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A CALL TO ACTION

Embodied Thinking and Human-Computer Interaction Design

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Before beginning, I want to explain that this chapter is not a guide to embodied thinking, but rather a critical call to action. It highlights the deep history of embodied practice within the fields of dance and somatics and outlines the value of embodied thinking within human-computer interaction (HCI) design and, more specifically, wearable technology (WT) design. What this chapter does not do is provide a guide or framework for embodied practice. As a practitioner and scholar grounded in the fields of dance and somatics, I argue that a guide to embodiment cannot be written in a book. To fully understand embodied thinking, one must act, move, and do. Terms such as embodiment and embodied thinking are often discussed and analyzed in writing; but if the purpose is to learn *how* to engage in embodied thinking, then the answers will not come from a text. The answers come from movement-based exploration, active trial-and-error, and improvisation practices crafted to cultivate physical attunement to one's own body. To this end, my "call to action" is for the reader to move beyond a text-based understanding of embodiment to active engagement in embodied methodologies. Only then, I argue, can one understand how to apply embodied thinking to a design process.

The use of the term "embodiment" in HCI has dramatically increased since the turn of the new century. Following branches of embodied theory that use third-person, empirical methods of observation, design practices typically place bodies in the role of the active subject, and the researcher in the role of the passive observer (Schiphorst 2008: 67). Somatic techniques and various forms of contemporary dance offer a different perspective on embodiment, placing the observer and the subject in one body. As defined by Thecla Schiphorst, "Somatics techniques are intended to be used 'by the self on the self' in order to refine knowledge and precision through the use of the human body in action" (2008: 52). Somatics techniques such as Laban Movement Analysis, Alexander Technique, Feldenkrais Method, Body-Mind Centering, and Bartenieff Fundamentals provide methods for engaging in self-inquiry through movement and action. This first-person approach to embodied thinking cultivates knowledge from the *every-day* body. By focusing on self-study, it allows practitioners

to build upon their own capacity to move, rather than expecting people to meet a particular level of expertise to engage in the practice.

Contemporary dance applies these techniques in the training of highly technical or *virtuosic* bodies; however, somatics is often used to help dancers unlearn physically harmful, habituated movement patterns and relearn movement that is both healthy and virtuosic. Dance has also made its own contributions to embodied thinking by creating practices to engage in collective rather than individual exploration. Improvisational forms such as contact improvisation (postmodern dance), cyphering (urban dance), and various social dance forms place embodied thinking within a social context. In this, they provide methods for expanding self-knowledge into a social framework, giving space for practitioners to understand how their own actions affect the actions of others. These improvisational forms primarily exist within their respective fields of dance; however, improvisational techniques have been cultivated for and are often practiced by individuals without prior dance training.

The Ephemeral, Allusive, and In-Between Nature of Embodied Thinking

> It is often difficult to put into words, and even harder to justify to politicians, the ways in which dance works its magic—the basis of its transformative powers. We tend as a culture to value only what is tangible and measurable whereas dance is all about the ephemeral, the allusive, and the in-between.
>
> (Clarke 2007: 35)

The idea of "embodied thinking" is one that is well understood in the fields of contemporary dance and somatics, but one often difficult to capture in words on a page. Scholars and practitioners have explored many methods of sharing and reflecting upon embodied practices in writing; however, these writings become more of a reflective practice than a holistic account of an embodied experience (Kozel 2007; Bacon 2010; de Lima 2013). Familiar, yet constantly changing, embodied thinking is a method of processing our world through our moving bodies. Simple enough to define, a written description of "embodied thinking" lacks the ability to articulate how embodied thinking is understood in and through a body in motion. For example, reading step-by-step instructions on how to juggle does not mean one will immediately master the skill. The written instructions provide an initial framework for knowing. Action-based exploration teaches one how to juggle. A novice must feel the weight of the balls as they are held and learn to coordinate the visual cues of a ball falling with the physical sensation of the body aligning for a catch. The muscular exertion of the body must be calibrated to toss the ball "just so." All of these skills must be coordinated into a finely tuned set of actions that overlap and build upon each other like waves. Each of the senses must work in harmony and dynamically adapt to the shifting landscape of the balls in motion.

Now, given that I bring perspective to this term from the field of dance, it is easy to assume that, by "moving body," I refer to a highly active or highly trained, *virtuosic* body (as in the example of a juggler). Here, then, is where I wish to trouble perceptions of embodiment by referring back to my earlier descriptions of somatics as being for the *every-day* body and contemporary dance's use of somatics as a means to *unlearn* harmful movement patterns. Beyond unlearning, dance also explores embodied thinking as a means to cultivate dancers who are highly attuned to a multisensory awareness of their surroundings. In "Transmeaning: Dance as an Embodied Technology of Perception," Cecília de Lima explores the

ways in which dance "works its magic" not through physical spectacle but by processing and understanding our world through all of the senses:

> In the case of dance, it becomes clear that its particular "technological expertise" is not so much to do with virtuosity or the capacity of the body to move, but is more about having an improved awareness of movement related to the proprioceptive sense.
>
> (de Lima 2013: 20)

She goes on to define the *proprioceptive sense* through the work of J. J. Gibson (1966, 1979), stressing that: (1) perceptive systems are active mechanisms for receiving different sorts of stimulus information from the environment, (2) these diverse perceptive systems function in interrelation, and (3) perception is based on the skill to move.

The ability to dynamically perceive the world is one that is afforded simply by the fact that bodies move. The idea of movement is often associated with highly visible, voluntary movements, such as reaching for an object, sitting, standing, or walking. However, as we begin to turn our awareness to the body, it becomes clear that the body is always moving. Our heart beats; our chest rises and falls with each breath; our eardrums vibrate; our eyes move in their sockets to shift perspective. These micro-movements are highlighted in dance artist Steve Paxton's signature piece, "small dance." In this work, the solo dancer stands in one place, experiencing the micro-shifts of the body as it adjusts in relationship to gravity, breath, and other bodily processes (BodyCartography Project 2011). This piece attunes the dancer to the ways in which our body experiences the world through motion, reminding us that, even as we perceive ourselves as being still, we are moving. It also highlights the ease with which we adapt to ongoing stimuli and repetitive actions, removing them from the foreground of our conscious. For example, take the fairly common act of walking. Walking is a complicated process we learn as children through rigorous trial-and-error. Embodied thinking is crucial to this developmental process. Now, as adults, the act of walking is an action upon which we rarely consciously reflect. We walk frequently, but are highly desensitized to the act of walking itself. In dance, we often use walking to engage in embodied thinking practices and prompt simple questions such as:

- How do my feet feel upon the floor as I walk?
- What body part(s) are initiating or driving my walk?
- What am I seeing, hearing, feeling around me right now?
- How am I walking in relationship to the other people in the room?
- How am I breathing?
- How am I dynamically organizing my body, and am I comfortable?
- How does my perception of the world change if I change the way I walk by moving faster? Slower? Backwards? Sideways?

The purpose is not to answer these questions, but to open our awareness to our constant and ever-changing state of transformation. These questions foreground our habituated ways of moving and help us recognize the many sensations we experience without our conscious awareness.

Tuning into our proprioceptive sense not only heightens our self-awareness but also helps us understand how we come into contact with our world. Drawing on Maurice Merleau-Ponty's idea of "flesh," Susan Kozel writes:

> The body is a weave of different materialities, the body is a dynamic process, the body navigates the world at the intersection of a cluster of languages (verbal, physical, archetypal, mnemonic, and unconscious). It is electric, biological, and cultural. The body is a pattern of information and the body is both a site and a mapping onto sites. Above all, for Merleau-Ponty, bodies are flesh, and flesh is more than just bodies.
>
> (Kozel 2007: 33)

We experience ourselves as anatomical beings, kinesthetic beings, multisensory beings, sociocultural beings, and emotional beings; beings in conversation with space, objects, and others—beings who act and are acted upon in the world. The ability to move from a first-person embodied perspective to an understanding of how this perspective acts upon the world is how we learn empathy. In this, somatic practitioners argue that somatic and improvisational techniques are a form of "empathetic training." Furthermore, the dynamic flow from individual to collective or communal perspectives is how we build ethical relationships with ourselves and others both directly through interaction and indirectly through the objects and technologies we create (Schiphorst 2008: 65).

Embodiment and Interaction Design: Moving Beyond Rhetoric to Methodology

The term embodiment, or embodied thinking, is one that has been adopted into the language of many different practices, including interaction design. This is in no small part due to Paul Dourish's seminal work, *Where the Action Is: The Foundations of Embodied Interactions* (2001). Here, he builds an argument for embodied design by drawing from the fields of tangible computing, social computing, and phenomenology. In his sixth chapter, "Moving Toward Design," Dourish articulates a framework for embodied design in six principles. While listing these principles by no means fully captures their meaning, it does provide a glimpse into the nature and value of his work. These principles are: computation is a medium; meaning arises on multiple levels; users, not designers, create and communicate meaning; users, not designers, manage coupling; embodied technologies participate in the world they represent; and embodied interaction turns action into meaning (2001: 155–188). Similar to the means by which I situate my own argument for action, Dourish clearly states that his book (and any design theory text, for that matter) cannot guarantee design success. In this, he recognizes the value of learning from design practice as much as from design theory. While Dourish's principles have been built upon by other researchers in the field (Buchenau & Suri 2000; Klemmer, Hartmann, & Takayama 2006; Djajadiningrat, Matthews, & Stienstra 2007), this work misses one pertinent point: embodiment is not something one achieves merely through observation and design. Embodiment is a *way of being*. Dourish repeatedly refers to embodiment as a way of being in, actively engaging with, and coming to understand our world; however, when addressing the application of these ideas, the conversation repeatedly turns back to instances in which a community of users or designers is engaging with the technology. While this context-specific articulation of embodiment makes sense for both his research and the book's audience, it isolates embodiment into a specific setting, such as the design task at hand, ultimately detaching it from the broader world in which it exists. In this way, the designers are encouraged to "call upon" an embodied way of thinking within the design process; however, clear methods for somatic awareness are rarely suggested. Such a focus brings me to the following critical statements: (1) embodied thinking is not practiced solely through

interaction design, and (2) a designer's understanding of embodiment must move beyond the designed interaction. This second point is particularly pertinent as we move forward to a discussion of wearable technology (WT).

A Breakdown in Embodiment: Google Glass

As a designer, it is feasible to imagine that one can develop a comprehensive understanding of how technology meets the world when it is permanently fixed in a given environment (i.e., a point of sale terminal in a grocery store). In the case of WT, however, the convenience of a fixed environment does not exist. Consider Google Glass, which came to the market with great hype and enthusiasm in early 2015, but failed to fully take off. In his 2015 keynote at South by Southwest (SXSW), Google X's "Captain of Moonshots," Astro Teller, blames too much media attention for Google Glass's failure: "The thing that we did not do well, that was closer to a failure, is that we allowed and sometimes encouraged too much attention to the program" (Teller 2015). Later, in the question and answer session, he describes his surprise at the backlash of privacy concerns that arose from having a camera on the device: "I'm amazed by how sensitively people responded to some of the privacy issues. . . When someone walks into a bar wearing Glass . . . there are video cameras all over that bar recording everything." He goes on to describe how this is not "really" a conversation about privacy because Google Glass is only one of many cameras in the bar. Teller's statements both reveal how he devalues an honest concern (i.e., personal privacy) and demonstrate how a single component (i.e., the camera on a pair of Google Glasses) cannot be decoupled from the broader world in which it exists. The voyeuristic nature of the camera comes not only from the fact that it is an instrument meant for recording moving images but also from the way in which it is worn. Permanently facing outward on a moving body, the camera is always at eye level, always reminding others that it is there. It roves and seeks out new vantage points as its wearer moves, settling to stare directly into the eyes of another during a conversation. When people look at someone wearing Google Glass, they do not see two eyes staring back at them; they see three. The third eye could be recording everything. It is unblinking, always seeking new information; it also feels alive because it is connected to a living being. It cannot be put away. It just watches, while some "Glasshole" controls it.

Google Glass clearly demonstrates the many ways in which an interactive technology can fail to recede into the background given the myriad of environments in which it might be situated. This is particularly relevant in highly public, social contexts. In the case of privacy, Google Glass rubbed up against the world in a way that was most felt by those who were proximate to Google Glass wearers, hence the emergence of the derogatory name, Glasshole. The discomfort felt by people near technology users and wearers is a newer phenomenon not wholly accounted for in contemporary HCI design practices. Despite the increased production and consumption of portable and wearable devices, design practices still focus solely on the user or community of users, taking little account for those merely within proximity. Given HCI design does not prioritize or even account for the broader social implications of portability and wearability, it is highly unlikely that the social backlash encountered by Google Glass wearers would have been discovered within a design studio. Herein lies my argument for the embodied practices of somatics and movement improvisation.

Embodied practices teach us how to experience the world differently, how to open up our thinking to a phenomenological awareness—to a way of knowing that is situated in not only experiencing new ideas but also re-experiencing familiar spaces, actions, and interactions over and over again as if they were new. Had a Google Glass project member with experience

in a somatic practice visited a public space such as a bar or café and applied embodied thinking (even without wearing the device), it is possible they would have foreseen some of the ways in which Google Glass was a failure, particularly how it would affect those *not* wearing the device. This way of meeting the world decenters users (and their relationship with the technology) from being the only valuable subjects of observation. Furthermore, it questions the relationship between objects, people, and spaces by asking, "What is happening here? How is this space being influenced right now?" rather than, "What *should* be happening here? How *should* people adapt to me and what I make?" This distinction of "is" versus "should" is conveyed in many of Dourish's principles, but perhaps most clearly when he states that "the manipulation of meaning and *coupling* (or connection that arises during the course of an interaction) are primarily the responsibility of users, not of designers" (2001: 172). In this, we imagine *users* as anyone directly affected by the technology, both those using the technology and those proximate to the user. This reimagining of the term "users" expands Dourish's principle beyond its original intention and suggests designers are responsible to everyone affected by the technology within the design process. Had Teller and his team broadened their perspective of user beyond those wearing Google Glass, maybe they would have understood that the public's privacy concerns really are about privacy because the user made it this way. Different perceptions of privacy are not better or worse, only different. Just because people did not respond the way Teller thought they *should* have, does not make their concerns any less important, real, or meaningful to them.

Aesthetics and Embodied Agency in the Ever-Evolving Wearable Technology Landscape

As learned from Google Glass, knowing how technology affects our everyday experience is particularly important as we move into the field of WT. Beyond considering the broader social implications, I now turn back to our personal experience with WT as it relates to our bodies. Once interfaces are worn on bodies, an understanding of how they flow in and out of our dynamically shifting embodied experience becomes critical. We come into a different relationship with objects once they are worn rather than held. Portable objects (like mobile phones) blend more easily into the din of our everyday experience. They can be put away, hidden, and set aside. However, WT comes into a different relationship with us. Making contact with the flesh and tracking bodily functions in places (e.g., face, chest, and hips) often not touched by others, WT's physical relationship with the body is more intimate than that of portable objects, which are primarily operated by hand. Engaging in a multisensory relationship with intimate, often highly personal spaces of the body, WT thus has a deeper impact upon our embodied agency.

The idea of agency has often been considered apart from a corporal understanding of the self, where mental states are rendered superior to and somehow distinct from embodied states (Campbell et al. 2010: 1–2). However, embodied or corporal experience is central to how we understand both self and agency, and WT reveals the trouble with separating agency from bodies: wearers cannot easily distinguish their self-identity from the technology itself. The visual aesthetics, multisensory feedback, and physical materials of devices continuously interweave with a wearer's embodied experience. In this, WT is successful when it gives the user control to shape and define relationships. WT is far less successful, and in fact reduces embodied agency, when it acts upon people in ways that demand attention or recognition without consent. This reduction or loss of embodied agency can come in many forms, including unwelcomed and uncontrollable haptic, sonic, or visual cuing; distractingly "loud" visual

design; wearer discomfort; and reductive representations of embodied experiences that do not give agency to the user to contextualize the data. Again, if we broaden the concept of *user* to be all those affected by WT, then it is easy to imagine how these unwelcomed intrusions can apply to both the wearer and those proximate.

Issues of embodied agency are heightened when WT is adopted and imposed upon people by a company or organization. In 2002, Ana Viseu conducted a case study in which she studied Bell Canada field technicians wearing small computers fashioned to fit in shoulder bags. Similar to many of today's wearable technologies, the computers handled much of the "busywork," such as dispatch, communications, and fieldwork logs, that technicians were accustomed to doing. The computers did all of this work, collecting considerably more information than workers could themselves and freeing up time for them to do other things. This freedom was seen as a means to give workers increased agency within their everyday processes, but the actual sentiment among them was that of agency loss (Viseu 2005: 176). For instance, the highly organized software system required entry into prescribed fields and removed workers' ability to contextualize their notes. The software also removed their ability to correct mistakes in their work and decreased the amount of contact they had with their managers. These changes fundamentally altered the workers' self-identity, and the wearable computers became a recurring reminder of agency loss. In this scenario, WT allowed workers to physically move more naturally and freely within their work environment. In theory, this freedom should have improved their embodied experience. However, interaction design choices removed almost all embodied agency from the system at hand and left workers with devices onto which they could no longer inscribe themselves.

Since Viseu's experiment in 2002, data tracking through personal wearable devices has become nothing less than pervasive. Individual users are now choosing to self-track with WT, a behavior revered by the Quantified Self (QS) movement (Quantified Self 2015). Fitbit, for example, has become the most popular health- and fitness-tracking device on the market, making over 745 million USD in 2014 alone (Park 2014). While it has clearly been embraced by some sectors of western culture, its framework looks very similar to that of Bell Canada's wearable computers: a wearable/portable device that automatically tracks and logs user behavior. The unsettling implications of such devices have become more publicly transparent now that businesses and insurance companies are partnering with Fitbit to provide "perks" to users. Fitbit's corporate wellness program partners with businesses interested in tracking the health of their employees and lowering health insurance rates. Health insurance companies, such as United Health, Kaiser Foundation Group, Humana Group, and Aetna, are now developing perks programs that reward members for tracking and sharing their health data (Olson 2014). For instance, Discovery Health's "Vitality" health program offers "Vitality Points" to members who wear fitness tracking devices (Bernard 2015). Both Humana Group and John Hancock now partner with Vitality to offer similar rewards programs to their customers (John Hancock Vitality Program 2015; Humana 2016).

While aiming to shed light on the human experience, the QS movement compresses experience down to a lossy dataset large in size but devoid of critical contextual information. This type of tracking may be convenient and relatively easy to analyze, but it is based on a large set of assumptions about what types of behaviors are producing the data and how devices are being used. This concern is satirically highlighted in the work of artists, Tega Brain and Surya Mattu. Pushing back on the influx of health promotion programs such as Vitality, Brain and Mattu developed *Unfit Bits*: motion-generating devices that "set your data free" by connecting Fitbits to metronomes, bicycle tires, and other repetitive motion objects (Brain & Mattu 2015). *Unfit Bits* critically push back against the QS movement, demonstrating the

futility and arbitrariness in attempting to harness embodiment with massive quantities of data—a vital, much needed critique as the QS movement continues to grow.

While theories in embodied interaction design take us far, they cannot account for the value of engaging in embodied practices. In this, I challenge designers to become agents in their own embodied discovery by engaging in a somatic practice. This work is not easy, neat, or quick. Embodied thinking takes time to cultivate. It is difficult to articulate in words, and the ways in which it affects our work is not always easy to explicitly understand. The urgency to address this challenge has been felt by many in the WT design community for some time now. My biggest question as a somatic practitioner and dancer is when and why WT is necessary. Furthermore, who has the right to make WT? The inherently pervasive and invasive nature of WT means that we need designers who deeply care about these questions and want to take responsibility for ways WT affects not only potential users but also broader society. The potentially profound sociocultural impact that WT can and is having means that designers need to cultivate a deep, embodied ethos of care, one that recognizes the power of influencing people's embodied agency.

Cultivating responsible technologies will require a transdisciplinary approach, one in which somatics, movement improvisation, experience prototyping, and HCI design practices are integrated without predetermined prioritization. Some progress can be made through the work of interdisciplinary teams that include somatic practitioners, but I argue that real progress will come when all members of a design team learn to value and engage in embodied thinking. In this, I reiterate my call to action: I encourage readers to enrich the theoretical understanding of embodiment to one that is experienced through not only words on a page but also the bodies with which we are so intimately interconnected.

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