, exhibited as part of *The Evident Traces projects* curated by Christiane Paul (Whitney Museum). Artist and Principle Director: Thecla Schiphorst in collaboration with Susan Kozel and *The whisper[s] Research Group*. Group exhibition. Festival: <http://www.ciberartfestival.net/instala_en.htm> About Exhibitions: <http://www.realtimearts.net/article/62/7506>

whisper: wearable body architectures, interactive wearable public art presentation and exhibition, *e-culture fair*, Paradiso Theatre, Amsterdam, The Netherlands, Oct 23-25 2003, Artist and Principle Director: Thecla Schiphorst in collaboration with Susan Kozel and *The whisper[s] Research Group*. Group exhibition. <http://www.e-culturefair.nl/site/index_en.html> > projects > mymode

whisper: wearable body architectures, interactive wearable public art presentation and exhibition, *Respond Festival*, produced by *Future Physical*, Cambridge UK, April 2 – 6th 2003, curated by Ghislainne Boddington, Shinkansen and Lizzie Muller. Artist and Principle Director: Thecla Schiphorst in collaboration with Susan Kozel and *The whisper[s] Research Group*. Group Exhibition.

Respond Event: <http://www.futurephysical.org/pages/content/resp_env/nex.html>

Exhibition: <http://www.futurephysical.org/pages/programme/commissions.html> >co-productions >whisper

whisper: wearable body architectures, interactive wearable public art presentation and exhibition, Dutch Electronic Arts Festival, *DEAF03: Data Knitting*, Rotterdamse Schouwburg Theatre, Rotterdam, The Netherlands, Feb 23 – March 07 2003. Artist and Principle Director: Thecla Schiphorst in collaboration with Susan Kozel and *The whisper[s] Research Group*. Group exhibition. <http://www.deaf.v2.nl/03/>

Bodymaps: Artifacts of Touch, Interactive Computer Video Art Installation, *Virtual Incarnations Dance Umbrella 2000 Exhibition*, ICA Gallery, London England, October – November 2000. Artist: Thecla Schiphorst. Group Exhibition with artists: Merce Cunningham, Paul Kaiser, David Rokeby, Thecla Schiphorst. See archive: <http://193.123.212.249/wwwselect.html>

Bodymaps: Artifacts of Touch, Interactive Computer Video Art Installation, Media Art Exhibition: *Touche*, McKenzie Art Gallery, Regina, March - May 2000. Curated by Nina Czegledy, Artist: Thecla Schiphorst. Group Exhibition: Daniel Joliffe and Thecla Schiphorst. Mackenzie Art Gallery Archives <http://www.mackenzieartgallery.ca/Exhibitions/Exhibition_Archives/>

Felt Histories, Interactive Computer Video Art Installation, Media Art Exhibition at Gaerlock Gardens, *Oakville Galleries*, Oakville Ontario, February - April 2000, curated by Su Ditta, Artist: Thecla Schiphorst. Solo Exhibition. Oakville Gallery Website: <http://www.oakvillegalleries.com>

Felt Histories, Interactive Computer Video Art Installation, Media Art Exhibition: 7th *New York Digital Salon*, SVA, School of Visual Arts, New York City, January 2000. Artist: Thecla Schiphorst. Group Exhibition. New York Digital Salon: <http://www.nydigitalsalon.org/> 7th New York Digital Salon Installations: <http://www.nydigitalsalon.org/07/installationFrames.html>

Exhibition Catalogues

Schiphorst, T., *exhale: breath between bodies*, National Academy of Sciences, in exhibition Catalogue of the *Speculative Data and the Creative Imaginary: shared visions between art and technology,* Curated by Pamela Jennings, July 2007.

Schiphorst, T., *exhale: (breath between bodies),* in ACM Siggraph 2005 Emerging Technologies SIGGRAPH '05, July 2005, Article No. 6.

Schiphorst, T., *exhale: breath between bodies*, ACM SIGGRAPH 2005, in Juried Artists: Electronic Art and Animation Catalog, SIGGRAPH '05, pp. 62-63.

Performances

exhale: breath between bodies: Canada House Pavilion, Winter Olympics, Torino, Italy, Feb 18th 2006. Developed and choreographed 8 dancers for an interactive performance of *exhale: breath between bodies* to exemplify networked wearable technologies and design innovation, presented during New Media B.C. exposition.

exhale: breath between bodies: FutureFashion, Pisa, Italy, May 20th, 2006. Choreographed, Rehearsed and Developed choreography with 6 dancers for an interactive performance of *exhale: breath between bodies.* This performance was developed in the context of new interactive fashion that is integrating technology, communication and expressivity through smart textiles, soft circuits and urban design. <http://www.cutecircuit.com/now/futurefashion-catalog/>

exhale: breath between bodies: Light Lantern Festival, September 17th, 2005, Shadbolt Centre for the Arts, Public Dreams Productions <http://www.city.burnaby.bc.ca/cityhall/departments/departments_parks/prksrc_fclts/prksrc_fclts_shdblt.html>

exhale: breath between bodies: Cyber-Fashion Show Wired Woman, Vancouver October 2005, "What Wired Woman Wear", interactive fashion event <http://www.wiredwoman.com/>

exhale: breath between bodies: Cyber-Fashion Show Siggraph August 2005, as part exhibition and festival in the context of ACM Siggraph <http://psymbiote.org/cyfash/2005/>

<*between bodies*> Cyber-Fashion Show Siggraph August 2004, as part exhibition and festival in the context of ACM Siggraph http://www.siggraph.org/s2004/conference/studio/fashion.php?pageID=conference

Presentations Panels Reviewed

Ascott, R., Cos, D., Dolinsky, M., Gromala, D., Novak, M., Rogala, M., Schiphorst, T., Slattery, D., Vesna, V., "Artist Round Tables", ACM SIGGRAPH 2004 Art Gallery, SIGGRAPH '04, August '04, pp. 131-134.

Jeremijenko, N., Schiphorst, T., Mateus, M., Straus, W., Wright, W., Kerne, A., Siggraph Panel, "Extending interface practice: an ecosystem approach", ACM Siggraph 2002 abstracts, pp. 90-92.

New Bodies, New Realities, Live Chat Room, Dance Umbrella 2000,October 2000, live webcast event with Thecla Schiphorst, Merce Cunningham, Paul Kaiser, Shelley Eshkar, Wayne McGregor; moderated by Ghislainne Boddington.

Presentations Invited

Keynote	ECSCW European Computer Supported Co-operative Work, Vienna, Sept 9-11, 2009.
Workshop	*Wearable Computing for Art and Performance*: a workshop in Laban Computer Movement Analysis and Intermedia Performance, University of Illinois at Urbana Champaign, September 3-6 2009
Lecture	Krannart Centre for the Arts, Invited Lecture Series, University of Illinois at Urbana Champaign, April 2009
Presentation	HASTAC Conference, April 2009, University of Illinois Champaign
Presentation	SXSW, South by South-West, March 2009
Keynote	Creativity and Cognition, 2007, Washington DC, July 12-15, 2007.
Presentation	Dutch Electronic Arts Festival DEAF07, Rotterdam, April 2007.
Workshop	Dutch Electronic Arts Festival DEAF07, Rotterdam, April 2007.
Keynote	NTA National Textiles Association, February 2007, South Carolina.
Presentation	Dancing Around Technology, V2_Lab Open Process Workshops, Feb 2007.
Lecture	Smart Fabrics Europe Conference, December 12-15, 2006, Edinburgh.
Presentation	Fleshing Out, V2_, November 22-23 2006, Rotterdam, Amsterdam.
Presentation	ITEA Passepartout Technical Demonstrations, Paris Oct 11-14, 2006.
Lecture	Smart Fabrics Conference, Intertech, March 2006, Miami.
Lecture	Digifest 2006, May 10-15, 2006, Toronto, Ontario Science Centre.
Presentation	Smart Fabrics Europe, Invited Lecture and Presentation, Dec 2006.
Presentation	Nokia University Research Collaborations workshop; presentation: move.me project, December 15, 2005, Nokia Vancouver.
Presentation	Digital Cultures Workshop and Lab, University of Trent at Nottingham, conference presenter, November 27 – December 4, 2005.
Presentation	Banff, Bodies In Motion Seminar, June 24–27, 2005, research presentation, whisper[s] project.
Presentation	ASU Flexible Fabrics Research Presentation, ASU, June 2005.
Presentation	Canada Japan Culture New Media Days, New Media Exchange, Nagoya Expo, June 4-8, 2005, Japan Canada, Invited to represent Canada New Media Research, sponsored by Heritage Canada.
Presentation	Consciousness Reframed Conference, Beijing, China, Nov 22-28, 2004.
Panel	New Forms Festival, October 14-16, 2004.
Lecture	Venice Biennelle, Dance and Technology Festival, June 2004.
Workshop	“Cross Dressing and Border Crossings”, SigCHI 2004 Vienna, Austria, Workshop, CHI Workshop, ACM CHI 2004, April 2004, Vienna.
Lecture	Banff wireless workshop, Lecture, Banff New Media Institute, “A case history of the whisper project”, November 14–16, 2003.
Panel	e-culture fair, Amsterdam, Wearable Technologies, sensory tools and performance, October 23, 2003, with Thecla Schiphorst (whisper), Joey Ryan, Institute of Sonology, STEIM, Jussi Angelsleve, Media Lab Europe.
Lecture	RISQ2003-Canarie ANW2003, Networks for People: Accessibility > Performance > Results > Conference Montreal, “whisper: networking wearable community architectures”, October 20-23, 2003.
Panel	Merce Cunningham, The Four Discoveries, Presenter, Panelist, “Merce Cunningham’s process with LifeForms, computer dance technology” BAM, Brooklyn Academy of Music, New York, October 18, 2003.
Lecture	V2 – Waag Symposium, “whisper: wearable body architectures”, Den Haag, The Netherlands, September 4–6, 2003.

Presentation	NewForms Festival, July 30, 2003, Conference Roundtable, “whisper: wearable body architectures”.
Presentation	Consciousness Reframed, Newport, University of Wales, “Wearing our<selves>”, July 4-6, 2003.
Presentation	Nomadic Arts and Technology Conference, “BodyState: building our technologies through attention modeling”, Zurich April 15-17, 2003.
Presentation	Venice Biennale, Conference on Dance and Technology, “Movement architectures: the dancing body within the machine”, May 8-10, 2003.
Presentation	Future Physical, Presentation, Respond Festival and Conference, Cambridge, UK, April 1-5, 2003.
Panel	DEAF festival, Data Knitting, Women and Technology, March 7, 2003.
Keynote	Wear Me! Conference and Festival, Norfolk, England, produced by Future Physical, December 5, 2002.
Presentation	Bridges II, The Banff New Media Institute, October 4–6, 2002, Collaboration and Our Bodies.
Artist Talk	BEAP, The Biennale of Electronic Arts, Perth University, August 6, 2002.
Presentation	Consciousness Reframed 2002: John Curtin Gallery, Curtin University of Technology, Perth, Western Australia, August 2-4, 2002.
Panel	Siggraph 2002, Extending Interface Practice an ecosystem approach.
Panel	Theatre, Gender and Beyond, London, UK, SmartLab, July 7-8, 2002.
Presentation	V2-Lab, Seminar, V2- anarchiving conf, Pulp Fashion, July 5, 2002.
Presentation	Intimate Technologies, Banff Summit, April 25-28, 2002.
Workshop	Workshop on Physiological Computing, CHI2002, Minneapolis.
Panel	The Uncanny, Experiments in Cyborg Culture: reading the Cyborg, artist’s panel, Vancouver Art Gallery, February 2002.
Presentation	The Art of Software, Sonic Arts festival, Amsterdam, December 2001.
Presentation	9-11-N2N Networks to Nanosystems: Art, Science and Technology in Times of Crisis, UCLA, UC Santa Cruz, November 2001.
Artist Talk	Foundation Lecture Emily Carr Institute of Art and Design, August 2001.
Presentation	Extreme Computing, Conference, Barcelona, July 2001.
Presentation	e-naissance | new configurations Conference, Turino, Italy April 2001.
Presentation	Bridges Symposium, UCI, conference May 2001.
Presentation	ISEA, Paris, December 2000.

Reviews

HorizonZero: Digital Arts and Culture in Canada, Issue 04: TOUCH, November 2002, “Artifacts of Touch: Thecla Schiphorst re-choreographs the relationship between technology and the public body”, by Jeanne Randolph; <http://www.horizonzero.ca/textsite/touch.php?is=4&file=10&tlang=0>

HorizonZero: Digital Arts and Culture in Canada, Issue 04: TOUCH, November 2002, “Bodymaps, Thecla Schiphorst”, by Eric Raymond; <http://www.horizonzero.ca/textsite/touch.php?is=4&file=9&tlang=0>

Word Count of Main Body of Thesis: 76,353

Signed

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