

CHAPTER 6

Contemporary Theory

A distinguishing feature of Contemporary art that set it apart from Modernism was that much of the work was considered socially conscious, being interpreted and construed from cultural perspectives, such as feminism, multiculturalism and globalization. A wide range of ideals, methods and practices were promoted, explored and pursued, incorporating a number of philosophical and critical methods that collectively became coined as “postmodernist.” A “theory industry” was born (Stiles, 1996) where many new modes of theoretical debate and scholarly discourse took shape. Critical theory, in its various manifestations, took center stage, questioning the status of texts and the role of the authors who speak through them.

There are similar parallels that took place between the shift from modern to contemporary HCI, with the emergence of a more self-conscious reflexivity and social conscience, as exemplified by the third paradigm (Harrison et al., 2007). Different human values came to the forefront, extending and superseding previously mainstream HCI goals to improve efficiency and productivity. Cultural perspectives, such as feminism, multiculturalism and critical theory, were also promoted.

6.1 HUMAN VALUES

Contemporary HCI theory began in the mid to late 2000s. Debates surfaced about what HCI researchers do, what practitioners should be doing, whether they should be doing it and what their respective social responsibilities ought to be in a changing world of increasing technology use and dependency (see Blythe et al., 2008; Dourish et al., 2004b). The manifesto “Being Human: Human-Computer Interaction in the Year 2020” paved the way for a different kind of value-driven agenda. Concerns were voiced that if HCI was to continue to be of relevance in the 21st Century, it needed to change tack (Harper et al., 2008). New directions proposed included operationalizing contemporary society’s aspirations and desires for self-understanding and expression. But to do so, needed a different set of conceptual tools that could tackle the empirical, philosophical and moral investigation of technology.

Given the pace at which HCI has moved forwards in its short history (Grudin, 2012), and its propensity to join forces with other disciplines, it seems well positioned to take on this new set of social, moral and cultural challenges. Not being strongly wedded to a particular set of techniques or paradigms that are steeped in tradition, means it can rapidly change course, abandon “old” ways of studying and embrace the new.

Indeed, a new set of concepts, tools and methods is beginning to appear that are intended to address the wider range of human values, rather than well versed human needs (e.g., computers should

be easy to learn, easy to use, etc.). They include getting to grips with *life* goals (cf. to *user's* goals), such as how people can pursue healthier, more meaningful and enjoyable lifestyles; and probing technology's underbelly as it becomes more insidious; including looking at how governments and organizations have become more reliant on computer technology to control society while individuals have started to use it in more criminal ways, making people worry more about what information is tracked, analyzed and stored about them.

Action Research is one such socially responsible approach that is being promoted in HCI. It provides methods and approaches for conducting democratic and collaborative research with members of a community (Hayes, 2011). In particular, it offers theoretical lenses, methodological approaches, and pragmatic guidance for conducting socially relevant, collaborative and engaged research (Stringer, 2007). Where it differs from previous participatory design approaches, is that while primarily seeking to help with practical concerns, it also aspires to scientific rigor and the promotion of sustainable social change. To achieve these three goals, a cyclical methodology is followed, with an emphasis on problem formulation, intervention design, deployment (i.e., "action"), observation of the effects of the action, reflection and then redefinition of the problem. A further distinction is to come up with a solution that improves on previous ones and which helps all those engaged in the project learn through the actions they take.

Being engaged in socially aware and responsible research involves asking different questions, such as what are culturally appropriate technologies for the home (Bell et al., 2003). A range of contemporary topics have begun to be explored with quite different questions being asked than previous usability or hedonistic ones, including health and well-being, climate change, feminism, multiculturalism, globalization, world peace and poverty (Shneiderman, 2011).

Adding Understanding to the Mix

As part of the new agenda for HCI, the *Being Human* report (Harper et al., 2008) proposed extending the canonical 4-stage iterative model of user-centered design by adding another stage. The new stage, called *understand*, is intended to address explicitly the human values that the technology in question will be designed to serve. Depending on the values of interest, the *understand* stage can draw on disciplines as diverse as philosophy, psychology, art, sociology, cultural studies, and architecture. These investigations are intended to point to fundamental research that needs to be conducted, relevant research that has already been carried out, or some combination of the two.

Some researchers have gone far afield, decamping to developing countries in an effort to use and develop ICT to help reduce poverty, starvation, improve sanitation, etc. Many of these new IT projects are well intentioned. However, concerns within the HCI community have started to be

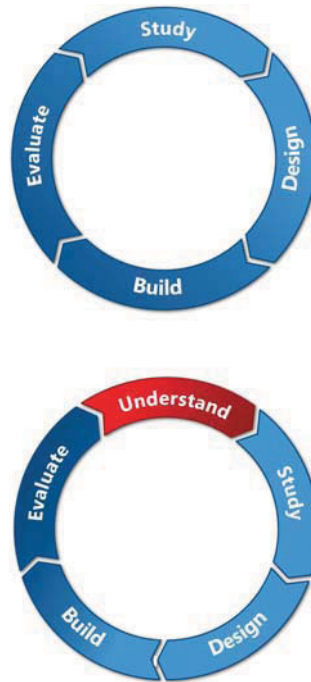


Figure 6.1: The conventional user-centered research and design process (top) and the extended five-stage research and design process (bottom) encompassing a new stage of conceptual analysis or “understanding” of human values. (From [Harper et al., 2008](#).)

voiced about the motivations for looking “out there” ([Taylor, 2011](#)). In particular, there is a sense of unease for those who waver between wanting to make the world a better place while needing to collect ethnographic materials to publish and furnish theory building. Is it possible to do both and is it desirable? The dilemma of trying to be a participant and a researcher has ramifications for the balance of research and development. Here, I just give a flavor of the new theoretical approaches that have been selected, imported and developed within Contemporary HCI. But, it is acknowledged that many of the new theories should be viewed in the wider context of the researcher’s social responsibility — and in the fullness of time it will be interesting to see how the moral narrative evolves for areas such as ICTD, HCI for peace and animal-computer interaction ([Mancini, 2011](#)).

I have chosen to select four major “turns” to characterize and distinguish between the main kinds of HCI contemporary theory. These are:

- (a) turn to design
- (b) turn to culture

- (c) turn to the wild
- (d) turn to embodiment

The rhetorical device of “a turn” has become popularized as a way of noting a change in the framing of HCI ever since the phrase “turn to the social” was coined in the 1990s. It is acknowledged there are several other turns that have appeared in the HCI literature, besides the ones listed above, such as those about particular topics or areas, such as emotion, enjoyment and sustainability, and a turn to “practice.” For the purpose of this chapter, however, the turns to design, culture, the wild and embodiment are only covered.

6.2 TURN TO DESIGN

Since the early 1990s, design has been considered central to HCI, beginning with a focus on software design, user-centered design and interface design (e.g., [Karat, 1991](#); [Winograd, 1996](#)). How to gather user requirements and developing methods that could better inform user-centered design have been two central themes. Case studies, such as the Mac interface and VisiCalc, were drawn upon to illustrate good practice in software design.

The turn to design as a more theoretical concern began in earnest during the 2000s when researchers began discussing how design theory and critical design could play a more central role in HCI. [Winograd's](#) early paper (1997) proposing that interaction design was about the “interspaces” inhabited by “multiple people, workstations, servers and other devices” in a complex web of interactions, led others to consider how to create design spaces within which people could communicate through. [Shön's](#) (1987) influential ideas on reflective practice were also brought into the mix.

A landmark book by [Löwgren and Stolterman \(2004\)](#) called *Thoughtful Interaction Design* drew from a range of Art, Design and Humanities theories, including English Literature. A running theme throughout was *not* about how to do interaction design but how to *think* about it. This shift from prescription to reflection drew attention to the complexity of design. Reducing it to a recipe book of steps to be followed or lessons learned was considered an over-simplification. Instead, much interpretation and understanding is needed of the choices that have to be made throughout the design process, often between trade-offs. This is where design theory can inspire; liberating “the designer from preconceived notions and conceptions of how the design process can be performed” and using it to “create new conditions for design, different patterns of thinking and acting, new design principles, and a general understanding of the conditions for creative and innovative work” (p8).

The idea that interaction design be informed by theories from aesthetics, ethics, politics and ideology was a radical departure for many in software design. Instead of thinking in terms of which methods to use *per se*, another push was towards thinking about how to use them *responsibly*, by applying them sensitively, skillfully and appropriately. Concepts such as pleasure, user experience, enjoyment and play provided much new food for thought, enabling designers to contemplate what it means to design for lifestyles — and as something we *live with*, not simply something we *use* ([Hallnäs and Redström, 2002](#)).

More recently, there has been a move towards accountability: it has been increasingly argued that designers have a responsibility towards what they choose to examine, analyze and design for. Debates about what this might entail have been aired; new terms have surfaced, such as design activism (Light, 2009), sustainable design (Blevis, 2007), inclusive design (Vanderheiden, 2008), value-sensitive design (Friedman et al., 2006) and worth-sensitive design (Cockton, 2006).

As part of the trend towards more critical reflection, researchers have also looked to various forms of philosophy that they see as providing deeper ways of understanding technology-mediated experience. For example, Fallman (2011) has presented the philosophies of technology by Borgmann (1992) and Ihde (1993) to the HCI community as a way of helping them articulate the range of human values in relation to technology: introducing notions of *device paradigm* and *non-neutrality of technology mediated experience*, respectively, while Cockton (2010) has introduced Badiou's (1988) theory on *design situations* that in itself, was a response to postmodernist ontologies. These kinds of philosophical theories provide epistemologies about the state of the world and what constitutes reality. For those with a proclivity for, or background in, this kind of philosophy, they can provide alternative ways of reading and understanding the ethics of technology and the value-based choices designers make and connecting between them. For others, they can appear somewhat overwhelming.

A more accessible approach to philosophizing about HCI was McCarthy and Wright's (2004) *Technology as Experience* framework, where the *phenomenology* of the user experience was discussed and applied to design practice. A particular focus was the *felt experience*, i.e., how something is felt by the user. The ideas were drawn from Pragmatism, and in particular, the philosophical writings of Dewey that emphasize the sense-making aspects of human experiences. This understanding is applied to the whole experience of a technology that people have in terms of their interconnected aspects, rather than as fragmented aspects (e.g., its usability or utility). But defining a felt experience is very difficult because it is nebulous and ever-present to us, just as swimming in water is to a fish. Their way of tackling this was to describe it in holistic and metaphorical terms.

Technology as Experience in a Nutshell

McCarthy and Wright (2004) propose four core threads that make up our holistic experiences: compositional, sensual, emotional and spatio-temporal. The sensual thread is concerned with our sensory engagement with a situation, and can be equated with the level of absorption people have with various technological devices and applications, most notable being computer games, cell phones and chatrooms, where users can be highly absorbed in their interactions at a sensory level. The emotional thread includes emotions such as sorrow, anger, joy and happiness. Emotions are intertwined with the situation in which they arise, e.g., a person becomes angry with a computer because it does not work properly. Emotions also involve making judgments of value. For example, when purchasing a new cell phone, people may be drawn to the

ones that are most cool-looking but be in an emotional turmoil because they are the most expensive. The compositional thread is concerned with the narrative part of an experience, as it unfolds, and the way a person makes sense of them. For example, when shopping online, the choices laid out to people can lead them in a coherent way to making a desired purchase or they can lead to frustrating experiences resulting in no purchase being made. When in this situation, people ask themselves questions such as “What is this about? Where am I? What has happened? What is going to happen next? What would happen if ...?” The spatio-temporal thread refers to the space and time in which our experiences take place and their effect upon those experiences, including how we talk of time speeding up, standing still and slowing down, and needing one’s own space.

The threads are meant as ideas to help designers think and talk more clearly and concretely about the relationship between technology and experience. For example, when buying clothes online, the framework can be used to capture the whole gamut of experiences, including: the fear or joy of needing to buy a new outfit; the time and place where it can be purchased, e.g., online stores or shopping mall; the tensions of how to engage with the vendor, e.g., the pushy sales assistant or an anonymous website; the value judgment involved in contemplating the cost and how much one is prepared to spend; the internal monologue that goes on where questions are asked such as will it look good on me, what size should I buy, do I have shoes to match, do I need to try it on, how easy will it be to wash, will I need to iron it each time and how often will I be able to wear it. All of these aspects can be described in terms of the four threads and in so doing highlight which aspects are more important for a given product. Such interlinked facets and concerns are what most of us engage with in our everyday actions and interactions with others.

The threads may provide metaphors for thinking about design, but how well do they inform design in practice? Heather Collins and Aaron Loehrlein (id-book.com) describe in a case study how they used them as inputs for web design. They found the threads to be helpful in thinking about the balance of the different experiences they were hoping to elicit. Since [Wright and McCarthy \(2010\)](#) developed their ideas further, explicating what is meant by *experience-centered design* from a humanistic approach when designing digital technologies.

Besides social responsibility, other design values that have been promoted are ludic and playful ones that promote curiosity, exploration and aesthetic enjoyment amongst people when they encounter new technologies. The idea is to trigger more reflection in users/people on what they no-

tice and how it changes their perspective of and relation to the environment. A diversity of artifacts has been created within a playful context, including a periscope (Rogers et al., 2005), an ambient horn (Price and Rogers, 2004) and the drift table (Gaver et al., 2004) — all of which are unusual, sometimes bizarre and often strange. Gaver et al. (2003) have also argued that ambiguity can be a desirable property in interaction design; making people stop and wonder about the artifact design, and to think more generally about the role technology plays in their lives. The theoretical underpinning of these forays into more “creative HCI” is that there isn’t one preferred interpretation of a system but multiple (Sengers and Gaver, 2006). This way of viewing technology design draws inspiration from Science and Technology Studies (STS), which has documented the many ways that technologies are *interpretively flexible*, i.e., lend themselves to different interpretations besides those intended by their developers (e.g., Bijker, 1995). The idea of framing HCI in the context of multiple interpretations is also behind the cultural theories that have since been imported into HCI, to which we now turn.

6.3 TURN TO CULTURE

There are many questions about how we understand, think, and interpret what we see, hear and touch around us that do not lend themselves to being addressed by scientific theories of cause and effect or social theories of accountability. Many of our concerns about human nature and conduct are about interpretation, such as what did he mean by that, why did he give me that look, why did that performance appear so sublime and so on. These kinds of questions are the bread and butter of other disciplines, namely the Arts and Humanities. They are real questions that invite disciplined answers, involving another language and another conceptual scheme, such as argumentation and intersubjectivity (Scruton, 2012).

There are many theories and approaches within the Arts and Humanities that have evolved to answer questions about the human condition. Several with a background in these fields have jumped ship and joined HCI, as did the sociologists in the 1990s, seeing opportunities to interpret and explain the user experience and other aspects of HCI using their repertoire of interpretative schemes. Cultural theory is one such approach that has made some in-roads into HCI; an umbrella term for social commentary, critical analysis and a re-contextualizing of interaction design (Satchell, 2008). The different disciplines and philosophies they bring to bear include anthropology, social theory, Marxism, feminism, language theory and critical theory. Each of these can be broken down into sub-fields or phases of their development, for example, critical theory comprises film theory, literary theory, political theory and psychoanalytic theory, while feminism has been labeled as liberal, radical, multi-cultural and postmodern among others (Bardzell, 2009). New forms have also been developed to meet the needs of interaction design, namely, *interaction criticism* (Bardzell and Bardzell, 2008).

Critical Theory in a Nutshell

For the outsider, unfamiliar with the landscape of cultural studies, Critical Theory can appear as a dizzying array of perspectives and nuanced varieties. Adopting a critical stance in HCI requires being skeptical, which from a postmodernist position, involves viewing knowledge as subjective construction, being situated in the personal, the social, the conceptual and the political. When applied to user-centered design, it is viewed as the understandings, interpretations and everyday practices of the people being studied or designed for. What this means in practice, is to understand HCI from a number of different angles, such as “linguistic, ideological, gender-based, institutional, environmental” and to develop multi-faceted knowledge constructs that are, “diverse, complex, intentional, subconscious, implicit, genealogically layered, ideological, linguistic and ritually structured — all at once.” (Bardzell, 2009). This seems like an art form and skill set that takes much practice to develop and hone. Indeed, Bardzell et al. (2010) further emphasize how interaction criticism be seen as an *expert reading* of design artifacts, communicating new insights that can be of value to HCI. Part of the expertise in critical practice is knowing the body of knowledge in the design field and having a good sense of the important contributions that can be made from a critical stance. For those unfamiliar with this form of multi-layering and interpretative position, it can appear daunting and unwieldy. As with importing other theories into HCI, there is the danger that, researchers new to critical theory, will cherry pick certain concepts, resulting in them becoming overly simplified when out of context. In doing so, their interpretation — similar to the fate of affordances — may lose their original explanatory force, even to the point of trivializing a topic, and in so doing, making them vulnerable for ridicule by those from other “scientific” schools of thought.

The struggle facing those championing critical theory and, more generally, the adoption of a cultural theory approach to HCI, is what they are offering is an even more radical departure from the scientific paradigm than the Modernist theories imported into HCI. Moreover, bending the underlying principles and ethos of the cultural theory approach to match perceived needs of HCI practice, may be seen by some to be like heresy, grossly distorting its contribution from being interpretative to being other (such as prescriptive). But there is a price to pay for not adapting when decamping into an applied field; critical theorists may be regarded as a fringe activity, and at worse dismissed, by those unfamiliar with their method or style of writing. The way forward has to be to appropriate an HCI-oriented form of interpretation, which is more accessible to the HCI

community, but which still has its distinctiveness for addressing questions concerning human nature and the human condition. Bardzell (2009) has made a stab at this, proposing four kinds of mappings that critical theory and aesthetics can make to the practice of HCI: (i) informing the existing design process; (ii) resisting or innovating on the design process; (iii) developing and adapting critical theory relevant for HCI; and (iv) critiquing interaction designs that expose the consequences of design. Significantly, he argues, that such mappings are not intended to supersede or reject previous scientific methods in HCI — as many of the alternative theoretical approaches, such as situated action and ethnomethodology, argued for. This move towards more openness is an important step if it is to survive and flourish in Contemporary HCI, where there are ever more theories popping up, vying for attention.

6.4 TURN TO THE WILD

In-the-wild approaches to interaction design began appearing in the mid-2000s, although Hutchins (1995) seminal book “Cognition in the Wild” set a precedent for rethinking how to study cognitive and social phenomena in context rather than in isolation. Following this significant body of work, a number of in-the-wild studies and accounts began to appear in the HCI and Ubicomp literatures, describing how new technologies were being designed, prototyped, and implemented *in situ* (see Rogers et al., 2007). Wild approaches differ from earlier ethnographic approaches insofar as their focus is not on observing existing practices or deriving system requirements *per se* (Rogers, 2011). Instead, novel technologies are developed to augment people, places and settings; interventions installed and different ways of behaving encouraged. A key concern is to observe how people react, change and integrated these in their everyday lives.

The shift towards conducting in-the-wild studies has largely come about from a growing interest in how pervasive technologies can be designed to enhance and become part of the *everydayness* of life. Instead of the goal being to develop *solutions* that fit in with existing practices, the trend has been to experiment with new technological *possibilities* that can change and even disrupt behavior. Central to designing in-the-wild is being able to show how behavior changes over suitable periods of time of technologies being used *in situ* and in practice.

The outcomes of these in-the-wild studies have been most revealing demonstrating different findings from those arising from studies (Hornecker and Nicol, 2012; Marshall et al., 2011a; Rogers et al., 2007). In particular, in-the-wild studies show how people come to understand and appropriate technologies in their own terms and for their own situated purposes. Another difference is that in the lab participants are brought to the experiment and shown their place by a researcher or assistant and then provided with instructions as to what they have to do. There is always someone at hand to explain the purpose of the study, show how to use the system, or fix things if they don't go according to plan. This form of scaffolding is largely absent in-the-wild. The locus of control shifts from the experimenter to the participant. Hence, it becomes much harder, if not impossible, to design an in-the-wild study that can isolate specific effects. Instead, the researcher has to make

sense of data in-the-wild, where there are many factors and interdependencies at play that might be causing the observed effect.

The impact of these studies is making researchers rethink what the role of theory is for in-the-wild. The approach I advocate is to import *different* theories into interaction design that have been developed to explain behavior as it occurs in the real world; and then *re-contextualizing* how such a theory should frame research when used in-the-wild, and ultimately, constructing new *wild theories*, based on the findings from in-the-wild studies (Rogers, 2011).

The first two suggestions resonate with the challenges and approaches the other turns in contemporary HCI are proposing: bringing in alternative theories originating from the behavioral sciences and philosophy — that explain how people behave and act in the real world. One theory is *embodiment* — concerned with the social and physical context of the body in structuring cognition and how the world is experienced (this will be covered in more detail as “a turn” in its own right in the next section). Another is *ecological rationality*, which examines how people can make reasonable decisions given the constraints that they naturally and commonly face, such as limited time, information and computational abilities.

Ecological rationality. There has been a growing interest in how people make decisions when confronted with information overload, such as when shopping on the web or at a store. How easy is it to make a decision when confronted with overwhelming choice? Classical rational theories of decision-making (e.g., von Neumann and Morgenstern, 1944) posit that making a choice involves weighing up the costs and benefits of different courses of action. This is assumed to involve exhaustively processing the information and making trade-offs between features. Such strategies are very costly in computational and informational terms — not least because they require the decision-maker to find a way of comparing the different options.

In contrast, the theory of ecological rationality proposes that people tend to use simple heuristics when making decisions (Gigerenzer et al., 1999). Human minds have evolved to act quickly, making just good enough decisions. This theoretical approach proposes that the mind has adapted its limitations to match the structures of information available in the environment. Instead of trying to process all the available information in the environment and consider all possible options, people often make surprisingly good decisions using simple “fast and frugal” heuristics. These are rules of thumb that ignore most of the available information. They include recognition heuristics that largely eliminate the need for information and just make choices on the basis of what is recognized; search heuristics that look for options only until one is found that is good enough, and choice heuristics that seek as little information as possible to determine which option should be selected. Hence, we typically rely only on a few important cues. For example, in the supermarket, shoppers make snap judgments based on a paucity of information, such as buying brands they recognize, are low-priced, or have attractive packaging — seldom reading other package information. This suggests that an effective design strategy is to follow the adage less is more rather than more is more making key information about a product highly salient.

The theory provides a different way of thinking about designing information and how to make it salient when *in situ*. It goes against the grain of much current thinking in ubiquitous computing about contextual information (often based on unbounded rationality models of decision-making). Instead of providing exhaustive mobile recommenders of restaurants, places to visit, etc., for people on the move, the approach is minimalist, determining how, where and when to display salient information that can be capitalized on as part of a fast and frugal heuristic (Todd et al., 2011). This can lead to thinking about structuring the information environment in subtly different ways that can readily and even unconsciously influence people's choices and behaviors in desired directions. Furthermore, instead of trying to change people's behavior through influencing what and how they consciously think about an issue, it involves thinking about how to change the *context* in which they make their decisions, which may or may not involve conscious decision-making. This has led to quite different ways of designing displays in context in order to depict salient information. Instead of providing ever more information to enable people to compare products when making a choice, it is argued that a better strategy is to design technological interventions that provide just enough information and in the right form to facilitate good choices. One solution is to exploit new forms of augmented reality technology that enable information-frugal decision-making and which have glanceable displays that can represent key information in an easy-to-digest form.

Another idea is to develop new wild theory. But what form should it take? Instead of using theory to make a prediction and applying it to a specific problem, it is argued that a wild theory would address more broadly the interdependences between design, technology and behavior. While using this kind of coarser grain of analysis is not new — for example, socio-technical systems theories have been doing this for years — the subject of interest is, i.e., changing everyday behavior and designing *in situ*. Is so doing, a wild theory would become part of the design discourse rather than being formulated into a specific prediction or explanatory framework.

In-the-wild theory in a Nutshell

A starting point might for developing a wild theory might be a much talked about behavior that society is concerned with (e.g., energy consumption, well being, social entrepreneurship). The focus would be how to augment, facilitate or change it in ways that are desired by individuals and society. The problem-design space is couched in terms of an embodied, ecological or other new theoretical understanding of the way people behave in their everyday world and how a in-the-wild design could change this. A number of couplings between the environment, behavior and technology could be explored. Instead of looking at single cause-effects where doing X will produce Y, we could begin to explore a number of interlinked changes that we wish to implement, some through technological designs and others not. For example, a wild theory of technologically facilitated behavioral change would be concerned with

understanding the interdependencies between everyday phenomena, information salience, ubiquitous computing and ethics. Wild theory would also feed directly into the development of conceptual tools for design and research. Hence, I see wild theories as emerging from the cross-fertilization of alternative theory, findings from in-the-wild studies and contemporary social concerns.

6.5 TURN TO EMBODIMENT

The turn to embodiment has been gathering momentum in HCI, following the success of [Dourish's \(2001\)](#) book “Where the Action Is.” It is about understanding interaction in terms of practical engagement with the social and physical environment. This is considered to be more representative of the way technology is heading in terms of how it is appropriated by people in their everyday settings and the diversity of physical ways we can now touch, manipulate and use interfaces, from tangibles to gesture-based hands free ones. It draws inspiration from a number of areas and theories, namely, [Winograd and Flores's \(1986\)](#) discussion of phenomenology, [Suchman's \(1987\)](#) notion of situated action, Gibsonian's conception of affordance, philosophical ideas from [Heidegger \(1996\)](#) thesis about “embodied interaction.” That is a lot of ideas to bring together! Instead of trying to be a unified overarching theory, it has been suggested that it is more profitable to consider using the different aspects of embodiment to account for different behaviors ([Marshall et al., 2013](#)); for example, in describing what actions are available in a physically shared space ([Robertson, 1997](#)) and encouraging students to learn through physical manipulations or movements ([Antle et al., 2009](#)).

Embodied Interaction in a Nutshell

To adopt an embodied interaction stance means having a particular sensibility and approach to viewing technology, design and the world. An embodied interaction perspective takes account of the way human beings are embodied, where perception and action are always embodied. This allows for viewing interactions differently from viewing perception and action as separate stages. [Dourish \(2001\)](#) proposed embodied interaction essentially as a *stance* and an *organizing principle* that researchers and designers can adopt to help them uncover issues in the design and use of existing technologies and the design of new interactive systems. Everyday practices can be examined, analyzed and critiqued in relation to principles, claims and arguments about embodiment. The latter include “technology and practice cannot be separated from each other; they are coextensive and will coevolve,” “embodied interaction turns action into meaning” and “meanings arise on multiple levels.”

Different meanings are ascribed in interaction through our embodied interaction with the tangible world and with each other. Rather than struggle to make sense of the inflexible meaning encoded in computers we create and communicate meaning of our actions by exploring, adapting and adopting interactive technologies, incorporating it into our world and everyday practices. For example, an interactive surface can be at once, a tool to plan a day out, a shared space that a group can gather around in discussion, and a convenient surface on which to place a cup of coffee.

For some, reading Dourish's book can be enlightening, setting them off in new research directions. Others, however, have struggled to understand the connotations of what an embodied stance means and how to go about operationalizing it. Klemmer et al. (2006) have tried to fill this gap by developing a more applied framework of embodiment, suggesting a number of concrete themes intended to help designers. Similar to Dourish and others, they draw from a variety of theoretical and empirical works to explain embodiment; but their particular flavor draws from a synthesis of ideas arising out of philosophy, psychology and sociology, resulting in a theoretical blending that promotes bodily engagement with the physical and digital worlds; tangibility and reflective practice. In contrast to Dourish's take on embodiment, they emphasize the impact of *learning through doing*; drawing ideas from developmental psychology theory about how children learn to move their bodies and the consequences of their actions. They outline five themes intended to *inspire* new design approaches that combine the physical with the computational and also as input for evaluating systems in context.

While the five themes summarize succinctly a body of relevant theoretical and empirical research, together with raising new questions, they, too, only really hint at how the designer might consider different facets of "thinking through doing." The extent to which a designer or researcher can apply one or more of these themes ultimately depends on their sensibilities to the underlying philosophy. Hence, similar to Dourish's stance, they still have to do the work "to work out" what it means to design *embodied* technologies for *embodied* people in an *embedded* world.

Another more applied approach to embodied interaction is Hornecker and Buur's (2006) Tangible Interaction framework that conceptualizes technologies in terms of embodied interaction, tangible manipulation, physical representation of data and embeddedness in real space. It offers four themes and a set of concepts intended to help researchers in understanding the interaction with tangible interaction systems and in designing for the support of social interaction. These are *tangible manipulation* (the material representations with distinct tactile qualities), *spatial interaction* (it is embedded in real space and therefore occurs by movement in space), *embodied facilitation* (how the configuration of material objects and space affects and directs emerging group behavior) and *expressive representation* (the expressiveness and legibility of tangible systems). Similar to Klemmer et al. (2006) their framework leaves it to designers' interpretation and sensibilities, but tries to summarize the main issues as questions that can drive and inspire creative design.

As with the cultural theory approaches, there is a danger that such under-specificity — be it *Dourish*, *Klemmer et al.* or *Hornecker and Buur's* take on embodiment — might result, yet again, in a piecemeal approach where the researcher or designer, finds themselves slipping into over-simplified interpretations of embodiment, that bear little resemblance with the phenomenological experience of enactment. When everyone starts talking about: “embodied this, embodied that” it will be like Norman’s affordances, where everyone is referring to a sense of body-interaction, but not much more. But, clearly, theories about embodiment and their implications for design are more than skin deep. The question this raises is whether it really matters if people talk about embodied this or embodied that when they mean something less than envisioned by those who have imported and re-interpreted it in an HCI context. If it adds to their armory of terms, and importantly, others understand what they mean by it, then it seems a harmless addition.

A different approach has been to show how the idea of embodiment can be specifically applied. Instead of blending theories, a single theoretical framework is used to directly inform the design of interfaces — in some ways not dissimilar to the Classical theory approach. An example is *Hurtienne's* (2009) approach; he has drawn inspiration from cognitive linguistics, leading to a new cognitive theory in interaction design. His theory of embodied cognition is grounded in the ways that people experience the world through physical interaction, and it emphasizes the value of using abstraction from specific contexts. In particular, he draws from *image schema theory* (*Johnson, 1987*) that describes the *abstract representations of recurring sensorimotor patterns of experience*. An example of an image schema is when we place objects in other ones; it leads to a higher-level understanding of what a “container” is and its attributes (e.g., an inside, a boundary, an outside, one can be placed inside another).

Based on the ideas from schema image, *Hurtienne* (2009) designed different interfaces that he then made predictions about in terms of user. The findings from his experiments show both preference and performance being better for interfaces that map onto the schema than those that are inconsistent with them. He suggests that image schemas could be usefully employed as part of the language to describe conceptual models (cf. *Johnson and Henderson, 2012*) while also offering a way of showing how a cognitive linguistic theory of embodiment can be practically applied to interface design that is suggestive but also flexible.

6.6 THE NEXT TURN

I have described a number of turns that have taken place during the most recent period of HCI, and outlined some of the contemporary theories that have emerged. Many of these have been aligned with the third-wave HCI (*Harrison et al., 2011, 2007*). My intention, here, has been to focus on the theoretical developments that have spanned the history of HCI, their promise and impact. My three proposed epochs were shown to have parallels with the three main periods labeled in the history of Art: Classical, Modern and Contemporary. There is of course overlap with the way the three waves have been defined and distinguished in critiques and overviews of HCI; however, the three

terms used here offer further distinguishing features that are specific to the way theory has emerged, evolved and exited.

It is impossible to do justice to all the theories that have been promulgated and published in the burgeoning HCI literature. As I write, there are other theories beginning to make their mark, that some might consider warrant being labeled as another turn. For example, there is the beginnings of a “turn to space,” that includes schematic modeling frameworks, such as *proxemics* and *F-formations*, which conceptualise people’s everyday interactions with each other in physical space, using diagrammatic formats that lend themselves to doing some of the “the work” that designers need to do, especially as they broaden out to address design in terms of expanding technologies, environments and values. Both of these schematic frameworks were developed for analyzing social interactions and have been shown to be highly relevant to recent technology design concerns — such as people’s expectations and understanding of how an ecology of devices and displays should behave when embedded in the environment while also being part of their own set of personal devices. Proxemics, originally developed by the cultural anthropologist Edward Hall (1963), is concerned with how people interpret and use spatial relationships in their everyday lives with a focus on the use of space in interpersonal communication. Parallels are drawn when thinking about the design of device ecologies (Ballendat et al., 2010): just as people expect more engagement and intimacy when they move closer to others, so will they expect more interaction possibilities with the devices and displays they come into closer contact with. F-formations, originally developed by Adam Kendon (1990), is concerned with analyzing how the spatial organization and physical aspects of a setting influence interactions between people. In essence, they are the spatial patterns formed during face-to-face interactions between two or more people. Marshall et al. (2011b) showed how it can be applied to understanding how different kinds of technology-embedded/rich environments can constrain social interactions and how this can feed into the design of shared technologies, where the aim is to transform the social interactions.

Within art history, there are ongoing debates about where next; post post-modernism, post neo, and post contemporary and so on. The relentless striving for the new, coupled with an ever increasing self-awareness, suggests the new kids on the block will always want to create new movements, but the problem for them is what to call them (since all the “new” words have all but been exhausted) and how they will differ from previous ones (since there are fewer ideas and framings that have not been conceived of before). One suggestion is that the art world can go backwards as easily as forwards: “all of a sudden the mechanisms of previous novelties are called upon and pushed out to center stage, redressed” (Bradley, 2011). The same fate may fall upon HCI theory, too, where researchers continue wrestling with “out with the old/in with the new,” but the difference being, that each new generation of Young Turks has to fight within an increasingly crowded space. Retro theory might just become the old-new.