"Being-in-the-World": Embodied Interaction

Chapters 2 and 3 introduced tangible and social computing, two current research directions in Human-Computer Interaction. HCI, of course, encompasses much more than these two areas of research, but the goal was not to be comprehensive. The goal, instead, was to provide enough background to support an argument that, despite the fact that they are normally taken to be different research agendas, tangible and social computing are in fact two different aspects of the same program of investigation. This chapter sets out to show how.

Chapter 1 considered the development of HCI in terms of the human skills and abilities that interactive technologies draw upon. Understanding the relationship between tangible and social computing means finding the common skills and abilities they exploit.

One straightforward observation is that they both smooth interaction by exploiting a sense of "familiarity." Tangible and social computing both capitalize upon our familiarity with the everyday world, a world of social and physical interactions. As physical beings, we are unavoidably enmeshed in a world of physical facts. We cannot escape the world of physical objects that we lift, sit on, and push around, nor the consequences of physical phenomena such as gravity, inertia, mass, and friction. But our daily experience is social as well as physical. We interact daily with other people, and we live in a world that is socially constructed. Elements of our daily experience—family, technology, highway, invention, child, store, politician—gain their meaning from the network of social interactions in which they figure. So, the social and the physical are intertwined and inescapable aspects of our everyday experiences. Tangible and social
computing are both attempts to capitalize on those experiences and our familiarity with them. They make interacting with the computer seem more like those arenas of everyday action with which we are more familiar and in which we are more skilled.

However, the idea of “familiarity” is a fairly shallow way to relate these concepts; I want to suggest deeper connection. In exploring the relationship between tangible and social computing, my argument is based on the hypothesis that they are not just exploiting similar approaches, but are actually founded on the same idea.

The idea that underlies each of them is what I will call embodiment. Embodiment is the common way in which we encounter physical and social reality in the everyday world. Embodied phenomena are ones we encounter directly rather than abstractly. For the proponents of tangible and social computing, the key to their effectiveness is the fact that we, and our actions, are embodied elements of the everyday world.

The goal of this chapter is to introduce, explain, and explore the idea of embodiment, and to present it as a unifying principle for tangible and social computing. Mainly, this will mean exploring the emergence of the concept of embodiment from earlier work. Embodiment is not a new idea. It is a common theme running through a great deal of the philosophy of the last hundred years, and in particular the area of phenomenology. My argument here is that by looking to the phenomenological tradition, we can develop a position that serves to explain, to relate, and to develop the tangible and social computing programs.

**Embodiment**

We have already encountered embodiment, indirectly, as a phenomenon underlying the ideas of tangible and social computing. The goal of this chapter is to focus on embodiment directly, refining it by exploring its antecedents in phenomenology and related areas. As a starting point, though, we need a working definition. A naive definition would be one that emphasized physical presence:

*Embodiment 1. Embodiment means possessing and acting through a physical manifestation in the world.*

However, physical presence is a more restrictive definition than I have in mind here. Certainly, embodiment retains this notion of immanent “presence,” and of the fact that something occurs in the world; but it need not rest on a purely physical foundation. Embodiment extends to other phenomena that unfold directly in the world; conversations, mutually engaged actions, and so on. So we can start with a more elaborated definition:

*Embodiment 2. Embodied phenomena are those that by their very nature occur in real time and real space.*

This definition incorporates the sense of physical presence from the earlier one, but extends it to include a broader range of phenomena that may not be physical but are nonetheless occurrent in the world. Embodiment denotes a form of participative status.

This is much more than a concern with “making it like the real world.” We are familiar with “real-world-ness” in user interfaces through the use of metaphors of all sorts, from windows to desktops, buttons, and virtual worlds. However, embodiment strikes more deeply than simply the use of familiar models and metaphors in an interface. Some might serve to make this distinction clearer.

Imagine a 3-D computer game. It exploits my familiarity with the structure of the three-dimensional world by using perspective geometry to create a convincing and compelling setting for the game. It might rely on the fact that I understand that objects can be hidden from view by walls or other intervening objects, that if I can see you then you can see me, and other features of the everyday world. This could be further exploited by a version of the game designed for immersive virtual reality. It might use a head-mounted display to match the movement of the scene to the movement of my head, and so give me a stronger sense of being surrounded by the computer-generated imagery. Both of these approaches take advantage of my deep familiarity with the nature and structure of the everyday world.

However, there is a considerable difference between using the real world as a metaphor for interaction and using it as a medium for interaction. As in this game, real-world metaphors can be used to suggest and guide action, and to help us understand information systems and how to
use them. Even in an immersive virtual-reality environment, users are disconnected observers of a world they do not inhabit directly. They peer out at it, figure out what's going on, decide on some course of action, and enact it through the narrow interface of the keyboard or the data-glove, carefully monitoring the result to see if it turns out the way they expected. Our experience in the everyday world is not of that sort. There is no homunculus sitting inside our heads, staring out at the world through our eyes, enacting some plan of action by manipulating our hands, and checking carefully to make sure we don't overshoot when reaching for the coffee cup. We inhabit our bodies and they in turn inhabit the world, with seamless connections back and forth.

Similarly, "conversational" computational systems, which use natural language-processing techniques and attempt to incorporate the rules of conversational interaction, may well make it easier and more natural to interact with computer systems in as much as they can exploit familiar patterns of everyday human action. However, encoding conversational rules about turn-taking and anaphoric reference is a world away from responding to the way in which those conversational rules arise out of a world of human social action, conducted through the coordinated media of spoken language, gaze, and posture. We inhabit conversations as embodied phenomena in the everyday world.

Distinguishing between inhabited interaction in the world on one hand, and disconnected observation and control on the other, is at the heart of the embodied interaction proposal. First, though, we should ask: If we are all embodied, and our actions are all embodied, then isn't the term embodied interaction in danger of being meaningless? Now, after all, could there be any sort of interaction that was not embodied? What I am claiming for "embodied interaction" is not simply that it is a form of interaction that is embodied, but rather that it is an approach to the design and analysis of interaction that takes embodiment to be central to, even constitutive of, the whole phenomenon. This is certainly a departure from traditional approaches to HCI design.

Tangible and social computing both reflect this central concern with embodiment. The tangible computing work attempts to capitalize on our physical skills and our familiarity with real world objects. It also tries to make computation manifest to us in the world in the same way as we encounter other phenomena, both as a way of making computation fit more naturally with the everyday world and as a way of enriching our experiences with the physical. It attempts to move computation and interaction out of the world of abstract cognitive processes and into the same phenomenal world as our other sorts of interactions. The trends in social computing are also built upon a notion of embodiment. The use of sociological approaches in the design of interactive technology has, however, been driven primarily by concerns with the interaction of computation and "the workaday world" (Moran and Anderson 1990). The paradigmatic perspective on social action motivating this approach is the "situated" perspective (e.g., Suchman 1987; Clancey 1997), which is grounded in the relationship between social action and the settings in which it unfolds, the relationship of embodiment.

The best way to see how the same form of embodiment underwrites both of these areas is to consider the origin of the concept as it has developed in the phenomenological tradition of the past hundred years or so.

The Phenomenological Backdrop

Although it is not generally incorporated into HCI design approaches, embodiment is not a new idea. It has been explored perhaps most extensively within phenomenology, a branch of philosophy that is principally concerned with the elements of human experience. In contrast to philosophical positions that look for a "truth" independent of our own experience, phenomenology holds that the phenomena of experience are central to questions of ontology (the study of the nature of being and categories of existence) and epistemology (the study of knowledge).

Originating in the latter part of the nineteenth century, phenomenology has gone through a number of transitions in the past hundred years and has separated into a number of distinct intellectual positions. However, the behavior of embodied actors going about their business in the world has been central to all of them. What follows briefly outlines aspects of the work of four phenomenological theorists—Edmund Husserl, Martin Heidegger, Alfred Schutz, and Maurice Merleau-Ponty—whose thought and writings have been particularly relevant to questions of embodiment and interaction.
Husserl's Transcendental Phenomenology

In this way, Hilbert discovered the solid foundation of mathematics in the consistency of its formal system: mathematics does not have to be "true" as long as it is "consistent" and as long as that is the case, there is no need for further foundation.
—Kojin Karatani, "Natural Numbers"

Edmund Husserl (1859–1938) was the founder of the phenomenological tradition. For Husserl, phenomenology was a method for exploring the nature of human experience and perception.

Husserl had originally trained as a mathematician. However, he was unhappy with the direction that mathematics and science were taking during his lifetime. This was a critical time for science, when foundational issues about the relationship of science to the world were in question. The advent of non-Euclidian geometries, and the explorations of formalists like Hilbert and Frege, had begun to question the idea of mathematics as an objective formalization of the world. Husserl was frustrated by the idea that science and mathematics were increasingly conducted on an abstract plane that was disconnected from human experience and human understanding, independently of questions of truth and applicability. He felt that the sciences increasingly dealt with idealized entities and internal abstractions a world apart from the concrete phenomena of daily life. In his later work, he pointed particularly to the work of Galileo as a turning point in the development of this abstract, idealized reasoning:

For Platonism, the real had a more or less perfect methexis in the ideal. This afforded ancient geometry possibilities of a primitive application to reality. [But] through Galileo's mathematicization of nature, nature itself is idealized under the new mathematics. Nature itself becomes—to express it a modern way—a mathematical manifold. (Husserl 1936:23)

Husserl's primary criticism of this idealized scientific conception of the world was that it had distanced science and mathematics from the everyday world and everyday practical concerns, and in doing so, had distanced it from the live experience of people acting in the world. Galileo was responsible for a surreptitious substitution of the mathematically substructured world of ideals for the only real world, the one that is actually given through perception, that is ever experienced and experienceable—our everyday life-world. (Husserl 1936:48–49)

Husserl wanted to redress this balance and envisioned a science that was firmly grounded on the phenomena of experience, which in turn meant developing the philosophy of experience as a rigorous science. This had also been Descartes's intent; Husserl saw his program as a Cartesianism for the twentieth century.

Descartes had attempted to uncover how a subjective consciousness could know with any certainty about external reality. Franz Brentano, under whom Husserl studied, had further developed this into a theory of "intentionality," which described the way that mental states could refer to elements of external reality. Intentionality describes the relationship between the tree outside my window and my thinking about it; for Brentano, all mental states have this property of being about something. Husserl elaborated Brentano's ideas further, and proposed phenomenology as a method for examining the nature of intentionality.

Phenomenology aims to uncover the relationship between the objects of consciousness—the objects of intentionality, which Husserl terms noema—and our mental experiences of those objects, our consciousness of them, which he terms noesis. Making this separation allows the phenomenologist to begin to analyze how we perceive and experience the phenomena of the everyday world: how noema and noesis are related and how they feature as parts of our experience of the world. However, in order to examine these questions rigorously, the phenomenologist must suspend the "natural attitude" to the world that assumes the existence of the perceived objects on the basis of perception. Phenomenology's objective is to explore how the natural attitude comes about in the first place.

What I Husserl posits is a parallelism between the objects of perception and the acts of perception. When I see a rabbit, I have not only to recognize that what I'm seeing is a rabbit, but also that what I'm doing is seeing it (as opposed to imagining or remembering it). There is a parallelism between these two domains, and mental acts can themselves become phenomena of experience as I recall or reflect upon them.

The separation that Husserl proposes between the objects of perception and the perceptions themselves is mirrored by a second separation between the elements of the world and their "essences" or essential characteristics. In recognizing that what I'm seeing is a rabbit, I move from the world of immediate everyday affairs—this particular set of
sense-impressions—to the world of the formal, the essential. He argues that the objects of intentionality are always “essences.”

These ideas and the phenomenological method were developed initially in Logical Investigations (1900) and Ideas: General Introduction to a Pure Phenomenology (1913). In his last major work, The Crisis of European Sciences and Transcendental Phenomenology (1936), Husserl further elaborated his principles (partly in response to criticisms from some such as Heidegger, below) and introduced the concept of the life-world, or lebenswelt. The life-world is the intersubjective, mundane world of background understandings and experiences of the world. It is the world of the natural attitude and of everyday experience. Although the life-world is the background from which any scientific understanding of the world emerges, Husserl argued, it had gone largely unexplored in earlier accounts of meaning, knowledge, and understanding. Incorporating the idea of the life-world into phenomenology served to direct its attention to the role of these unconscious, “sedimented” understandings in our dealings with everyday reality.

Phenomenology, then, was a significant departure from previous philosophical positions. Most importantly, it rejected abstract and formalized reasoning, looking instead at the pretheoretical, prerational world of everyday experience. Although (as we will see) many people later moved away from a pure Husserlian position, Husserl’s work has had considerable influence in turning attention, first, to everyday experience rather than formalized knowledge, and second, to that experience as a phenomenon to be studied in its own right.

Heidegger’s Hermeneutic Phenomenology
Although Husserl had first articulated the phenomenological position, it was one of his students who would most profoundly influence the development of phenomenological thought. That student was Martin Heidegger (1889–1976). Heidegger’s magnum opus, Being and Time (1927 [tr. 1961]), took Husserl’s work as a starting point but developed it in radically new ways by showing how mental life and everyday experience were fundamentally intertwined.

Heidegger followed Husserl in attempting to uncover the intentionality of experience. However, where Heidegger broke with Husserl was in rejecting the mentalistic attitude that Husserl had adopted. By “mentalistic,” I mean a focus in Husserl’s phenomenology on cognitive, mental phenomena separated from the physical phenomena of mundane existence.

This was a perspective that Husserl had inherited from Descartes. Descartes’ famous dictum, “cogito ergo sum”—I think, therefore I am—had reflected a doctrine that we “occupy” two different and separate worlds, the world of physical reality and the world of mental experience. This doctrine, called Cartesian dualism, holds that mind and body are quite different; thinking and being are two different sets of phenomena. In common with most philosophers, Husserl had adopted this dualism and had devoted his attention to mental life and cognition, to how we could know about the world “out there.”

Heidegger argued that Husserl and others had focused on mental phenomena, on the cogito, at the expense of being, or the sum. However, he proposed, clearly one needed to be in order to think. Being comes first; thinking is derived from being. So, it would make no sense to explore intentionality independently of the nature of being that supports it. The nature of being—how we exist in the world—shapes the way that we understand the world, because our understanding of the world is essentially an understanding of how we are in it. So Heidegger rejected the dualism of mind and body altogether. He argued that thinking and being are fundamentally intertwined. Essentially, Heidegger transformed the problem of phenomenology from an epistemological question, a question about knowledge, to an ontological question, a question about forms and categories of existence. Instead of asking, “How can we know about the world?” Heidegger asked, “How does the world reveal itself to us through our encounters with it?”

This was a radical transformation of the traditional point of view. Most philosophers since Descartes had taken the position that the mind is the seat of reason and meaning. The mind observes the world, gives it meaning by relating it to abstract understandings of an idealized reality and, on the basis of that meaning, formulates a plan of action. Heidegger turned that around. From his perspective, the meaningfulness of everyday experience lies not in the head, but in the world. It is a consequence of our mode of being, of the way in which we exist in the world. Where traditional philosophical approaches argued that we proceed
from perception to meaning to action, Heidegger stressed the way that we ordinarily act in a world that is already organized in terms of meaning. The world has meaning for us in the ways in which we encounter it and the ways that it makes itself available to us.

The most important aspect of the way in which we encounter the world is that we encounter it practically. We encounter the world as a place in which we act. It is the way in which we act—the practical tasks in which we are engaged, and how they are accommodated into the world—that makes the world meaningful for us. Heidegger rejected the very kinds of intentionality that Husserl and others had pursued—an abstract, disconnected intentionality, the intentionality of a Cartesian homunculus peering out at the world and seeing what’s there. Instead, he argued for intentionality as an aspect of practical affairs:

The kind of dealing which is closest to us is as we have shown, not a bare perceptual cognition, but rather that kind of concern which manipulates things and puts them to use. (Heidegger 1927:95)

Meaning inheres in the world as we find it. The central element of our existence is to interpret that meaning through the ways in which we encounter the world. The interpretive nature of understanding is the basis for Heidegger’s phenomenology, a hermeneutic phenomenology.  

At the center of Heidegger’s work is the concept of Dasein, which is the essence of being human. Dasein is usually translated as “being-in-the-world,” emphasizing the way in which being is inseparable from the world in which it occurs. It follows, then, that one of the central questions concerns how Dasein is oriented toward the world. As noted earlier, the orientation is a fundamentally practical one; it is purposeful and active. The world, however, is not simply the object of Dasein’s action, but also, at times, the medium through which that action is accomplished. In other words, one of the ways that Dasein encounters the world is to be able to use what it finds in order to accomplish its goals. Heidegger uses the term it to refer to elements in the world turned into tools for our use. There are two important ideas captured by the term equipment. The first is that it refers not simply to the tool, but to the tool as a tool and for some task. “Equipment,” Heidegger comments, “is essentially ‘something in-order-to’” (1927:99). The second is that equipment does not stand alone. Equipment is linked to other equipment in the way that it relies upon, works with, suggests, is similar or dissimilar to, or is otherwise related to other equipment.

This aspect of Heidegger’s phenomenology is already known in HCI. It was one of the elements on which Winograd and Flores (1986) based their analysis of computational theories of cognition. In particular, they were concerned with Heidegger’s distinction between “ready-to-hand” (zuhanden) and “present-at-hand” (vorhanden). These are ways, Heidegger explains, that we encounter the world and act through it. As an example, consider the mouse connected to my computer. Much of the time, I act through the mouse; the mouse is an extension of my hand as I select objects, operate menus, and so forth. The mouse is, in Heidegger’s terms, ready-to-hand. Sometimes, however, such as when I reach the edge of the mousepad and cannot move the mouse further, my orientation toward the mouse changes. Now, I become conscious of the mouse mediating my action, precisely because of the fact that it has been interrupted. The mouse becomes the object of my attention as I pick it up and move it back to the center of the mousepad. When I act on the mouse in this way, being mindful of it as an object of my activity, the mouse is present-at-hand.

Heidegger does more than point out that we have different ways of orienting toward objects; his observation is more radical. He argues that the mouse exists for us as an entity only because of the way in which it can become present-at-hand, and becomes equipment only through the way in which it can be ready-to-hand. And in being ready-to-hand, it disappears from view—or “withdraws”—as an independent entity:

The ready-to-hand is not grasped theoretically at all. . . . The peculiarity of what is proximally ready-to-hand is that, in its readiness-to-hand, it must, as it were, withdraw in order to be ready-to-hand quite authentically. That with which our everyday dealings proximally dwell is not the tools themselves. On the contrary, that with which we concern ourselves primarily is the work (1927:99)

In other words, as we act through technology that has become ready-to-hand, the technology itself disappears from our immediate concerns. We are caught up in the performance of the work; our mode of being is one of “absorbed coping.” The equipment fades into the background. This unspoken background against which our actions are played out is at the heart of Heidegger’s view of being-in-the-world. So, in fact, although I
suggested earlier that Heidegger had transformed the question of meaning from an epistemological question to an ontological question, the form of his answer is really "preontological." By preontological, I mean that it is outside of and prior to our focused attention. The way in which the world occurs as an unconscious but accessible background to our activity is essential to our mode of being.

We can see that although Heidegger had taken Husserl's work as his starting point, he soon departed from it radically. Our mundane experience of the world was central to his work, just as it had been to Husserl's; but for Heidegger, our engaged participation in the world came to play a central role in the questions of being and meaning. Where Husserl had turned his (and our) attention to the primacy of actual experience rather than abstract reasoning, Heidegger had moved the site of that experience into the world. Dasein is embodied being; it is not simply embedded in the world, but inseparable from it such that it makes no sense to talk of it having an existence independent of that world.

Although it has been extremely influential, Heidegger's was not the only elaboration of Husserl's work. Husserl's phenomenology was developed in different directions by others. One of these was Alfred Schutz, whose work is a key bridge from the concerns of Husserl and Heidegger to those of Harold Garfinkel and other sociologists.

Schutz's Phenomenology of the Social World

Husserl and Heidegger had developed phenomenology in different directions, but they had nonetheless both concentrated on the individual experience of the world. The critical contribution of Alfred Schutz (1899-1959) was to extend phenomenology beyond the individual to encompass the social world.

Schutz was Austrian, and lived for the first part of his life in Vienna. He published his first major work, *The Phenomenology of the Social World*, in 1932 [tr. 1967]. After working briefly with Husserl at Freiburg, he moved to the United States, where he spent the rest of his life, further developing his ideas about a phenomenological approach to the problems of sociology.

In particular, Schutz's program centered on the problem of intersubjectivity. At its most basic, the problem is this: given that our experiences of the world are fundamentally our own, how can we achieve, between different individuals, a common experience of the world, and a shared framework for meaning? If I don't know what you experience of the world, or what you experience when I talk to you, how can we ever understand each other or come to any understanding of the world around us? How can the relationship between two people's subjective experience be maintained?

The problem of intersubjectivity is a crucial one for sociology. Social order is mutually constituted by its members; it arises out of the collective action of us all. Collective action, however, depends on intersubjectivity. It depends absolutely on our intersubjective understandings of the world and of our actions in it. Unsurprisingly, then, the early sociologists had turned their attention to these foundational questions.

Schutz's starting point was the work of Max Weber. Weber was one of the founding figures of modern sociology. He held that the goal of sociology was the interpretive understanding of subjectively meaningful social acts. By interpretive understanding, Weber meant that sociology's goal was to study action in order to uncover the orderliness that lay behind it, an orderliness that could be expressed in terms of general rules. The objective reality of these laws and social facts was the unquestioned position of traditional sociology. Weber and other sociological theorists argued that society and the stability of social facts are a given, existing independently of their application or interpretation by social actors.

However, Schutz rejected this view. In particular, he was concerned with Weber's treatment of the problem of intersubjectivity. Schutz felt that Weber had passed over the issues of how those "subjectively meaningful social acts" that Weber wanted to explicate actually *became* meaningful to people, and could be recognized and understood by others as being meaningful. Clearly, the whole edifice of Weber's sociology turned on this issue. In contrast with the traditional approach, Schutz argued that the meaningfulness of social action had to emerge within the context of the actor's own experience of the world. Drawing on the phenomenological tradition and its concerns with everyday experience, he saw intersubjectivity not as some universal law, but rather as a mundane, practical problem, routinely solved by social actors in the course of their action and interaction.
In other words, Schutz identifies the source of intersubjectivity as Husserl's *lebenswelt*. This is the life-world that Husserl had introduced in his later writings, the “mundane world of lived experience already existing as a product of the unreflecting cognitions of ordinary actors” (Heritage 1984:44). For Schutz, this world of lived experience incorporates our social understandings, too—understandings of how our actions look to others and how others' look to us.

Essentially, Schutz argues that the actions of others seem to us to be the actions of reasonable social actors because we assume them, in the first instance, to be so. Intersubjectivity is achieved, as a practical concern, as a consequence of these assumptions; that we share a common reality, that we act rationally within that reality, and so forth. This assumption of rationality is part of the “natural attitude.” We work under the assumption that others are rational as we are, and that others’ experience is like our own:

A man in the natural attitude, then, understands the world by interpreting his own lived experiences of it, whether these experiences be of inanimate things, of animals, or of his fellow human beings. (Schutz 1932:108)

All genuine understanding of the other person must start out from acts of explanation performed by the observer on his own lived experience. (Schutz 1932:13)

So, in Schutz’s model, intersubjectivity is the outcome of these assumptions in the natural attitude. Intersubjectivity results only and entirely from the fact that people do it. It is a practical achievement of social actors, a response to the practical problems of engaging with each other in concerted social action.

Schutz recognized that this assumption of rationality could not be simply an instantaneous achievement. To interpret actions as rational requires that we can see them emerge within a pattern of goals, causes, requirements, and motivations. To this end, Schutz developed a model of the social world that reflected its orientation toward past events and future intentions as a feature of the practical achievement of intersubjective meaning. The interpretive model of intersubjectivity that Schutz proposed applies not only to explicit acts of communication, but also to simple observable behavior. Following Weber, he used the example of watching a woodcutter chopping wood. One understands the woodcutter’s actions by projecting oneself into the place of the woodcutter, imagining oneself to be carrying out his actions, and so interpreting the actions of the woodcutter from the point of view of one's own life-world and experience. This relies on the assumption that the woodcutter is, broadly, motivated by the concerns that would motivate us in that situation, attentive to the same sort of issues that we would be, and so forth. Now, more or less other information—observable information related to lived experiences—may or may not be available to be able to tell more, such as whether the woodcutter is cutting wood to earn a living or for exercise. But, regardless, the assumption of rationality provides a starting point for the development of further understanding. This is one important aspect of the characterisation of the problem of intersubjectivity as a practical, mundane problem—that the solution need only be “good enough” for the matters at hand.

Schutz’s approach brought phenomenological reasoning to the problems of sociology. In doing so, he opened up a new set of concerns for sociologist, by turning the life-world into a site of social scientific inquiry:

For Schutz, the *lebenswelt* is a world of mundane events and institutions which the ordinary members of society constitute and reconstitute without even being aware of the fact. This mundane world is both the unnoticed ground on which social science is founded, and, in many cases, its unnoticed object of investigation. (Heritage 1984:44).

Taking the life-world as a focus recasts the problems of sociology. It means turning away from the idea of general laws that operate outside the immediate purview of the actors whose behavior they regulate. Instead, it characterizes sociological problems as practical, mundane ones routinely encountered—and solved—by social actors in the course of their daily activities. Social actors are, in effect, practical sociologists, solving the problems of sociology for themselves every day. This reorientation of sociology toward a new set of questions and a new method of inquiry was one of the critical motivations for Garfinkel’s development of ethnomethodology, as introduced in the previous chapter and explored in more detail shortly. For the moment, however, I will address one further aspect of the development of phenomenology.

Merleau-Ponty and the Phenomenology of Perception

Of the various phenomenological thinkers presented here, the one for whom the notion of “embodiment” was most central was the French
philosopher Maurice Merleau-Ponty (1908–1961). Like his contemporary and colleague Jean-Paul Sartre, Merleau-Ponty concerned himself broadly with questions of phenomenology and existentialism, and with the political implications of these positions. His major work, *The Phenomenology of Perception*, was first published in 1945 (with an English translation appearing in 1962), and deals directly with questions of embodiment.

Merleau-Ponty's objective was to reconcile Husserl's "philosophy of essences" with Heidegger's "philosophy of being." From Husserl, he inherited a concern with questions of perception. From Heidegger, he inherited an orientation toward being situated in the world. He resolved these two perspectives by focusing on the role of the body in perception.

The body, in Merleau-Ponty's phenomenology, plays a pivotal role in the mind/body, subject/object duality with which Husserl had struggled. For Merleau-Ponty, the body is neither subject nor object, but an ambiguous third party. Nonetheless, the body plays a critical role in any theory of perception. Perception of an external reality comes about through and in relation to a sense of the body. "A theory of the body," Merleau-Ponty argued, "is already a theory of perception" (Merleau-Ponty 1945:203). There are two important aspects to this proposal. One is the role that the body can play in mediating between Husserl's and Heidegger's positions. The other is a broadening of the role of body and bodily perception beyond the purely psychophysical.

The body can no longer be regarded as an entity to be examined in its own right but has to be placed in the context of a world. Moreover, being-in-the-world cannot itself be understood as a certain relation that obtains between a central body and a surrounding world, but has to be understood in terms of tasks, action to be accomplished, a free space which outlines in advance the possibilities available to the body at any time. (MacLellan 1993:174).

As should be clear, the embodied nature of action (and actors) was central to Merleau-Ponty's philosophy. Dreyfus (1996) points out three different meanings of embodiment in Merleau-Ponty's work. The first is the physical embodiment of a human subject, with legs and arms, and of a certain size and shape; the second is the set of bodily skills and situational responses that we have developed; and the third is the cultural "skills," abilities, and understandings that we responsively gain from the cultural world in which we are embedded. Each of these aspects, simultaneously, contributes to and conditions the actions of the individual, both in terms of how they understand their own embodiment (the "phenomenological body") and how it is understood by others (the "objective body").

Given the central place of "embodiment" in Merleau-Ponty's work, and his concern with the body and bodily experience, this may be an appropriate moment to say something more about the use I want to make here of the term *embodiment*. I am using the term largely to capture a sense of "phenomenological presence," the way that a variety of interactive phenomena arise from a direct and engaged participation in the world. As I outlined earlier, this includes both physically realized and socially situated phenomena, and the chapters that follow will explore both the dimensions and the consequences of this approach. However, in Merleau-Ponty's work, the idea of "embodiment" is used to draw particular attention to the role of the body. This concern with the body is echoed in much current work in Critical Theory, and particularly in explorations into the relationship between questions of self and technology, such as the "cyborg" work initiated by Donna Haraway (1991), Sandy Stone's (1991) comments on virtual presence, or (more distantly) Don Ihde's (1991) investigations of the mediating role of technology in science. Although I am sympathetic to their perspectives, however, my concerns here are not those of Haraway and her colleagues, nor should my use of the term *embodied* be confused with the issues that they wish to identify. Indeed, the lessons I want to draw from the phenomenological perspective will be broader (and less specific) than those that primarily occupied Merleau-Ponty.

Although his influence in HCI has been much less significant than that of Heidegger or even Schutz, Merleau-Ponty has nonetheless made an appearance. Robertson (1997) uses Merleau-Ponty's work as the basis of a taxonomy of embodied actions for the analysis of group activity. For instance, Merleau-Ponty's emphasis on the "reversibility" of perception—how, in our bodily presence and through our bodily experience, we can apprehend aspects of the perceptions of ourselves that we engender in others—provides her with the tools to explore how groups manage their mutual orientations, both to each other and to external artifacts, in
face-to-face and in virtual settings. Robertson’s investigations show the relevance of embodied accounts of phenomenological perception in understanding how technology mediates interpersonal communication. While the communicative role of technology is quite clear in Robertson’s work—she was, after all studying the use of video-communication technologies—I will argue that this same communicative role can be ascribed to a much broader range of technologies, and that phenomenological perspectives can be similarly enlightening.

Summary: Phenomenology and Being-in-the-World

It should be clear by this stage that embodiment is not a new idea—far from it. Instead, it has been central to a particular thread of philosophical thought since the late nineteenth century. However, for each of the phenomenological positions that have been outlined here, embodiment has played a different role. Husserl was concerned with how the life-world was based in everyday embodied experience rather than abstract reasoning; Schutz recognized that this conception of the life-world could be extended to address problems in social interaction. For Heidegger, embodied action was essential to our mode of being and to the ways in which we encountered the world, while Merleau-Ponty emphasized the critical role of the body in mediating between internal and external experience. Throughout these accounts, the idea of a world that we encounter directly rather than abstractly is of central concern.

What the phenomenologists have explored is the relationship between embodied action and meaning. For them, the source of meaning (and meaningfulness) is not a collection of abstract, idealized entities; instead, it is to be found in the world in which we act, and which acts upon us. This world is already filled with meaning. Its meaning is to be found in the way in which it reveals itself to us as being available for our actions. It is only through those actions, and the possibility for actions that the world affords us, that we can come to find the world, in both its physical and social manifestations, meaningful.

It should also be made clear, in light of this introduction, why embodiment and phenomenology are relevant to tangible and social computing. The relationship between tangible and social computing is not simply that they both exploit familiar metaphors for interaction. Instead, they both build on an account of the relationship between action and meaning that phenomenology has explored. They both place action and interaction prior to “theory” and abstract understanding. So, the phenomenological perspective offers a starting point for a foundational understanding of embodied interaction, one that the rest of the book will attempt to set out.

Before moving on, though, I want to spend some time discussing other approaches and show how they relate to the work discussed so far. Up to this point, I have primarily addressed the phenomenological tradition, but it is only one approach concerned with the relationship between cognition and action. In the rest of this chapter, I will introduce some other perspectives. These other approaches serve two roles here. First, they flesh out the picture of embodiment as an aspect of twentieth century thought; and second, they can provide us with further insights into the nature of being-in-the-world, both physical and social.

Being in the Physical World

A number of theorists, working in different domains and bringing different perspectives to bear, have recognized the importance of our physical embodiment in the world as a central aspect of how we act and react.

In HCI, the work of the psychologist J. J. Gibson is perhaps the most familiar, especially as explored in the writings of Dona’d Norman. Throughout his career, Gibson was principally concerned with visual perception; with how living creatures can see, can recognize what they see, and can act on it. Although psychologists had long studied the topic, Gibson became frustrated with conventional approaches. His frustration stemmed from the fact that they separated seeing from acting, while he regarded the two as being deeply connected.

Gibson’s starting point was to consider visual perception not as a link between optics and neural activity, but as a point of contact between the creature and its environment, an environment in which the creature moves around and within which it acts:

One sees the environment not just with the eyes but with the eyes in the head on the shoulders of a body that gets about. We look at details with the eyes, but we also look around with the mobile head, and we go-and-look with the mobile body. (Gibson 1979:222)
Gibson placed visual perception within a frame of being and acting, and in doing so laid the foundations for what he and others came to call “ecological psychology.” In contrast to approaches such as cognitive psychology, which tended to restrict their focus to mental processing and were defined by the boundaries of the head, ecological psychology was concerned with the organism living and acting in the world. From the ecological perspective, “cognition” was not purely a neural phenomenon, but was located within (and throughout) a complex involving the organism, action and the environment. Ecological psychology studies “knowledge in the world” rather than “knowledge in the head.”

One central construct of Gibson’s approach, which has had a particularly telling impact on the development of HCl, was the concept of “affordance.” Technically, an affordance is a property of the environment that affords action to appropriately equipped organisms. For example, the glass of my window affords looking to me, because I have eyes that operate in that part of the electromagnetic spectrum to which the glass is transparent. The atmosphere at sea level affords comfortable breathing to me, for the oxygen content of the air provides my body with adequate sustenance; but at an altitude of 35,000 feet, the atmosphere no longer affords breathing to me, although it might afford it to some other creature with lower oxygen requirements. My office chair affords sitting to me, because its seat matches the length of my legs. My office chair does not afford sitting to a horse or a rabbit; they are not “appropriately equipped” individuals. Similarly, I am not appropriately equipped to be able to breathe underwater or see in pitch darkness, although other creatures are, and so those environments afford different kinds of actions to them than they do to me.

In other words, an affordance is a three-way relationship between the environment, the organism, and an activity. This three-way relationship is at the heart of ecological psychology, and the challenge of ecological psychology lies in just how it is centered on the notion of an organism acting in an environment: being in the world.

As noted, ideas from ecological psychology have made their way into the world of HCl. Donald Norman (1988, 1993) has made considerable use of Gibson’s analytic framework, and particularly the concept of affordance, in his work on design and interaction in both the everyday physical world and the world of computer interfaces. Norman uses the concept of affordance to explore the relationship between form and function in design and to show how good design can make the appropriate use of a device clear and obvious to a user. Although Norman uses many examples drawn from the physical environment and physical product design, the same ideas also apply to the design of user interfaces, where the functionality (or the “opportunity for action”), that a system offers can be made more or less obvious in its visual appearance.

Subsequently, William Gaver took affordances as a starting point for a model of interactive system design (Gaver 1991), as well as for the analysis of cooperative technologies (Gaver 1992). Gaver’s goal was not simply to use the ecological approach to analyze interfaces, but also to build it into a systematic basis for interactive system design. For example, taking his cues from Gibson’s discussion of the “eyes in the head on the shoulders of a body,” Gaver argued that one failing of video-communication technologies was that they offer no means for visual exploration of the remote scene. Typical arrangements of cameras and monitors provide only a fixed view of the remote location, and that view is outside the control of the observer. By contrast, in the everyday world, our field of view is related to the way we are moving through the environment, and we have the opportunity to stop, look around, and so build up a better picture of what is around us by exploration. On this basis, Gaver and colleagues developed a prototype video-communication system (called the Virtual Window) that allowed users to explore a remote scene through head movements analogous to those by which we might look around us in the everyday world (Gaver, Smets, and Overbeeke 1995).

The idea of physical embodiment as an aspect of understanding the world was also one explored by Michael Polanyi. His book The Tacit Dimension (Polanyi 1966) explored the idea of “tacit knowledge”: those things that we know, but unconsciously and inexpressibly. One source of examples of tacit knowledge is we might call “embodied skills,” such as juggling or riding a bike. These are “tacit” skills in the sense that, while we might able to describe them, we cannot explain exactly what we do when we go about these tasks. We just do them. The understanding of “what” and the understanding of “how” are different kinds of knowledge.

Explicit integration cannot replace its tacit counterpart. The skill of a driver cannot be replaced by a thorough schooling in the theory of the motorcar; the
knowledge I have of my own body differs altogether from the knowledge of its physiology, and the roles of rhyming and prosody do not tell me what a poem told me, without any knowledge of its rules. (Polanyi 1966:20)

Embodied skills depend on a tight coupling between perception and action. Polanyi distinguishes between what he calls proximal and distal phenomena. Loosely, proximal means “close by” or “at hand,” while distal means “at a distance.” He argues that, in cases of tacit skills, our focus is on the distal phenomena, while the proximal phenomena are those through which the distal is achieved. Take the example of using a stick to feel your way in the dark. You have the sense of exploring the ground in front of you (distal) while, in fact, what you are experiencing is a set of sensory impressions at the hand holding the stick (proximal). So, although your actual experience might be proximal, your attention is transferred to the distal phenomenon. Just as the environmental movement urged us to “think globally, act locally,” so Polanyi observes that we think distally but act proximally. He notes that this transfer of attention, from proximal to distal, is associated with a semantic shift. The meaning we associate with proximal phenomena is actually that of their distal correlates. In the stick example, the pressure on our hands is interpreted to mean the presence of a barrier on the ground. Or again, on a boat, we interpret the subtle shifts in our balance in terms of the movement of the deck beneath our feet without even being aware that we are making the transition from proximal to distal phenomena. Polanyi sees this as a general phenomenon:

All meaning tends to be displaced away from ourselves, and that is in fact my justification for using the terms “proximal” and “distal” to describe the first and second terms of tacit knowing. (1966:13).

Even though bicycle riding and juggling seem to pop up as the quintessential examples of tacit knowledge, Polanyi’s interests are broader than simply physical skills. His idea of tacit knowledge applies generally to situations in which we understand “what to do” without being able to express “how to do it.” In The Tacit Dimension, what he actually has in his sights is not riding bicycles, but rather the question of how science is conducted and theory uncovered. A scientist before he turned to philosophy, Polanyi set out to address the observation that although science appears to progress through a thoroughly rational and regimented sequence of hypothesis, experimentation, observation, and analysis, it is equally dependent on such “irrational” phenomena as insights, hunches, and intuitions about results that do or do not “ring true.” He makes the case that the relationship between proximal and distal phenomena is akin to that between a hidden reality and observable fact, and that it is through the scientist’s relationship to this hidden reality that science progresses.4

The progress of science is not of immediate concern here (except in as much as we might be able to contribute to it). What is significant, though, is the way that Polanyi sees the relationship between proximal and distal in semantic terms, that is, in terms of the meaning they convey. This is strongly reminiscent of the concerns of the phenomenologists with the relationship between meaning and action, but we can see it, too, in the way that embodiment arises from these other perspectives.

**Being in the Social World**

The directness of embodiment is not only a phenomenon of the physical world. It is also crucial to a stance on the social world that has underpinned a good deal of the influence of sociological thinking on HCI in recent years.

We have already encountered one major trend in the role of embodiment in sociology, particularly with respect to issues of Human-Computer Interaction. That trend is the one represented by “situated” perspective, associated particularly with Suchman, but also with others such as Clancey (1997) or Lave (1988). And, as I have suggested earlier, Suchman's work can be related directly to the work of phenomenologists, in that Suchman works in the ethnomethodological tradition established by Harold Garfinkel, who himself drew extensively on the work of Alfred Schutz.

We encountered these perspectives in the previous chapter, but let me briefly summarize in order to draw attention to the threads relating their positions. Suchman's critique of the prevailing cognitivist model in Artificial Intelligence and interaction design drew attention to the fact that the sequential organization of action is not formulaic outcome of abstract planning, but rather is an improvised, ad hoc accomplishment, a moment-by-moment response to immediate needs and the setting in which it takes
place. The organization of action emerges within the frame of the action itself. Suchman demonstrated now a number of problems with interactive technology lay in the imbalance between the situated organization of practical action and the regimented models that systems embody. In coming to this conclusion, Suchman drew extensively on the ethnomethodological perspective that Garfinkel had pioneered. Whereas conventional sociological approaches take the position that we act in response to an objectively given social world, ethnomethodology claims that everyday social practice creates and sustains that social world by rendering it publicly available and intelligible. Members’ methods for making action accountable are means through which the phenomenon of objective social reality is achieved.

As should be clear, Garfinkel’s ethnomethodological approach is heavily influenced by Schutz and his work. Schutz had emphasized that intersubjectivity is the achievement of social actors in the course of their activity, and drew upon Husserl’s formulation of the *lebenswelt*, the life-world of mundane experience, in claiming intersubjectivity as an achievement or outcome of the natural attitude. This approach is echoed in Garfinkel’s concept of accountability, his concern with practical rationality and commonsense understandings, and his exploration of members’ methods for rendering their actions meaningful to each other. Indeed, Garfinkel repeatedly observes that Schutz, almost alone among social scientists of his generation, had begun to uncover the ways in which social reality is the ongoing achievement of social actors. Subsequently, as discussed in chapter 3, Garfinkel elaborated Schutz’s orientation toward the life-world and used it to initiate a radical reconsideration of the problems, topics, and methods of sociology.

So, the link that Suchman forged between HCI and sociology also connected it to a broader tradition that was, from the outside, oriented toward questions of embodiment. Ethnomethodology adopted a concern for these issues from Schutz’s phenomenology. Garfinkel drew from other sources as well, however, and at least one other important basis for Garfinkel’s work addressed questions of embodiment, albeit from a different angle. This was the ordinary language philosophy of Ludwig Wittgenstein.

**Wittgenstein and the Meaning of Language**

Like Elvis Presley, Ludwig Wittgenstein (1889–1951) had a professional career that fell into two distinct phases.

The first phase is his work up until his initial withdrawal from philosophy in 1919, and encompasses his investigations into the philosophy of logic and mathematics with Russell and Moore at Cambridge. The major work of this period was his dissertation, *Tractatus Logico-Philosophicus*, which he completed while a prisoner of war. Published in 1921, the *Tractatus* is organized as a series of terse, numbered propositions, arranged into seven sets and accompanied by some commentary. Proceeding from the first proposition, “The world is the totality of facts,” to the last, “Whereof we cannot speak, thereof we must remain silent,” the *Tractatus* attempts to explore the nature of facts and propositions. One of the best-known elements of this work is the “picture theory” of meaning, according to which language represents (or pictures) the relationships between entities in the world.

After 1919, Wittgenstein “retired” from philosophy and taught in an elementary school in rural Austria. Finding it hard to keep away, though, he returned to Cambridge in 1929 to take up his philosophical studies again. In this second phase of his career, though, he departed radically from the principles that guided his earlier work.

The major work of Wittgenstein’s second career is the *Philosophical Investigations*, which appeared posthumously in 1953. Once again, the topic is meaning, but now Wittgenstein took a very different perspective. In this later work, Wittgenstein rejected the positivist view of language and meaning that had characterized the *Tractatus*. He no longer held the view that words simply signify states of the world. He now saw meaning as embedded not in language or linguistic expressions themselves, but rather in the practice or use of language.

Wittgenstein reoriented his view of language from a logical construction of facts and truth statements to a set of loosely connected “language games,” socially shared linguistic practices “consisting of language and the actions into which it is woven.” Language games reflect a common orientation toward action and experience that provides a context for determining meaning. Using language, he argued, is a human activity, and its effective meaning must be sought in the activity that it accomplishes, or in what Wittgenstein called the “form of life” that surrounds specific linguistic practice. It is on this basis that, in *Philosophical Investigations* (§43), he famously wrote, “the meaning of a word is its use in the language.”
The “language games” perspective emphasizes that language is not simply an external expression of inner mental states, but rather is a form of action. It is something that people do. So, the utterance cannot be separated from the speaker, or from the systems of meaning in which speaker and hearer are enmeshed. From this perspective, the questions that he had struggled with in his early career were rendered meaningless. The “truth” of a statement was no longer a sensible topic; now, his attention was turned to the “appropriateness” of an utterance, that is, to what made it the right thing to say in such-and-such a circumstance, and what might make it meaningful to hearers. The question is how language is organized into systems of meaning or language games. Language games are the embodied practices of communities, and the context of the language game arises from the experience, needs, capacities, and so forth of those who are engaged in it. “To imagine a language,” Wittgenstein observed, “is to imagine a form of life” (§19). In other words, the setting in which language is used contributes to the apprehension of its meaning, where “setting” is not just the local occasion of its use, but the very way in which the speakers of that language exist in the world.

So, embodiment is as central to Wittgenstein’s approach to language as it is to Heidegger’s view of Being. He argues that language and meaning are inseparable from the practices of language users. Meaning resides not in disembodied representations, but in practical occasions of language use. Although Wittgenstein was not working directly in the phenomenological tradition, his approach clearly resonates with much of that line of thought, and indeed, his exploration of meaning and rule-following figure as strongly as the influence of Schutz in Garfinkel’s ethnomethodology.

Summary

This chapter has taken something of a whirlwind tour through the work of many people who have addressed the issue of embodiment in one way or another.

It began with the phenomenologists. I outlined Husserl’s attempts to reorient the Cartesian program around the phenomena of experience; Heidegger’s reconstruction of phenomenology around the primacy of being-in-the-world; Schutz’s expansion of the phenomenological program to account for problems of social interaction; and Merleau-Ponty’s elaboration of the role of the body in perception and understanding.

I also explored the work of others who, although outside the phenomenological tradition, followed similar paths. So, we saw how Gibson had initiated an approach to psychology that recognized the importance of the interaction between an organism and its environment, and how his work has subsequently come to be adopted in HCI. Similarly, I explored the ways that Suchman’s program, introduced in chapter 3, traces its intellectual lineage to Schutz, through Garfinkel. Finally, I introduced Wittgenstein’s work on ordinary language philosophy, another of the major influences on Garfinkel’s work.

It has not been my goal to spin these all these threads into a uniform theoretical fabric; that would be a monumental and potentially misguided task. Instead, my goal is to take these related approaches and find some common patterns that might shed light on the relationship between tangible and social computing. There are three notable common elements to the approaches outlined in this chapter.

First, they all take embodiment as central. “Embodiment” does not simply mean “physical manifestation.” Rather, it means being grounded in everyday, mundane experience. The claim of the approaches outlined here is that embodiment is a foundational property, out of which meaning, theory, and action arise. They all place the source of action and meaning in the world. Embodiment is a participative status, a way of being, rather than a physical property.

Second, the approaches focus on practice: everyday engagement with the world directed toward the accomplishment of practical tasks. They all take action in the world to be fundamental to our understandings of the world and our relationship with it. So, their perspective is not simply that we are embodied in the world, but also that the world is the site and setting of all activity. It shapes and is shaped by the activities of embodied agents.

Third, they point to embodied practical action as the source of meaning. We find the world meaningful primarily with respect to the ways in which we act within it. Whether this is through Gibson’s affordances of the environment or Heidegger’s concern with objects manifesting themselves
through coming to be present-at-hand, the approaches outlined in this chapter see embodiment as a source for intentionality, rather than as the object of it.

Early in this chapter, I lay out some working definitions for embodiment and embodied interaction. After exploring how the idea has been used and developed by other schools of thought, we are, perhaps, now in a position to lay out some better ones.

The starting point was:

*Embodied phenomena are those which by their very nature occur in real time and real space.*

In light of the elements brought together in this chapter, we now have a better understanding of embodiment, and its consequences. We can now say:

*Embodiment is the property of our engagement with the world that allows us to make it meaningful.*

Similarly, then, we can say:

*Embodied Interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts.*

The major lesson that I draw from the phenomenological work is that embodiment is about the relationship between action and meaning. We have already spent some time, in considering social perspectives, talking about action. What we need to explore in more detail is just what is implied by “meaning.”