
The Varieties of User Experience

"Our fields of experience have no more definite boundaries than our fields of view. Both are fringed forever by a more that continuously develops, and that continuously supercedes them as life proceeds."
William James¹

"Quality [of experience] is concrete and existential, and hence varies with individuals since it is impregnated with their uniqueness." John Dewey²

"When writing or reading . . . like this, we face the problem that we cannot learn what we do not already know. Writings are not representations or explanations of the world, they are intended to trigger some awareness by the reader toward his or her own experiences."
Susan Bødker³

1.1 Introduction

The work presented here is radically interdisciplinary⁴, situating itself between knowledge traditions that are historically rooted in divergent terrains and climates of knowing. These roots originate in human computer interaction (which has traditionally grown out of usability engineering and computer science), and in somatics and performance (focusing on body-based disciplines that have flourished largely outside of academia and that originate from the shared history of modern dance and somatic practice). Powerful and accelerating shifts in technology, culture and society are asking, even demanding, new mechanisms for 'realizing' the world, its inhabitants and their relations. It is within this climate of necessity and change that such seemingly disparate traditions can work together in a shared concern for understanding human experience.

¹ James, W. (2003). *Essays in Radical Empiricism*, London: Dover Publications, p. 37.

² Dewey, J. (1934). The Varied Substance of the Arts, in *Art As Experience*, Carbondale, Illinois: Southern Illinois University Press, p. 223.

³ Bødker, S. (1990). *Through the Interface: A Human Activity Approach to User Interface Design*, Hillsdale, New Jersey: Lawrence Erlbaum Associates, p. 3.

⁴ Wright, Blythe & McCarthy (2006) refer to *radical interdisciplinary dialogue* in their argument for extending design perspectives within HCI, see Wright, P., Blythe, M., & McCarthy, J. (2006), User Experience and the Idea of Design in HCI, *Lecture Notes in Computer Science, 3941*, Springer Verlag, p. 1-14; also Davis (2003); and Mateus & Sengers (2003) use the phrase *radical interdisciplinarity* to express the need to integrate technical and humanistic research to design for experience and narrative.

This common ground, this shared concern for experience, is a starting point that seeds a comparison of the varied and differentiated epistemologies of practice that thrive between human computer interaction (HCI) and the fields of somatics⁵ and performance. Body-based practices are the specific focus of the epistemological history shared between somatics and modern dance performance, fields that intersect and align through a common genealogy of practice. This inquiry forms the basis of *Research through Art*⁶, practice-based research that is exemplified by applying somatic awareness of bodily experience to HCI in order to expand the practical application of embodied theory within technology design. Artistic outcomes and technological examples concentrate on networked, tangible and wearable technologies, offering a theoretical framework originating in practice. The intention is to support the efficacy of experience and embodiment practices, while contributing to knowledge that responds to an increasingly technological world.

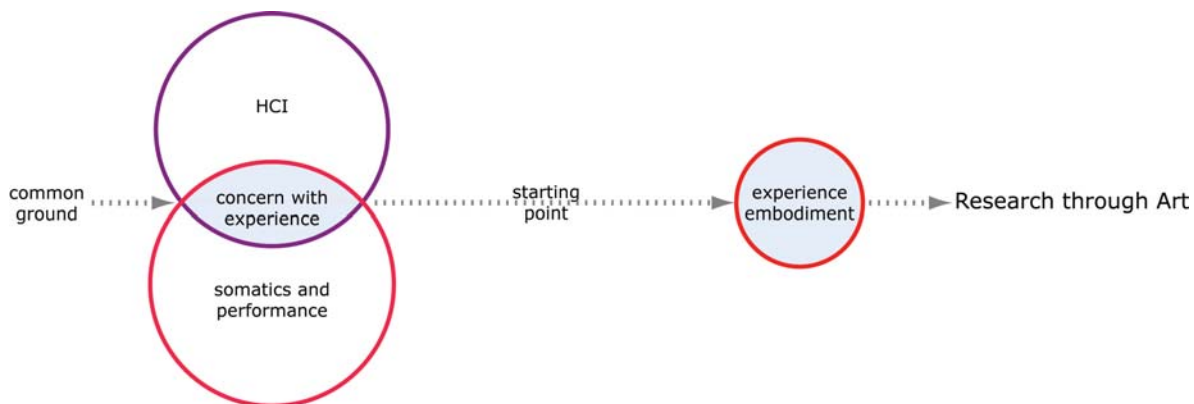


Figure 1. The common ground of 'concern with experience' seeds the basis of Research through Art

⁵ Somatics is a term applied to a field of practice and research developed during the late nineteenth and twentieth century in Europe and America. Following over a century of development and practice from pioneers of bodywork and body awareness, the field was named Somatics by American philosopher Thomas Hanna, and *Somatothérapie* by French physicians and educators. Hanna founded the American journal *Somatics* in 1976, subtitled *The Magazine-Journal of the Bodily Arts and Sciences*, and French psychiatrist Richard Meyer, the French journal *Somatothérapie* in 1989, to review theoretical and practical work in the field. Hanna's definition is "the field which studies the soma: namely, the body as perceived from within by first-person perception" in Hanna, T. (1986). What is Somatics?, *Somatics Journal of the Bodily Arts and Sciences*, 5(4), Spring/Summer 1986, p. 4.

⁶ Christopher Frayling's 1993 paper 'Research in Art and Design' is cited frequently in support of practice-based research, and most recently within HCI in John Zimmerman, Jodi Forlizzi and Shelley Evanson's CHI'07 paper exploring integration of design in research and practice (Zimmerman 2007). They suggest that this approach enables designers to contribute to HCI based on their strengths in addressing under-constrained problems, and which stresses design artifacts as outcomes that can transform the world from its current state to a preferred state, see: Frayling, C. (1993). Research in Art and Design. *Royal College of Art Research Papers*, 1(1), p. 1-5, and Zimmerman, J., Forlizzi, J., Evanson, S. (2007). Research through design as a method for interaction design research in HCI, *CHI '07: Proc SIGCHI Conf.* New York: ACM, p. 493-502.

1.2 Conceptual Framework

This work bridges embodied methodologies from somatics and performance to human computer interaction. I explore human experience and its inseparability from the material processes of technology. While the intended audience is HCI, this work will also be of interest to researchers that apply body-based somatic awareness practices to interdisciplinary methods in the sciences, social sciences and humanities: those interested in radical interdisciplinary dialogue. This research is aligned with others working within HCI and computation including Dourish (2001), McCarthy and Wright (2004) and Agre (1997). In Agre's introduction to *Computation and Human Experience*⁷ he emphasizes the integral connection between computational processes and their unmitigated connection with the world at large:

I wish to investigate this confluence of technology and human experience. The philosophical underside of technology has been deeply bound up with larger cultural movements, yet technical practitioners have generally understood themselves as responding to discrete instrumental "problems" and producing technologies that have "effects" upon the world.... I would like to contribute to a *critical technical practice* in which rigorous reflection upon technical ideas and practices becomes an integral part of day-to-day technical work itself.⁸

Although Agre's account of *critical technical practice* is focused on technological systems, technical practice itself can be represented within a wide variety of domains. With this wider view of technical practice in mind, Agre's statement can be applied equally to HCI as it can to the body-based practices within somatics and performance. Each defines, utilizes and refines a set of technical knowledge, applying this to practice that produces "effects" upon the world. In the case of human computer interaction, technical knowledge is embedded in computational systems and their representations, which include usability and user experience. In the case of somatics and performance,

⁷ Philip Agre takes the stance that people are intimately connected with the world around them and that the epistemological isolation that Descartes took for granted is untenable. Further explicating the views of Heidegger and Merleau-Ponty, he asserts this stance *technologically*, defining a *critical technical practice*. See Agre, P.E. (1997). *Computation and Human Experience*, Cambridge, UK: Cambridge University Press.

⁸ Ibid, p. xi.

technical knowledge is embedded in embodied systems and their representations: technical body-based practices where one of the primary goals is reproducibility (i.e. repeatability) of *body-state* in the context of day-to-day actions⁹.

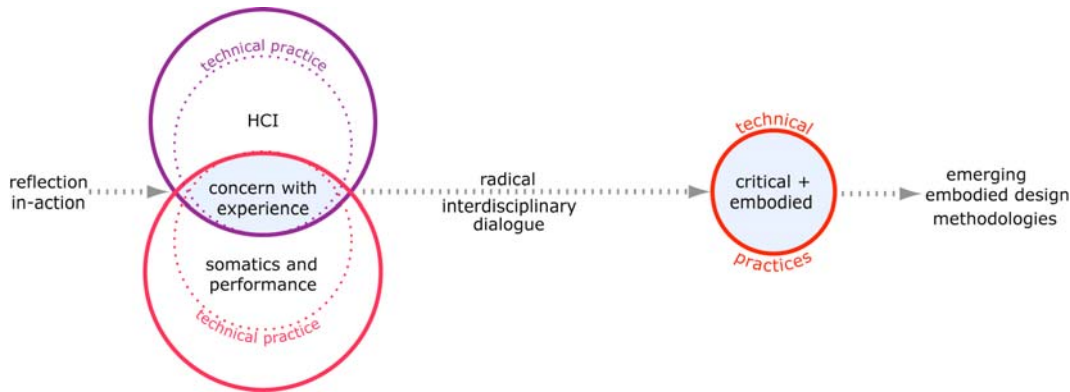


Figure 2. Critical Embodied Technical Practices support emerging embodied methodologies

In each case technical practice is inseparable from experience, so that ‘modeling embodied techniques’ is equally as experiential as ‘modeling computational systems’. It is not the intention of this work to create binarisms, but rather to unfold distinctions that clarify values and contributions to interdisciplinary methods. While we have not yet established substantive theory associated with the specific technical nature of embodied practice within HCI literature, the application of body-based technical practice in somatics and performance can provide core disciplinary expertise and further evidence for integrating body practices into the design of technology.

Technical processes express rigour, specificity, and knowledge: explicit as well as tacit. Agre speaks of *critical technical practice*. My work contributes *embodied processes* to critical technical practice where reflection-in-action¹⁰ can invite a dialogue between the

⁹ For example, Glen Hartelius makes an argument for a state-based access to knowledge which enables replicable inquiry in what he refers to as Somatic Phenomenology, see: Hartelius, G. (2007). Quantitative Somatic Phenomenology: Toward an Epistemology of Subjective Experience, *Journal of Consciousness Studies*, 14(12), p. 24–56.

¹⁰ Donald Schön discusses the epistemology of practice with his notion of ‘reflection-in-action’ which places technical problem solving within a broader context of reflective inquiry, and illustrates how reflection-in-action can be rigorous in its own right, linking the art of practice in uncertainty and uniqueness to the scientist’s art of research. Schön, D.A. (1983). *The Reflective Practitioner: How Professionals Think In Action*. Basic Books, p. 69. His discussion of reflection-in-action describes techniques of ‘thinking on your

differing *forms* of technical practice in computation and embodiment. I work to foster creativity by integrating these divergent epistemologies of practice. This approach uses a radical interdisciplinary dialogue,¹¹ in which the varieties of user experience can be expressed in the context of interaction.

To achieve this end, I explore the varied epistemological value centres within HCI, and the body-based knowledge within somatics and performance, focusing particularly on notions of technical rigor in action. This is an epistemological *reframing* of the nature of user experience within HCI and between HCI and somatics; its exploration is one of the primary goals of this research.

1.3 Conceptual Framework – An Approach to Embodied Interaction

In the midst of this terrain, embodied interaction continues to gain significance within the field of human computer interaction. Its growing recognition and value is evidenced in part by a notable increase in publication and systems design focusing on various aspects of experience and embodied interaction [see Table 1], including special journal issues exploring such topics as the emerging role of performance in human computer interaction (MacCaulay et al, 2006). The enduring need to interact through experience has spawned a variety of interdisciplinary bridging strategies in the hope of gaining a deeper understanding of human experience (Davis 2003), (McCarthy & Wright 2004), (Moen 2005). Along with phenomenology (Dourish 2001), cognitive science (Hurtienne & Israel 2007), psychology and the arts (Höök, Sengers, & Andersson 2003), recent interdisciplinary contributions to HCI include the knowledge-rich domains of somatics and performance traditions such as contemporary dance and physical theatre that carry long-standing traditions of embodied practice.

feet' in which attributes of 'corrective measures in action' based on awareness coupled with ability to redirect cognitive-motor functioning are identical to Somatic learning frameworks. This discussion illustrates that somatics has a potential to increase the adoption of reflection-in-action if applied in technical practices.

¹¹ See also footnote 4 in this chapter. The term 'radical interdisciplinary dialogue' can also be linked to William James' 'Radical Empiricism', in his conception of a 'pluralistic universe' perceptual experience unfolds revealing and necessitating multiple simultaneous truths, in which 'reality is created temporally day by day'.

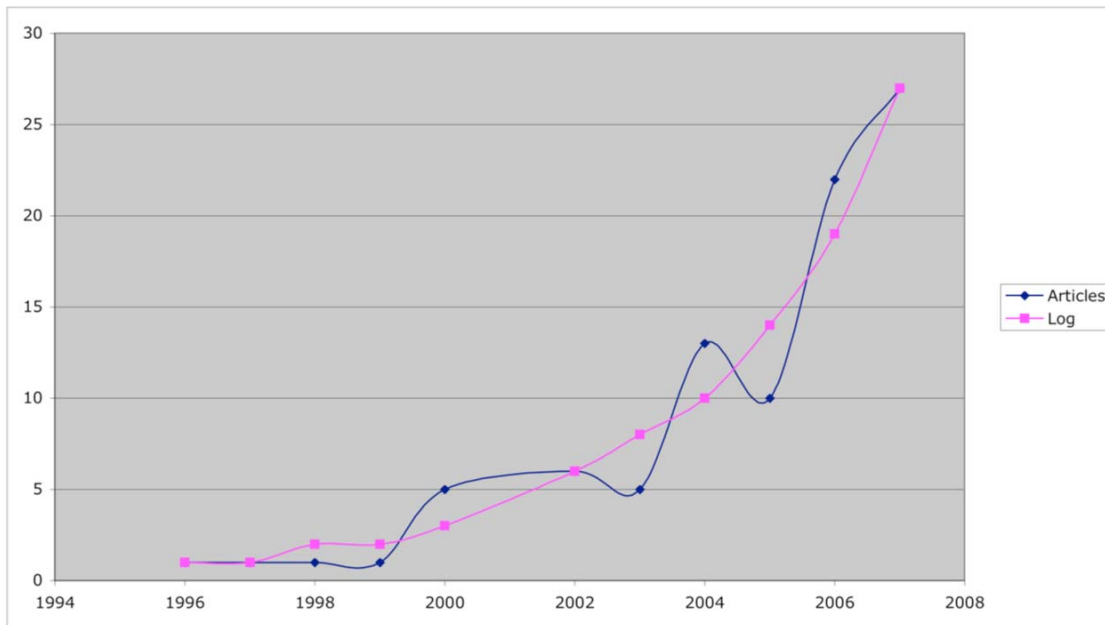


Table 1. Evidence of growth in HCI publications with keywords 'experience' and 'embodiment' ¹²

We have identified that the common ground between HCI, and the body-based practices within the fields of somatics and performance is found in the need to understand and model human experience, and that 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 with regard to the body as a site of experience. The contributions of body-based practices within somatics and performance to the larger history of embodiment is not yet fully articulated or understood within HCI. The differing epistemologies and their resulting approaches to experience, along with an unexplored terrain in the HCI literature, identify an under-theorized area of research and opportunities to develop richer knowledge that can be applied to the design of technology.

¹² The method used to obtain this data was based on a keyword search of the ACM Guide to Computing Literature for {embodiment, embodied, embodied interaction, experience, user experience, experience design}, extracted in November 2007. Abstracts and keywords were skimmed to filter and avoid inclusion of material that was not in the area of interest. The resulting chart illustrates growth in number publications and the logarithmic function of that growth.

Figure 3 below, outlines the proposed research exposition and progression as presented in this thesis.

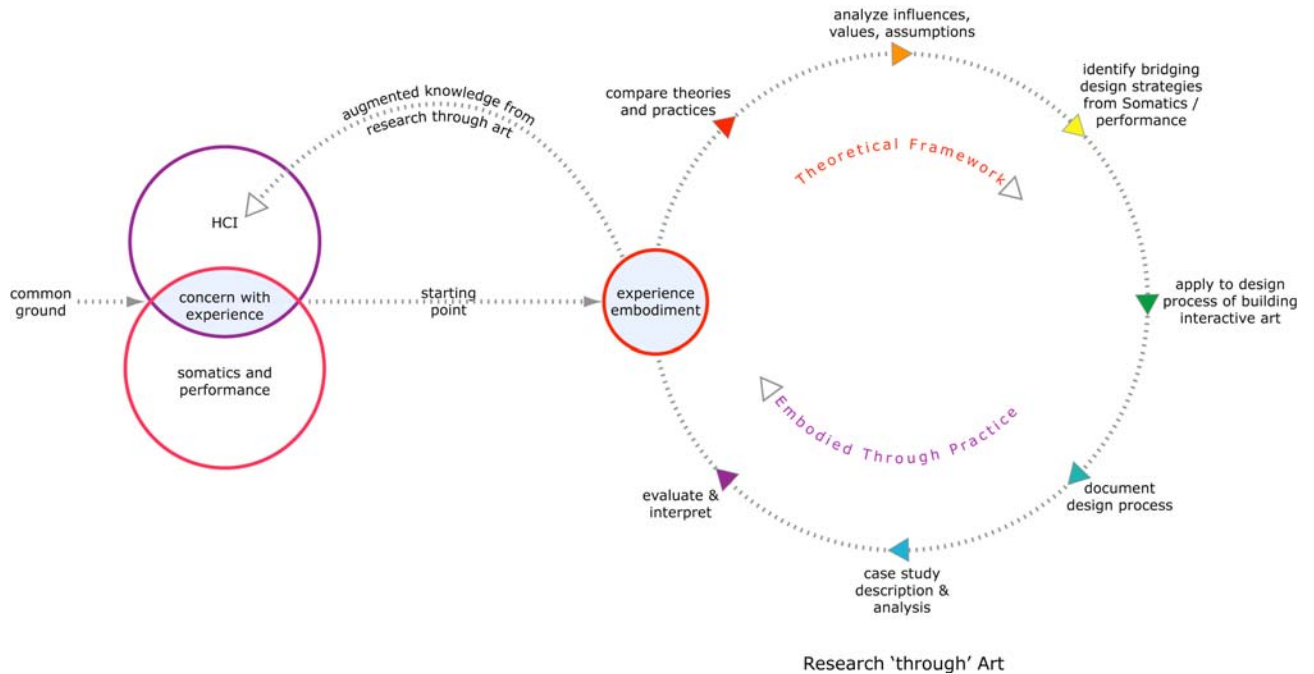


Figure 3. Conceptual Framework: Outline of Thesis Structure as Supported by Research through Art

Figure 3 illustrates a research through art cycle that begins with a shared concern for experience. This seeds a comparison of the epistemologies of practice between HCI, and body-based practices within the fields of somatics and performance. Comparing theories and practices of experience through the lens of 'reflection-in-action' allows us to focus on the transmission and representation of knowledge. By tracing the historical influences, values and assumptions underlying these two epistemological frameworks, and analyzing both fields within the larger context of society and culture, we can articulate resonances, similarities and differences. Comparing epistemologies of practice that distinguish HCI from the body-based practices within somatics and modern dance performance, is accomplished by tracing histories from mid-nineteenth century developments in the transmission and codification of bodily experience. This comparison fosters a historical perspective that can, in turn, bring appreciation and

greater contextual understanding to the specific attributes of bodily knowledge, while supporting a radical interdisciplinary dialogue between HCI and body-based somatic awareness practices. As an integral aspect of *Research through Art*, the analysis results in a theoretical framework and a set of design strategies that can be applied to the development of technologies and human experience through Interactive Art. These design strategies focus on bridging embodied practices within somatics and performance to human computer interaction. In order to bring a reflective and critical stance to this process, the subsequent application of these design strategies is exemplified through a series of case studies using interactive art that employs embodied interaction as a central expression of technology. These case studies provide evidence in the form of rigorously documented design processes that illustrate the multi-faceted techniques applied within embodied design, while simultaneously grounding the development of the theoretical framework. Evaluation is based on interpretations of the assumptions, methods and outcomes: the 'self-evidence' that results from analysis of these case studies. Outcomes are equally balanced between the theoretical framework and the artworks that enact the framework. This example of Research through Art is applied in the context of experience-design for tangible, wearable and social interaction.

1.4 Conceptual Framework – Positioning Artistic Practice

My artistic practice applies somatic awareness of experience to human computer interaction, focusing on the design of networked, wearable and tangible technologies that are exhibited as interactive art installations. The practice is born out of, and synthesizes three disciplinary approaches to 'making' that come together through formal training: contemporary dance performance, somatic body-based experiential awareness techniques, and computer systems analysis and design. This practice-based research intersects art and design modalities, as it intersects body and technology

modalities. The artistic, experiential and technological outcomes can be described as atypical uses of both body-based practices and digital technologies.

Somatics and contemporary dance share a genealogy of practice, yet they also differ in their approaches to practice. While both apply body-based techniques that educate somato-sensory awareness within the body, their goals are distinctly focused.

Somatics is ameliorative, focusing on the education of the sensory motor system to effect greater awareness of movement; its educational and therapeutic goals result in increased agency of the *everyday* body's ability to transform itself through its own self-cultivation, self-action and self-knowledge in the situation of daily felt-life.

Contemporary dance applies similar and even identical techniques of body-awareness, however the goal is to educate the *expert* technical body, both the instrument and the material of performativity. In contemporary dance, somatics education is applied to the body's expertise, virtuosity and agency in performance, where the goal is artistic and aesthetic; the dancer's skill enables an extended range of expressivity, repeatability, and proficiency in enacting technical bodily skill.

The emergence of the proposed research approach to 'radical interdisciplinary methods' is coloured by life-experience and extensive formal training across disciplinary boundaries of body and technology. My artistic practice has fueled a curiosity in bridging knowledge that has been internalized through decades of experience, but that remains unaccounted-for in an explanatory capacity within HCI, and between HCI and body-based practices. In choreographic practice, 'making' is inscribed directly through bodily knowledge: the bodily experience of the dancer and choreographer. In somatic practice, 'making' is akin to first-person body awareness and to self-reflexive action. While exploring how somatic awareness techniques can be applied to human computer interaction, the process of designing and implementing technologies *through* the body requires articulation, exemplification and validation in

order to be incorporated into the HCI literature in a legible and generalizable form that can support the design of technology as experience. The research presented here focuses on the articulation of more explicit body-based approaches, somatic techniques and the integration of a somatic historical context within HCI. The 'somatic turn' invites a rethinking of the process of making technology, one that includes design for the experience of the self.

1.5 Conceptual Framework – Background and Prior Work

My interest in this research is founded in deep working knowledge and experience from the fields of somatics and performance. A life-long training in contemporary dance, choreography and somatics practice include expert knowledge in a range of movement creation, movement analysis, physical and structural techniques (Laban Effort / Shape, Feldenkrais and Alexander Methods, Pilates and Ashtanga Yoga), Applied Kinesiology (Body-Talk, Touch for Health, Hypertonix, Psychosomatic Energetics and One-Brain modalities) and contemporary dance technique and choreography (Cunningham, Limon, and Graham technique, Contact Improvisation and Butoh). These practices share a focus on ameliorative processes that operate on the somato-sensory body, and that enable the use of one's own experience as a tool of change. My professional training coupled with over 12 years experience in computing, computer programming, systems analysis and computing education prior to completing my Masters Degree, has enabled me to conceptualize and design within the field of human computer interaction. The research presented in this thesis advances my life-long interest in bridging the epistemologies of practice from body-based awareness techniques within somatics and contemporary dance performance in ways that can be legibly and coherently applied to human computer interaction. As a Media Artist who has exhibited internationally for over 15 years, my research has emerged from intersecting foundational knowledge of computing and body-based practices, and results in working technology prototypes: art installations that are exhibited, tested and validated within the context of an international interactive

art community. I adopt Christopher Frayling's¹³ usage of the term research through art to position these research strategies.

My artistic practice explores embodied interaction through movement, touch and body-state. The artwork is highly experiential, material, and aesthetic. My interdisciplinary background in performance (primarily contemporary dance), somatics and computing has framed the approach I apply to my artistic practice.

1.5.1. Movement. In 1993 I received an Interdisciplinary Master's Degree (M.A.) from Simon Fraser University between the School of Computer Science and the Dance Program within the School for Contemporary Arts. This degree was undertaken through "Special Arrangements", a degree designation for exceptional students working outside or between existing disciplines¹⁴. The research explored the relationship between dance and technology, and resulted in the design of a computer application called Life Forms, a 3D choreographic design tool. My contribution within the development team was user interface design; translating the choreographers' mental model (creative and kinesthetic methods) to a computational framework. This research combined creative and technical capacity, from design, through to implementation. In 1989, as a direct outcome of LifeForms' presence and early recognition within the global dance community, I began to work with the internationally acclaimed choreographer Merce Cunningham, supporting his creation of choreography with the computer. Cunningham's embrace of the LifeForms choreographic software radically changed the face of dance and technology.

¹³ Christopher Frayling's paper on 'Research in Art and Design' (Frayling 1993) adapted Richard Read's celebrated 1940's distinction between teaching to art and teaching through art and applied it to the evolving research culture of postgraduate art courses. Frayling's contribution has shaped further discussions of art as research – where the methods and conventions and debates of research became embodied in the artifact itself.

¹⁴ Extracted from <<http://www.sfu.ca/gradstudents/prospective/specialarr.html>>, Nov 15, 2007, "Exceptionally able students may pursue graduate studies outside or between existing graduate programs by enrolling under Special Arrangements".

I continue to work with movement as material. Movement is integral to expression within dance and to learning within somatics. An example is *immerce*, an interface to an archival database application exploring multiple navigation modes based on Cunningham's choreographic methods. Navigation modes included Linear, Associative and Random, and a Memory Map that traced the user's navigation through the dataspace. This work won three IDMA (International Digital Media Awards) and was exhibited in Canada and abroad.

1.5.2. Touch. The sense of touch has been a theme in my artwork since 1995 and in my somatics training since 1984. My historical exploration of tactile interaction spans a fifteen year period and is illustrated through a range of expressiveness and application. Touch and tactile interfaces are used as an exploration of *active touch*¹⁵ in experience, in particular, experience that 'attends' to our inner state. Touch is sometimes called "the first sense"; it is associated with intimacy and empathy. Touch is also an important sense in the field of somatics, and remains influential in my research trajectory.

Bodymaps: artifacts of touch and Felt Histories (two interactive art installations that used touch, 1995-1999) were exhibited internationally at Ars Electronica, Paris Cultural Centre, Screens Festival, Interaction 97 in Japan, and many others. As a result of this work, I was awarded the prestigious PetroCanada award in 1998, a biennial award granted by the Canada Council for the Arts to a Canadian artist for innovation and contribution to New Technologies design and research.

My conception of 'A Semantics of Caress' began in 1984 with my study of Laban Effort Shape Analysis, where I successfully applied Laban's Effort Qualities to the expressive

¹⁵ *Active touch* is defined in Gibson, J.J. (1966). *The Senses Considered as Perceptual Systems*, Westport, Connecticut: Greenwood Press, p. 99. Gibson identifies that touch can be simultaneously Objective and Subjective "the same stimulating event has two possible poles of experience, one objective and the other subjective. There are many possible meanings of the term *sensation* but this is one: the detection of the impression made on a perceiver while he is primarily engaged in detecting the world".

movement of 3D human figure animation. Through observations made during the exhibitions of *Bodymaps* and *Felt Histories*, I began to conceive of a tactile semantics that could be applied to a computational model. This work has evolved iteratively through a series of input devices and participant observation. Its most recent implementation exists in *soft(n)*, where 10 networked soft objects communicate with one another and the interactive participants through qualities of touch (2007). This development is one of the applications of somatics described in the final case study of the thesis.

1.5.3. Body-State. The three case studies presented within this thesis focus on my most recent artworks with wearable and mobile technologies. These works explore participants' first-person interaction with their own *body-state* and the sharing of their state with other networked participants in the installation. Many physical techniques in somatics and performance access our experience of body-state, and one of the primary interaction techniques is paying attention to qualities of first-person experience. I explore body-state through physiological data such as breath and heart rate. This input data is shared between participants through touch and movement, while sound and visual output patterns represent and communicate the collective group state. My goal is to cultivate self-observation so that body-state can be observed and shared with others in a networked environment. In these artworks this is explored in an open and playful social environment. During the course of this research, I have designed and implemented four original wearable/mobile art installations that have been exhibited in a series of international art venues including: the Dutch Electronic Arts Festival (DEAF03) in Rotterdam, the Future Physical Respond festival in Cambridge, England, the e-culture fair in Amsterdam, Ciber@rts festival in Bilbao (2004), Spain, Siggraph05 Emerging Technologies and Art Gallery, the Dutch Electronic Arts Festival (DEAF07) in Rotterdam and Picnic'07 in Amsterdam.

My personal observations of the internal validity of technical knowledge within somatics, coupled with a personal history of exploring how these techniques can be applied to the design of experience for computational systems has led me to this research. My interest in human experience and the somatics model of self-cultivation, together with my respect for the far-reaching impact of technology “transforming the world from its current state to a preferred state”¹⁶ is the point of departure for a reframing of the epistemologies of practice in these fields. This aligns my approach with Schön’s appreciation of research-in-practice where “the contributions that I [Schön] have found most helpful are from people for whom research functions not as a distraction from practice but as a development of it.”¹⁷ In his discussion of research-in-practice, Schön states:

When someone reflects-in-action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case...He does not separate thinking from doing... because his experimenting is a kind of action, implementation is built into his inquiry. Thus reflection-in-action can proceed, even in situations of uncertainty or uniqueness, because it is not bound by the dichotomies of Technical Rationality.¹⁸

1.6 Research Strategy - Methodology

My research strategy is based on an overarching process of research through art that has explanatory value within the HCI community in the context of design for embodied interaction. As a result of creating a series of interactive art works over a period of seven years: *whisper* [2001-2003], *exhale* [2004-2005] and *soft(n)* [2006-2007], each resulting in rich descriptive data sets, a multiple case-study research strategy was

¹⁶ Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). Research through design as a method for interaction design research in HCI, *CHI '07: Proceedings of the SIGCHI conference on Human factors in computing systems*, New York: ACM, p. 493.

¹⁷ Schön, D.A. (1983), op. cit. p. ix.

¹⁸ Ibid p. 69. Donald Schön counterpoints reflection-in-action with Technical Rationality in which problem solving is emphasized over problem setting and where the ends are agreed upon before the solution is implemented. Technical rationality is a successful strategy when ends are fixed and clear, and that problem-solving methods are known prior to their implementation, but less successful in situations where ends are ill-defined or “wicked”, see also: Buchanan, R. (1996). Wicked Problems in design thinking. In Buchanan, R., & Margolin, V. (eds.), *The Idea of Design*, Cambridge, Massachusetts: MIT Press, p. 3-20.

selected in order to analyze and build upon this data. This comparative case study approach enables a rich variety of somatic body-based techniques to be explored, documented and assessed during the design period in which these art-works were created. Multiple cases allowed for the development of cumulative knowledge, for testing the replication of results and for the development of a rich theoretical framework.

1.6.1. Research through Art

Research through Art enables a discovery-led and speculative design process to unfold through an inquiry that is leading the development of the artwork. This is the overarching frame of the research. Because the HCI literature offers no insights into how we can apply somatic awareness techniques or similar embodied theory to design and implementation of new technology, and because I frame my research within artistic activity, I utilize a *Research through Art* approach with the goal of gaining insights into the application of somatic practice to the design of technology that can be shared in an HCI context. My intention is to extrapolate common features and values that can be extended to a design framework that can lend insight to the broader HCI community, and that can enable somatic body-based practices to be a *resource* for technology design within HCI.

1.6.2. Comparative Case Studies as Research Strategy

I selected three case studies, each tracing the process of making an interactive-art work. Each of these art-works was selected for two primary reasons: they were created during the process of defining and refining the research laid out in this thesis, and as a result, their process was rigorously and explicitly documented and reflected-in-action. This iterative reflection-through-practice resulted in an approach to gathering and enacting knowledge. The case studies are cumulative and interconnected, yet each case study's analysis highlights a particular aspect of an artistic design process where somatic body-based knowledge is applied to a technological

design process. Each case study describes, illuminates and documents design process, materials, experience and artifacts that resulted directly from the exploration and implementation of somatic awareness techniques and strategies, often articulated through discovery-led speculative design approaches. These design processes utilized a synthesis of technological, material, aesthetic and experiential processes that resulted in the interactive artwork.

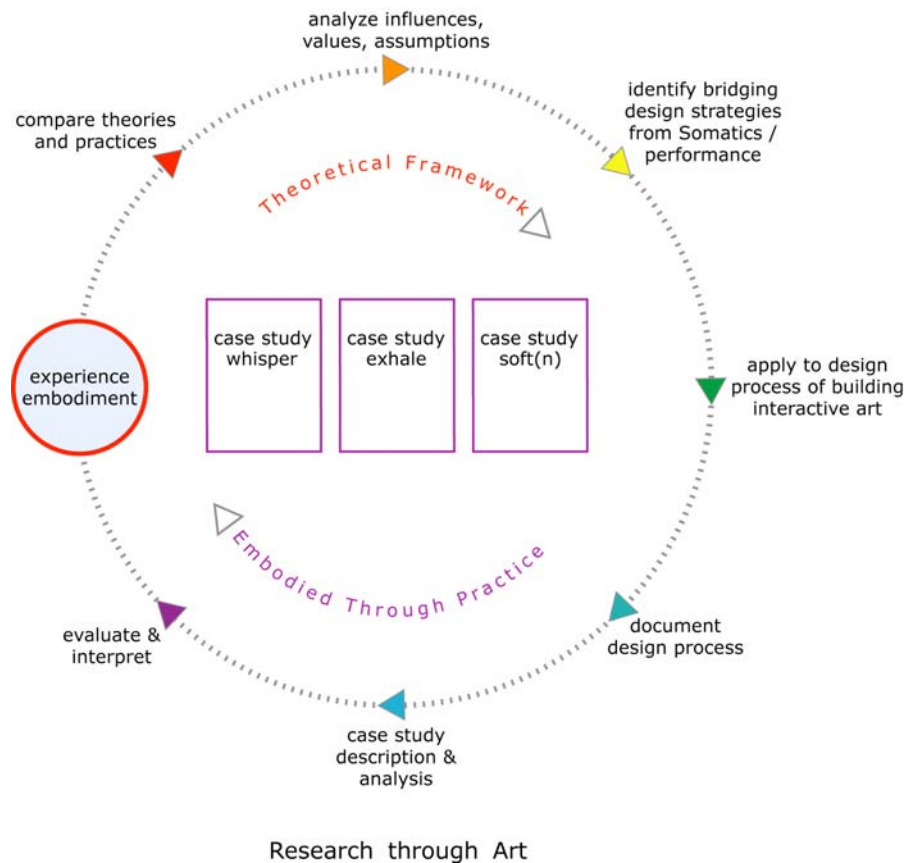


Figure 4. Research Strategy: Comparative Case Study Analysis within Research through Art Cycle

1.6.3. Personal Experience Combined with Empirical Data

In Robert K. Yin's¹⁹ comprehensive presentation and analysis of case study research, he suggests that the combination of personal experience with extensive empirical data enables multiple sources of evidence to be integrated into a coherent theoretical framework, optimizing case study design. The art-works whisper, exhale and *soft(n)*

¹⁹ Yin, R.K. (2003). *Case Study Research: Design and Methods*, Thousand Oaks, CA: Sage Publications, p. 98.

combine personal experience within a seven-year research through art process. Personal experience based on expert knowledge determined the conceptual framework and research questions that seeded the research. Documentation of data in the form of design process, materials, experience and artifacts collected during this time frame represent extensive empirical data. These multiple sources of evidence enable triangulation and analysis of case study data, enhancing validity through the development of cumulative knowledge and testing replication of experiential results.

1.6.4. Case Study as Appropriate Strategy

Yin²⁰ also describes specific attributes of *scope* and *data collection and data analysis* that are suited to the case study as a research strategy. When the *scope* of research investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident²¹, a case study provides a highly appropriate research strategy. This thesis investigates the contemporary *phenomenon* of the application of somatic body-based practices within its real-life *context* of technology design within HCI. As previously articulated, HCI offers little guidance as how to apply somatic awareness techniques or similar embodied theory to design and making of new technology. By positioning the phenomenon of body-based somatics practice within the context of HCI and design for technology, the case study can allow “you [to] deliberately ... research contextual conditions.”²²

Yin continues by illustrating that the contextual condition (in this case the exploration of somatic practice within HCI) also defines a set of *data collection and data analysis strategies*. The case study inquiry relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and it benefits from the prior development of theoretical propositions to guide data collection and analysis.

²⁰ Ibid. p. 12.

²¹ Ibid. p. 13.

²² Ibid.

Figure 4 illustrates the interconnection of the theoretical framework with its articulation throughout the case study design, and its use as a frame for testing propositional evidence that results from the application of somatic awareness techniques through the design of the art-works themselves.

1.6.5. First-Person Somatic Phenomenology

The ‘somatic turn’ invites a rethinking of the process of making technology, one that includes design for the experience of the self. Including self-experience and self-awareness *into* technological design brings an ethical dimension to the assessment of technological systems in HCI. Within the data collected throughout the case study research, first-person methods are forefronted in their centrality to somatics and body-based epistemologies of practice, and in their effect upon articulating design processes for technology [See Figure 5].

Research through Art

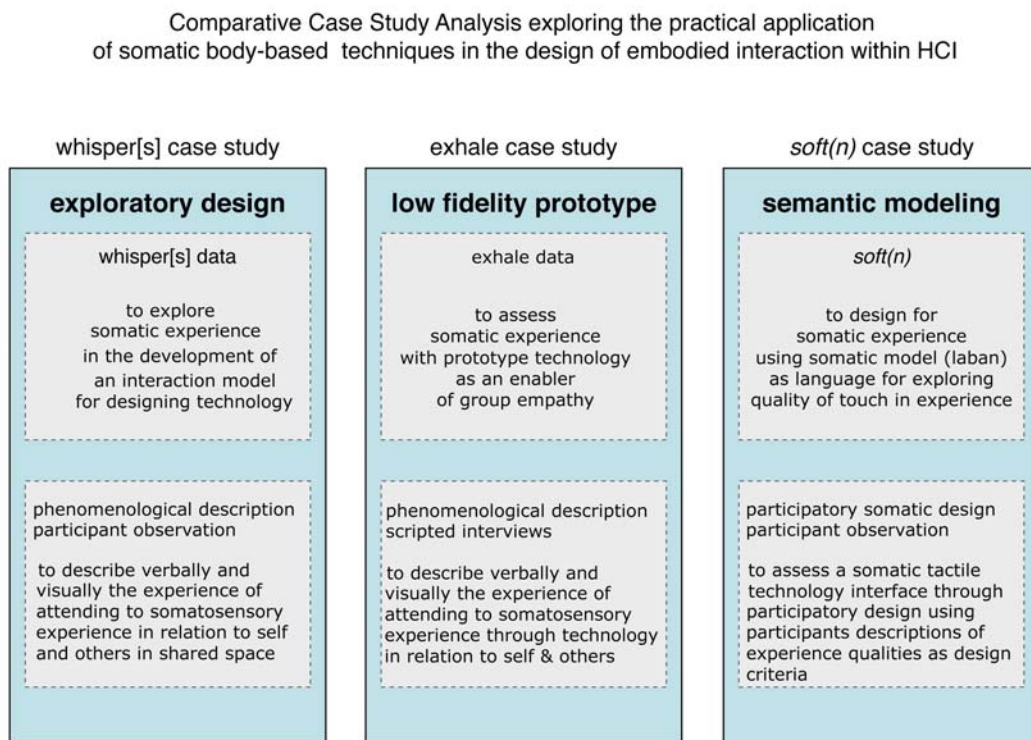


Figure 5. Case Study Evidence highlights accessing and interpreting first-person experience

First-Person methodologies have a rich history in somatics and contemporary dance practice. Practitioners and scholars such as Elizabeth Behnke²³ and Sondra Fraleigh²⁴ have written extensively about bringing direct experience of the moving body into scholarship, and into technical practice: the body of knowledge that represents the moving self. Fraleigh's approach places first-person experience on a continuum with second and third person approaches to interpreting experience, and is aligned with the phenomenological methods of data collection, such as phenomenological description and hermeneutic interpretation that has been utilized within the case-study design.

I wanted to weave the intuitive voice of the dancer into a descriptive aesthetics, slipping from first-person voice to analytical third-person theory, as phenomenology does.²⁵

Just as Fraleigh is concerned that the future of dance research not be dictated solely by objective distance and quantification, this research works to articulate how the intersection of first-person methods and phenomenological approaches to somatic experience can be integrated *as practice* within technology design. While first-person practices in somatics and dance performance are based in self-cultivation and self-agency, they act upon the self in order to ameliorate, to improve our *technical skills* of accessing experience. The application of first-person methods within this research can be differentiated by its context. Its goal is to articulate first-person methods *through* the design of technology, so that the ameliorative process is at once individual, cultural and systemic: it becomes simultaneously inter-subjective and a form of social self-inquiry. Awareness of one's own organism leads to recognition of the commonality of all human organisms.²⁶ Attention is an ecological process. The proposition is that as the self is cultivated, an ethical relationship can emerge between self-awareness and technologies created from the application of attention to our experience.

²³ Behnke, E.A. (2008). Interkinaesthetic Affectivity: A Phenomenological Approach. *Continental Philosophy Review*, 41(2). p. 143-161.

²⁴ Fraleigh, S.H. (2000). Consciousness Matters, *Dance Research Journal*, 32(1), Summer 2000, p. 54-62.

²⁵ Ibid. p. 54.

²⁶ Trigant Burrow, a psychoanalyst coined the term *cotention* to identify shared attention to experience, also called social self-inquiry, in Burrow, T. (1999). *The Social Basis of Consciousness*, London: Routledge.

1.6.6. Research Questions

This research is focused on the varieties of user-experience from the pragmatic to the exquisite, and articulates this focus by bridging embodied methodologies from somatics and performance to human computer interaction. The propositions, exploration and evidence gathered has followed from an inquiry based on the following research questions:

- How can body-based somatic practices be described, articulated in practice, and applied in an HCI context, in order to expand the practical application of embodied theory and its application to technology design?
- How can body-based somatic practices be used as a design resource within an HCI context?
- How can the ameliorative properties of first-person methods of somatics and contemporary dance performance enhance a reflective space for ethical valuation through a dialogic radical interdisciplinary approach to technology design within HCI?
- How can body-based somatic practices support an epistemological *reframing* of the nature of user experience within HCI and between HCI and somatics?

1.7 Chapters Outline

Figure 4 Illustrates the Chapter organization of the Thesis. Underlying the Thesis structure is the cycle from inception to realization to evaluation and interpretation. This is illustrated in the diagram as a 'Theoretical Framework' that is 'Embodied through Practice'. It is equally accurate to say that the enactment of the Artistic Practice is the foundation of the formalization and embodiment of the Theoretical Framework. The cycle as a whole is a balanced representation of reflection-in-action and research-through-art.

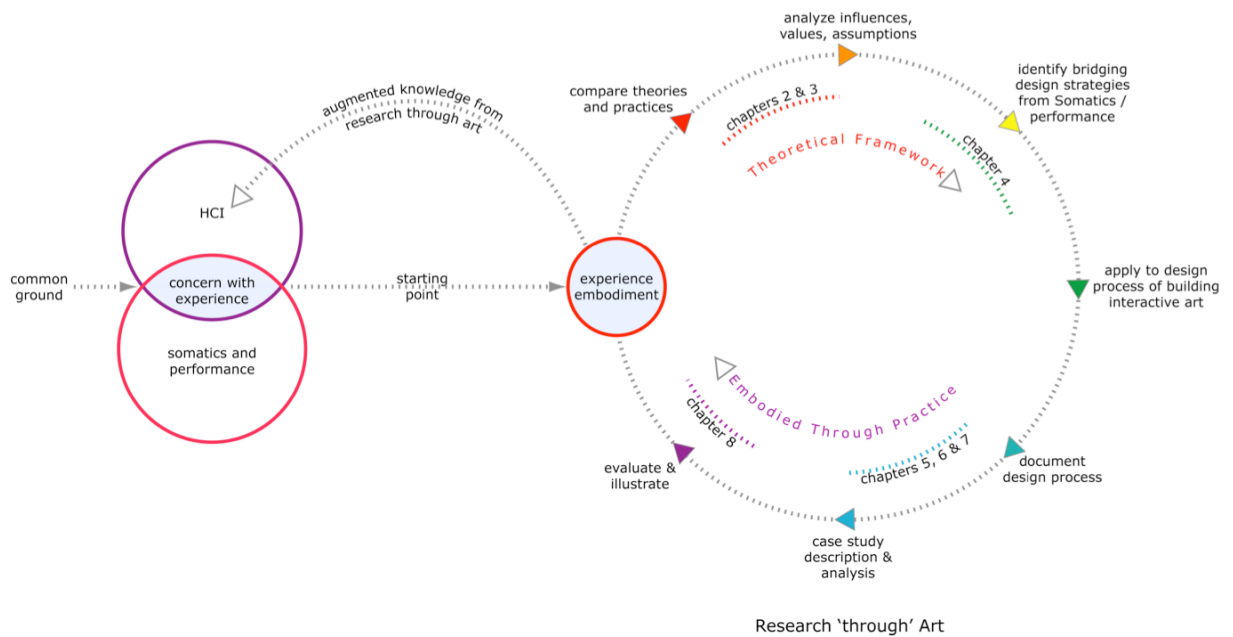


Figure 6. Conceptual Framework: Mapping the Chapters to the Thesis Research Structure

Chapter 2 *Somatics and Performance* explores the histories, influences and philosophical underpinnings of experience from within the perspective of body-based disciplines, and together with Chapter 3 outline the theoretical framework for the case studies. This chapter characterizes the technical practice of first-person methodologies, describes attitudes and values of experience from the perspective of body-based disciplines, illustrates the intertwining of somatics and contemporary dance performance practices, and lays a groundwork for the use of these technical practices in the field of human computer interaction.

Chapter 3 *User Experience within HCI* surveys research in user experience and outlines historical influences of human computer interaction in relation to the emerging recognition of embodied cognition within a broad range of cultural movements including contemporary science, humanities, the arts and the experience-centered histories of somatics. It identifies common historical influences that have shaped human computer interaction and the body-based somatic traditions, while emphasizing

the richness of interdisciplinary exploration within HCI, and drawing a perspective that can enable knowledge sharing between HCI and somatics.

Chapter 4 *Bridging Methodologies* presents an overview of the three case studies presented in the thesis. It discusses the comparative units of analysis utilized to gather data and construct evidence within each case study. It introduces and reviews the multiple approaches to somatic practice and knowledge. Each case study describes a specific aspect of the design of an interactive technological artwork [*whisper*, *exhale* and *soft(n)*]; and each artwork applies and highlights a particular set of technical practices from body-based somatics and contemporary dance performance practice to its technology design.

Chapter 5 *From the Inside Out*, the first case study, describes the experience design process of *whisper*, an interactive wearable art installation premiered at the Dutch Electronic Arts Festival in February 2004. The title *From the Inside Out* refers to the experiential processes explored in a series of five developmental workshops resulting in the interaction design model implemented in *whisper*.

Chapter 6 *Designing with Breath*, the second case study, explores the relevance and importance of breath as a somatic indicator of state. It describes the experiential design processes used in *exhale*, an interactive wearable art installation prototyped at Siggraph 2005 Emerging Technologies. The design inquiry focused on *how* networked wearable technology could mediate group empathy through shared breath; particularly how interaction, sharing and exchange could become 'legible' to the participants.

Chapter 7 *The Somaesthetics of Touch*, the final case study, describes the historical development of a '*Semantics of Caress*', a somatic representation of movement quality based on Laban Effort / Shape Analysis. This case study traces the concept from its

inception to the development of an input heuristics for tactile recognition. The most recent implementation was integrated in the interactive art installation *soft(n)*, a 'family' of 10 networked soft objects that respond to qualities of touch drawn from interactivity with installation participants.

Chapter 8 *Self Evidence: a Non-Alienated View*, analyzes the multiple sources of evidence gathered as case study data from the theoretical framework laid out in Chapters 2 and 3. This chapter analyzes, evaluates and critically reflects on the three case studies, focusing on what the case studies as a whole have contributed to the thesis objectives. It explores the nature of collaboration, and the extent to which the designer can act as a facilitator. It also discusses the role that somatic sensibilities can play in shaping a facilitation role. Evidence collected and documented in the website, DVD, Appendices and in-bound articles are referred to.

Chapter 9 *Toward A Richer Model of Experience* summarizes the theoretical framework and evaluates its validity in practice through interpretations of radical interdisciplinary dialogue. It reviews the application of somatic design strategies for technology, and reframes epistemologies of practice within HCI. It reflects and articulates the contribution to HCI, summarizes the relationship between theory and practice through the case studies, methodology and theory, and outlines future responsibilities for research in the area of somatics and embodied interaction. This chapter recommends the inclusion and even embrace of a set of somatic techniques that can be applied to the design of experience, inviting further exploration through reflection-in-practice. It posits attention as an ecological process, and suggests that an ethical relationship can emerge between self-awareness and technologies created from the application of attention to our experience.

