

Understanding Interaction Design Practices

Elizabeth Goodman

School of Information
University of California, Berkeley
Berkeley, CA 94720 USA
egoodman@ischool.berkeley.edu

Erik Stolterman

School of Informatics
and Computing
Indiana University, Bloomington
Bloomington, IN 47405 USA
estolter@indiana.edu

Ron Wakkary

School of Interactive Arts
and Technology
Simon Fraser University
Surrey, BC Canada V3T 0A3
rwakkary@sfu.ca

ABSTRACT

There is an undesirable gap between HCI research aimed at influencing interaction design practice and the practitioners in question. To close this gap, we advocate a theoretical and methodological focus on the day-to-day, lived experience of designers. To date, this type of theory-generative, experientially oriented research has focused on the users of technologies, not the designers. In contrast, we propose that HCI researchers turn their attention to producing theories of interaction design practice that resonate with practitioners themselves. In part one of this paper, we describe the mismatch between HCI research and interaction design practices. Then we present vignettes from an observational study of commercial design practice to illustrate the issues at hand. In part two, we discuss methodological and theoretical changes in research practice that might support the goal of integrating HCI research with interaction design practices. We then discuss current research methods and theories to identify changes that might enlarge our view on practice. In part three, we elaborate on our theoretically minded agenda and a kind of ideal-type theory.

Author Keywords

Interaction design, practice, theory

ACM Classification Keywords

H5.m [Miscellaneous]; K.4.3 [Organizational Impacts]

General Terms

Human Factors

INTRODUCTION

In many academic disciplines, one major research goal is influence on practice. The sharing of examples and theories of practice fuels education, research, and innovation in commercial activity. Indeed, human-computer interaction (HCI) researchers often describe HCI as an integration of academic practice and professional practices [3, 18, 32] – in

particular, the new profession of interaction design.

Interaction design – the specification of digital behaviors in response to human or machine stimuli – is a complex discipline. Ideally, interaction designers combine knowledge of technological possibilities of the platforms and systems in play, skilled aesthetic judgment, and empirically informed empathy with potential users [28, 36]. Interaction designers as practitioners work in many arenas of technology development, from universities and research labs to business product groups and small start-ups.

Multiple studies have suggested that many frameworks and theories proposed in HCI research (ie, [34, 43]) have not fulfilled creators' goals of influencing professional design practice. We propose this disconnection in part emerges from a persistent failure to adequately address the lived complexity of design practices. HCI's research commitment to systematic analysis of how people make use of technologies is well-known. Yet there has been much less attention paid to understanding the diversity of environments in which design takes place. This inattention, we propose, results from an assumption that the social worlds and epistemological beliefs of the imagined "users" of HCI theories and frameworks — in particular, professional interaction designers — are largely identical to those of the researchers producing them.

Interaction design, as a profession, has its own distinct professional associations, publications and conferences¹. If we as HCI researchers want to participate in this world, we will need to broaden our current research agenda. We cannot even assess the existence and nature of any gap without attending more closely to how professional designers actually work, and how they understand what constitute their competence, organizational, and professional roles. A broader research agenda could help HCI researchers understand and theorize what interaction design is, and present opportunities for HCI research to contribute to a broader range of practices.

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CHI 2011, May 7–12, 2011, Vancouver, BC, Canada.
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¹ For example, the Interaction Design Association (IXDA) association and annual conference, the interactive track of the South by Southwest (SXSW) conference, and the American Institute of Graphic Arts (AIGA).

In this paper, we contend there is a need to produce theories of designerly practice that are *resonant* with the everyday work of interaction designers. We believe that empirically grounded descriptions and critical analyses of design practice activities will offer frameworks for reflection on practices that designers can find useful. Such a research enterprise could then help create opportunities for HCI researchers to build longterm engagements with design practice that make sense to practitioners.

About this paper

The paper has three parts. In part one, we summarize two decades of publications that suggest a lack of synchronization between HCI research and interaction design practices. We then argue that many rational and scientific theories of design overlook the everyday practices of interaction design. We then move to three vignettes of everyday interaction design work to demonstrate how professionals negotiate research questions relevant to interaction design practice.

In part two, we discuss changes to the HCI research agenda that might better integrate HCI research and interaction design practices. We divide our discussion between methodological and theoretical concerns. We examine some current research methods and suggest how they could change to enlarge our views on practice. Moving to theoretical frameworks, we then draw out how some current theories suggest a kind of ideal-type theory.

In part three, we shift from the goal of researching interaction design practice to the aim of generating theories of practice. We elaborate the theoretically minded, practice-grounded agenda that we propose. We describe the opportunity for new theories to provide a language for discussing practice. Such a language would enable comparison of processes and projects, help support practitioners, influence the development of methods, tools and techniques for practice, and help evaluate the theories themselves.

We conclude with the notion that a research agenda for HCI practice oriented research would aim toward accounting for epistemological orientations, coherent principles that are open to critique and debate, and open methods to flexibility over prescriptions, and lastly but most importantly, mobilize theoretical ideas in a way that is accessible in practice and open to revision through practice.

DEFINING PRACTICE

The word “practice” has multiple meanings, and so we will clarify them before we continue.

The colloquial meaning of “practice,” as employed by both HCI researchers and professional interaction designers, often refers to professional design activities intended to create commercial products, as in articles such as “CHI and the Practitioner Dilemma” [1]. This definition of “practice” assumes a division between the interests and perspectives of university and corporate research and those of professional

practice. The social sciences, however, suggest more diverse notions of practice. This is particularly visible in research on professionalization [15, 19, 36].

Green recently argues for a definition of “professional practice” as four “senses” in which the concept can be understood and operationalized [15]. The first sense is when professional practice is seen as referring to the “practicing of a profession” as in ‘practicing medicine’, ‘practicing law’, etc. Secondly, the notion can refer to practicing professionalism, that is, it has a focus on what it means to be a professional, related to identity and position. Thirdly, it can refer to moral-ethical qualities of practice. Finally, professional practice can be opposed simply to amateur work. However, Green also argues that, in most definitions, regardless of “sense”, it all comes down to a study and understanding of three aspects, and those are the *activities*, *experiences*, and *contexts* of practice. Practice becomes the composite of what practitioners do, what they experience, and the context where this takes place.

How then to think about analyzing that composite? We draw on the rich and extensive tradition of “practice theory” here. Studies of design work have often focused on specific and fairly well defined activities, for instance, the processes of idea generation through sketching and brainstorming (i.e., [5]). In studying the social shaping of technology, Mackay and Gillespie [25] refer to this orientation as a *micro* view. Among other approaches it tends to a constructivist understanding of interactions and activities. Alternatively, they propose a *macro* orientation that examines phenomena from an ideological framing and is broader in its consideration of socio-economic factors. However, a practice-based perspective on design need not oppose *macro* and *micro* analyses.

Drawing on Kimbell’s application of practice theory in design [22], we can see interaction design practice as “carried by individuals” but constituted collectively. That is, looking at activities, experiences, and contexts requires that we look not just at individual minds and bodies, but also technical systems, organizational structures, tools, and knowledge [37]. Practice theory prompts us both to examine the embodied effort of designing technologies, using tools, and learning trades – but also how these activities are produced by and in turn sustain organizations, systems, and infrastructures.

HCI RESEARCH AND INTERACTION DESIGN

We are not alone in our concern that scholarly HCI research aimed at influencing professional design practitioners has fallen short of this goal; nor is this concern recent. Publications spanning the last two decades have identified various gaps between research — whether in universities or corporate laboratories — and non-research professional work. These publications have diagnosed three main problems. First, they have portrayed designers as relatively unaware of scholarly theories and methods [34]. One common complaint describes a lack of “knowledge

transfer” between the HCI research community and that of design work [16, 23, 34]. Second, they have described designers as knowledgeable but unlikely to apply those theories or methods because of time, cost, or labor constraints [16, 43, 47]. Third, they have examined differences in scholarly researchers’ and commercial practitioners’ perspectives on similar problems, such as designing a user interface [1, 35].

Notably, in 2004, Rogers identified a “gap between the demands of doing design and the way theory is conceptualized” based on a study of practitioners in the UK and US that analyzed recognition and use of then-common HCI theoretical frameworks [34]. Assessing the influence of theoretical perspectives intended to inform HCI design, she shows that design practitioners have not taken up the complex analytic frameworks produced for them by researchers. Instead, what has persisted is “the pervasive use of a handful of high level concepts,” such as “situatedness,” “context,” and “affordances.” “Ironically,” Rogers writes, “it appears that the analytic frameworks developed for use in HCI are not that accessible or easy to use.” She continues: “It would seem that quite a different frame of reference is needed – one which focuses more on the *process* of design and how the different kinds of designers, themselves, want to be supported.”

Another factor in the gap between HCI research and interaction design practices may lie in how some researchers define design complexity. Elsewhere, we have argued at length that HCI research mistakenly treats the complexities of design practice as a problem to be scientifically solved [43, 45]. In essence, many researchers assume that commercial designers can and should tackle the everyday experience of design complexity as they do — like scholarly scientists. This has led to a misapplication of scientific reasoning practices to design situations that in turn leads to results (methods, tools, and techniques) that design practitioners do not recognize as relevant.

In part, we believe that treating the complexities of different sorts of design practices as congruent to the work of scientists has rationalized away the need to closely examine actual design practice. And so it is no surprise that we have found so few rigorous, scholarly descriptions of the everyday work of interaction design, and even fewer of interaction designers’ own understandings of what they do.

One set of existing descriptions aims not to represent the fullness of design practice, but to motivate the development and refinement of methods, techniques, or tools to support specific design tasks. These studies approach designers as potential technology *users* [8, 9, 31, 35]. While potentially very helpful in creating and refining task-specific tools, the focus on interaction design practitioners as users radically limits our perspective on how interaction designers motivate their own actions, decisions, and processes.

Another set of experimental studies aimed at understanding the cognition of designers (notably, [6]) has resulted in

richly descriptive accounts of creative problem solving. Yet such studies often lack context by defining design situations as a well-bounded set of conversations internal to individual minds or within small teams. Ultimately, we believe that this focus on well-defined cognitive processes also crucially limits the analytic scope of the findings. We believe that this problem – of limiting one’s perspective on where and how design complexity comes into play – also helps disconnect HCI frameworks and interaction design practice.

These factors suggest some reasons behind the continuing complaints within HCI of a division between “practitioners” and researchers. Without a shared set of references, HCI researchers may treat the complexities of design practice as inherent to a mysterious “black art” [46]. Alternately, designers may view HCI researchers as overly oriented to an objectivism anchored in science. Science is only one of many cultural languages and lenses one could use to construct an understanding of design practice. Designers themselves simply may not share the values of objectivity, lack of bias, and a-cultural thinking held by scientists.

A growing body of research (within and without HCI) has begun to produce a more practice-based perspective on design. Drawing on their own practice and on observation of others, researchers have described design as resting on a form of knowledge that differs from conventional notions of science. In this approach, successful designers often in practice value reflexivity, interpretation, and “judgment” above intellectual objectivity [28, 41]. Phrases like the *reflective practitioner* [38], *thoughtful designer* [24] *designerly knowing* [6] *mindful learner* [20], and *ambiguity* [12] instantiate similar notions of a form of knowing specific to design. Design reasoning may be seen as improvisation or “artistry,” dealing with the particular, and only located “in action.” Given this emergence from situated reflection, theorists often describe design as an act of particularity and contingency [22, 28, 38] rather than an implementation of objective principles or universal methods.

Our agenda for dealing with the complexities of design draws from this reflective perspective, rather than from a notion of design as set of objectively graspable problems. Design practice complexity should be understood as the complexity a designer *experiences* in a particular design *context* [43]. In this view, design complexity emerges within activities of designing, experienced through acts of reflection, decision, and judgment. Therefore, the “eye” of the practicing designer(s) defines it. This definition also resonates with the three core aspects of practice that Green proposes (as mentioned earlier), that is, activity, experience, and context. Design complexity is *experiential*. It cannot be exclusively an attribute of function, form, or performance, nor of the design problem alone, without considering the activities of designing and the contexts of designers’ actions.

In summary, we locate the gap between HCI research and interaction design practice in researchers' distance from technology development practices that differ from their own. Design practice differs from scientific practice in valuing situated reflexivity and in locating complexity in experience. Some research tries to define and then solve the complexity of design practice through prescriptive frameworks. However, the complexity of design practice is emergent, experienced through reflection, judgment and practice in a manner that is synthetic and irreducible. A result of this distance is insufficient interest in and examination of the full complexity and richness of interaction design practice, and to even fewer attempts to theorize it. If we want a shared "frame of reference" between HCI theorizing and the practice of design, we will need more systematic and close attention to the experiences of the kind of practicing designers who are not already represented in HCI.

COMPLEXITY-IN-PRACTICE: STUDYING COMMERCIAL INTERACTION DESIGNERS

In this section, we provide a description and discussion of design practice that illustrates some of the ways that working designers grapple with complex questions of "good design." It draws on a six-month study of interaction designers in San Francisco's Bay Area.

The study included in-situ observation of three interaction design projects at two consulting companies, as well as interviews with eight designers outside the companies. The projects generally had one or more interaction designers, visual designers, and design researchers working alongside a project manager and perhaps (in consultancies) a client relationship manager, making a team of about three to five people. One project lasted six weeks; the other two lasted three months.

The participating consultancies were selected for recognized leadership in the interaction design professional community. They were also chosen as contrasts in organizational structure: a young, lightly staffed studio versus an older, larger firm. The interviewees were selected for individual breadth of technical experience as well as overall diversity of organizational location, including consultancies, start-ups, and in-house design teams. All had experience designing for computer-based applications (web and desktop software) as well as mobile applications. The majority of study participants were in the middle of their careers, with seven to 16 years of professional experience.

Many of the older designers had little formal training; they often described their first years as "learning on the job." Participants in their late 30s and 40s could often pinpoint a year in which they first used the phrase "interaction design" to describe what they did. Participants in their 20s and early 30s often had interaction design degrees, or had received early training through college internships. None attended — or wanted to attend — CHI or other ACM conferences, though one had an undergraduate degree in computer science. Their professional biographies echo the growth of

interaction design in the 1990s and the solidification of a professional identity independent of computer science through the establishment of university programs, professional associations, and specialized conferences.

Despite differences in job description and organizational location, participants defined their work similarly: they saw themselves *producing representations to guide what will or could be built*. These representations included: interaction frameworks, task flows, sitemaps, wireframes, paper prototypes, textual descriptions, technical requirements, and product specification documents.

Participants typically differentiated themselves both from the visual designers who craft the "look and feel" of interfaces and deal with questions of emotionality and brand identity — and from the "devs" — the programmers and engineers who build applications and services. Many designers saw user research as a part of their job, but not the heart of it. The two types of work might take place in two project phases, or rely on different team members.

In both consultancies and corporations, interaction design is organizationally separated from software and hardware implementation. Designers often have to think like translators in creating representations accessible to people from different educational and professional backgrounds. However, the politics of translating those representations into functional products and services means successful designers do much more than make wireframes or write specifications. They "manage client expectations" through rounds of meetings, "get buy-in" from stakeholders on design decisions, negotiate technical decisions with developers, then "socialize" their deliverables by presenting them to relevant decision-makers.

Accounts of practice: understanding interaction design

What do practitioners themselves value in interaction design? In other words, how do they formally or informally validate practice; what language and terms come into play when considering "good and bad practice"; or how, within a design situation, do appraisals arise for "who is a good or bad designer"? The questions or learned lessons of interaction design deeply inform these kinds of everyday judgments. And understanding them is important if HCI researchers want to support designers' own aims for their work. In this section, we describe how these sorts of questions arise and get answered during the course of project work. We hope here to illustrate the importance of the workaday conversations and decision-making that currently rarely appear in HCI research.

Account One: Shortcut — optimal versus realistic

We begin at a workshop intended to prioritize features for a mobile rail ticket booking application. The project lead has scheduled an hour for her clients to place 50 post-it notes, each with a short description of a piece of functionality, on a whiteboard. The designers will use discussion about the positioning of the post-it notes to establish client priorities.

As the clients place post-its, the project leader leaves them to talk to the researcher. Unasked, she quietly explains the logic behind this exercise. For her, there is an “optimal way of doing things” and a “realistic” way. She would prefer to have the clients “sorting [potential features] by business and user priorities separately,” and then sorting by technical feasibility. Instead, pressed for time by her clients’ tight travel schedule, she took a “shortcut.” This is, she points out, not the first shortcut she has had to take on this project:

Project leader: Sometimes you have to take some shortcuts just because it’s hard not to.

Researcher: Why?

Project leader: Because of time constraints. But it doesn’t get all the information we ideally could have gotten if everyone sat down and discussed it together.

Ten minutes later, the prioritization exercise is complete. The project lead will use its results to generate a feature set for the application – which they hope will have thousands of users within three months.

Account two: A choice between two kinds of good design
A designer is discussing a weekly client “check-in”:

Designer: I brought two options to the table – one that’s more simple but utilitarian and one that we’ve been talking about. We wanted to show both to the client and get their reactions but the less utilitarian one might be a little more interesting and playful in the end.

Researcher: And that’s good?

Designer: Yeah, that’s <pauses> good. [...] I mean, I was erring on the very usable simple side but there’s some question about whether that’s the most appropriate thing.

Researcher: Why?

Designer: Just I mean I guess it has a little bit to do with the hooks and just kind of making this not feel like it’s work.

The “hooks” are the pleasurable and entertaining experiences that the project lead wants to induce at various points in the mobile rail ticket booking application. The lead is concerned, as the designer suggests, that the application will “feel like it’s work” and not be enjoyable enough for users (likely be on vacation) to want to use.

Account three: Defining project-wide success

The team is sitting at a conference table. It is the second week of what will be a 12-week project. The lead designer has scheduled this meeting to answer a question raised by a colleague: “how do you measure success?” When asked, the lead designer realized that the team had never discussed metrics for evaluating the project. “Well,” he begins, “besides making the client happy, which we’re all assuming is a goal.” As the other team members talk, he summarizes their points on the whiteboard: “makes client happy”; “having a solid point of view”; “looks hot”; “something they [the client] use.” That last point prompts this exchange:

Lead designer: This could be a stepping-stone to lots of other projects. That could be a shared goal as well. This is a project to get more projects.

Project manager: It’s potentially about future work, additional work.

Lead designer: [to the team’s user researcher] You seem excited about this.

User researcher: That should be the measure of success of all projects.

Language and levels of practice

In *account one* it was so important for the designer to tell the researcher about how this workshop differed from the *ideal* method that she voluntarily stopped interacting with her clients. “Optimal” and “realistic” seem like objective concepts, but they actually refer to situational, negotiated judgments within the context of the project. What’s optimal for one schedule may be more realistic for another. Thus, the shortcut draws on professional judgment about the importance of having a face-to-face negotiation with clients. To someone who does not share the lead’s concern for satisfying client priorities while keeping the project on schedule, the rationale for her shortcut will be hard to see.

Where the designer in *account one* used precise, seemingly objective language to describe her situational tradeoffs, the designer in *account two* points to concepts that are tangibly present to him, but lacks precise language to explain them. In other words, he describes the relative qualities of the two options (“utilitarian” versus “interesting and playful”). But when it comes time to explaining what characteristics make one design more appropriate than another, he fumbles for words and uses an internal team metaphor – the “hooks.” Of course, the actual disposition of the project – whether it takes the more utilitarian or the more playful direction – is not up to the designer. With the support of his team lead, he has presented two options to the clients to choose between.

The research orientation of the two accounts discussed above involves analyzing *what* designers make and *how* designers make within the day-to-day, lived experience of practice. *Account three* illustrates how factors beyond the daily activities of making things impinge on the problem-solving processes of design – thus interweaving what have been called *macro* factors. There, three people in different roles – interaction design, user research, and project management – agree that one of the main ways to evaluate the project’s success is whether it wins the company more work. That is – the success of the project may not lie exclusively in what is designed but also in the organizational relationships forged by the design process.

Though formal evaluation and explicit theorizing were not often present in the design practices we studied, assessments occur regularly throughout the process of designing. Those assessments rest on *implicit theories of good design*. And theories, whether partially formed, ill informed or individually held, are always in operation. The question for HCI researchers is therefore not of generously

providing theories to people with none. Instead, it is of how to study the work of interaction designers in order to inform both design practice and HCI research by making designers' existing theorizing external and visible.

Making design practice an object of HCI research along with technology use will help create explicit theorizing. It can help make accessible new forms of design evaluation or it can help articulate and demystify approaches like critiques or socio-economic factors. We do not mean theories that prescribe rigid guidelines of quality. Rather, we mean theories that would acknowledge the inseparable interpretive aspects of evaluation, which in large part rely on experiences and judgments of designers. Theories of practice would help lay the groundwork for interpretation by addressing the need for mutual intelligibility of language, terms and concepts that are the materials of debate in asking questions of quality.

RESEARCHING PRACTICE: EXTENDING HCI RESEARCH METHODS AND THEORIES

In this section, we look to current methods of research and theories related to practice and how we can extend and improve upon them.

Extending the methodology toolkit

Studying practice, especially professional practice, is not a straightforward endeavor; its complexity suits a range of approaches and methods. The methods we discuss are not entirely new to HCI – indeed, some are quite familiar. Our aim is to argue that these methods should be applied not just to study *user* experiences of technology but also interaction designers' experience of their own work. We are convinced that experiential approaches to user experience could and should be applied to the study of design practice.

We are not advocating any particular method. Instead we believe that interaction design practice as a new form of professional practice needs to a diverse set of research methods, each bringing complementary aspects and perspectives to an overall understanding.

Earlier, we cited Rogers's identification of a "gap between the demands of doing design and the way theory is conceptualised" based on a *survey* of practitioners in the UK and US [34]. Vredenburg et al published a similar study based on surveys that examined user-centered design and professional practice [47]. *Mixed method surveys* provide an empirical and quantitative picture of the state of the field of design practice, and as a method it holds clear credibility within the HCI community.

In our study of interaction design consultancies reported in this paper, we utilized *participant observation*. In-situ data collection similar to our own study is a mainstay approach to understanding the fullness of practice. It is a well-accepted method within HCI based on the contributions of CSCW and workplace studies (such as [8]) and so holds similar credibility within the community as mixed-methods surveys. Moreover, it can push the researcher to confront issues of belonging and expertise: to what extent can the

researcher present himself or herself as a member of the design group being studied?

These two approaches can lead to significant findings on interaction design practices. However, we also advocate for an expansion to HCI's more usual methodological toolkit to include reported practice, anecdotal descriptions, and first-person research.

Reported practice

Reporting on practices by interviewing designers is a long-standing approach in the wider design fields. More recently, HCI and interaction design research venues have accepted it. For example, in an informal set of interviews [43], the authors observed how students used theories, methods, and instruments as tools for design. Additionally, Zimmerman et al based an analysis of research through design on interviews with a dozen HCI design researchers [48].

Anecdotes, stories, and cases

In some respects, descriptions of authors' design processes through descriptive anecdotes, stories or slightly more formal case studies have together contributed the most to giving insights into design practice in HCI. A good example is Gaver et al's account of the design of the *Prayer Companion*, an electronic resource for a group of cloistered nuns [13]. In another example, Wolf et al provide an account of their design of *Rendezvous*, a conferencing application as an illustration for how designers can communicate their "intellectual rigor to the CHI community" [46].

First-person research

This approach aims at an intentional accounting of practice that situates the designer reflexively as both the primary informant and researcher. For example, Wakkary provides a description and analysis of his own interaction design project *ec(h)o*, a tangible audio museum guide, as a way to explain design complexity [45]. Similarly, Gaver's first-person account of the design of *Video Window*, a video screen in his bedroom showing the skyline from outside his window, allowed the author through simultaneously living with and continually designing the system to analyze the intermingling aesthetic, utilitarian, and design issues of both creating and experiencing the system [13].

The approaches we suggest are by no means comprehensive. They are nascent in their evolution and use within HCI research. As part of the agenda to expand the repertoire of methods, we suggest some changes. *Reported practice*, as a method, raises questions about the status of the interview participants as experts. Should these designers remain anonymous, as is typical in user studies (i.e., [48]), or does identifying individual participants provide provenance and context for the data? Both are issues that affect credibility of the data. In *anecdotes, stories, and cases* how do we move from unintentional descriptions of practice to intentional and purposeful explanations that provide insights into research matters, as in the discussion Gaver et al provide with the *Prayer Companion*? And do

designers themselves gain credibility to science-oriented audiences through a reflective, self-critical first-person account? This is a critical concern for first-person research.

However, research on design practice can draw from existing traditions of first-person qualitative research such as anthropology and phenomenology. Specifically, they can use techniques of *bracketing* or *epoche* [29] to make explicit the researcher's perceptions and expectations *prior* to commencing the research with the expectation of comparing these assumptions to the later findings. Researchers can explicitly consider how and why their perspective on the world is situated, embodied, and partial — not a “view from nowhere” but part of “working relations” that enable them to conduct and publish research [44].

Our discussion has centered on data collection methods, yet these methods bring with them researcher commitments aimed to ensure the integrity of the data and analysis, and to maximize the potential for translation of the findings to other similar situations of design practice. For example, participant observation commits to expressing the observations and findings in the informant's or studied group's *own language*. In many respects, this commitment to representing research participants on their own terms underlies all the methods we discussed, with the exception of the quantitative aspects of mixed methods survey.

Theorizing interaction design practices

We advocate for increased research into the practices of interaction design with the benefit of *explicit theorizing of the findings*. Research that leads to theory will help interaction design share a common intellectual foundation with HCI research and vice versa. Such theoretical foundations would make it possible for researchers to compare and contrast their findings. A theoretical foundation is by no means a monolithic solution. Instead we look forward to developing a shared “language” or frame of reference that would enable researchers to accept and/or advocate ongoing critical reflection and rethinking of foundational assumptions about design practice.

We have argued that there has been little theorizing of interaction design practices within HCI. However, it is important to remember that design fields, including interaction design, have often resisted the type of abstractions and formalizations that constitute theories. An earlier relationship to craft still heavily influences design practice [33]. Within the craft tradition, explicit theorizing about practice is not common or valued. The craft tradition treats hands-on, everyday practice as something that can only be understood by doing it, by being a practitioner [33].

We have also argued that the lack of theory generated from within interaction design practice leaves HCI's relationship to practice vulnerable. Without a set of frameworks against which to position their own contributions, scholarly research can easily assume an objectivity-oriented perspective we earlier described as ill suited to designers more focused on critical judgment and reflection. So what

types of theories are better suited for interaction design practice? In this section we look at recent theories now largely used in HCI to examine the experiences of people with new technologies. While not fully serving the needs of a theory for interaction design practice, they are critical antecedents.

Activity theory, a theory of situated development and consciousness of the user, relates strongly to technology and informs design situations, its structures, and relationships. Though it does not provide a theory of practice, it can help us imagine a theory of interaction design practice. Kaptelinin and Nardi's *Acting with Technology* [21] is a good example of theory that aims to be descriptive, explanatory, and generative. Kaptelinin and Nardi discuss activity theory as a basis for revisionary critique of HCI. In it, they see the descriptive capacity to provide a new set of key concepts and definitions, and the explanatory capacity to redefine relationships and processes within HCI. They draw on Ben Shneiderman's notion [42] that generative theories facilitate creativity, invention, and discovery. Activity theory is generative in a theoretical sense in that it creates ongoing conceptual development within HCI. We see the need for theories of equal ambition that describe, explain, and ultimately generate ideas and actions of design practice that resonate with the activities of designers.

McCarthy and Wright's *Technology as Experience* [27], while also not a theory of interaction design, provides a pragmatist notion of generative theories that is potentially translatable to design practice. McCarthy and Wright's theory of user experience revises HCI theory by drawing on the pragmatist ideas of Dewey and the linguistics of novelist Mikhail Bakhtin. McCarthy and Wright re-theorize the notion of user experience to include the emotional, intellectual, and sensual aspects of interactions with technology, arguing in the pragmatist sense that we *live with* technology rather than simply use it. From a pragmatist viewpoint, theory is by definition generative. It is a systematic inquiry for imagining a possible future. For a pragmatist, theorizing is a necessary and practical consequence of living or approaching one's life such that theory changes one's world rather than represents it. McCarthy and Wright discuss how Dewey's criticism of scientific theory as retrospective, concerned with describing and explaining the world as it is, rather than prospective, concerned with how the world might become. The authors argue that their generative view is “valued not so much for whether it provides a true or false representation of the world as for whether it helps us think through relationships between for example, people, technology, and design.” We believe that a similar approach to the specifics of design practice — instead of user experience — might be highly valuable.

Participatory design (PD) is perhaps the best example of a generative theory that attempts to take on design in its fullness, including everyday practice. Participatory design

emerged from socio-technical concerns regarding the design and use of information systems in organizations [10, 17, 40]. Ehn's vision for technology development emphasizes embodied knowledge, mutual learning, and the active roles of different groups [10]. The basis of Ehn's notion of participation is a shared understanding of the design needs between designers and skilled workers. In order to create something new, designers must bridge the different languages, tacit knowledge, and past experiences that lie between them and stakeholders. Ehn phrased this as "the dialectics of tradition and transcendence – that is what design is all about."

Participatory design offers a set of theoretical tools for the practice of design and for the generation of design actions and outcomes. PD stands out as a relatively coherent and effective theory about and for design practice. Ehn in particular provides a theoretical context for PD based on Heidegger, Wittgenstein and Marx that offers a rationale and basis for further elaboration on techniques and principles incorporated into information systems design. The principles afford an articulation of techniques and goals for participatory design that mobilize the theory into a form serviceable in design practice – a *rationality resonance* between theory and practice [43]. PD focuses on the relationship between designers and end-users, devoting a large degree of its efforts on articulating how designers interact with end-users. It does not revise core concepts in how design occurs; rather it critiques scientific accounts of the user by offering a design perspective *from* users. It falls short of offering a mode of validation or self-reflection — ultimately the mechanism to critique and evolve theories. In consequence, it articulates little about the communication of PD research outcomes and PD's interactions with other disciplines. Yet it is a powerful precursor to thinking about practice in interaction design.

THEORIES OF PRACTICE?

Throughout this paper we have argued that research *into* interaction design practices can increase the practical relevance of HCI frameworks in general and lead to theorizing of interaction design practices. It will never be possible or desirable to establish an ideal, complete theory of interaction design practice. Nor is there agreement on what that would be like. Instead, the purpose of this section is to start the discussion about what would characterize a well-grounded and useful theory of practice.

To begin, we have drawn from previous theories the need for a theory to be descriptive, explanatory, generative and reflexive. If theorizing practice produces a unique type of theory, than the measures of success would differ as well. Theories for practice usually aim to be generative. In HCI research, theories often result in, or at least try to influence, changes in design practice and outcomes. However, this is hard to measure. Any form of validation would inevitably be interpretive and results would only be possible to measure over very long periods. Therefore, to detect, capture, and measure direct and immediate consequences of

a new theory seems highly improbable. An ideal theory could however result in greater awareness of the utmost complexity and richness of design practice as a human endeavor. Therefore, the first measure of success for theorizing practice should *not* be changed practice. Rather, it should be a combination of goals: the degree to which design researchers can articulate and publish research on design practice, and the degree to which theoretical descriptions make design practice more accessible to interdisciplinary research, to critical and emancipatory examinations, to comparison and contrasting with other practices, and to professional reflection. Overall, we argue for the criteria of *rationality resonance* [43], in which theories are grounded and recognizable from the perspective within practice. Initially we propose:

Descriptive: We see descriptions of practice as the origin of theorizing practice. The aim is to provide legitimate, rich accounts of practice from which to begin developing a common language and identifying mutually intelligible areas of interests and needs. Accurate descriptions of practice benefit both core and broadly interdisciplinary researchers/practitioners whose interest is in design. We encourage active acknowledgement that practice is multi-leveled and can be understood along a constructivist to ideological continuum or *micro* to *macro* scale.

Explanatory: Drawing from the preceding discussion, an ideal theory for interaction design should establish critical concepts, principles and definitions. It should also provide an explanation of the relationships, actions, actors, and processes within interaction design. This form of theory enables deeper analytical work. Analytical rigor based in evidentiary reasoning is a necessary criterion. Explanatory research helps close the gap between HCI research and interaction design practice by strengthening clear, analogous, and like concepts, as well as establishing new knowledge as credible across the communities.

Generative: Coherent principles drawn from explanatory or descriptive approaches may guide the development of research methods, design methods, and evaluation methods. This creates flexibility and experimentation in methods that avoid the prescriptive approaches of the past. The philosophical difference in a generative form is that theorizing is a necessary and practical consequence of practice and focuses on how practitioners can shape the world through practice. A generative theory leads to an understanding of future possibilities or inventions in interaction design and guides us in determining the value of each possibility. The forward orientation is best suited for design and would move HCI theorizing away from exclusive reliance on retrospective accounts of interaction phenomena – a key benefit for the purpose of bridging HCI research and interaction design practice cultures.

Critical/reflexive: Make explicit and open to question epistemological orientations within the theorizing. An underlying philosophical grounding appropriate to design

will guide the development of core concepts and defining principles. However, these concepts and principles need to constantly be open to critique and revisions. In addition, a reflexive theory grounded in practice will help mobilize theoretical ideas and actions in a way that is accessible in practice and open to revision through practice.

It is important to underline the interactions between the forms of theorizing in order to address practice. It will be more likely that theories of practice will be inclusive of all forms rather than separate theories with different approaches.

CONCLUSION

In this paper, we have argued that HCI lacks research and theorizing about interaction design practice. In response, we propose more frequent and more intensive studies of interaction design practice, development of theories of interaction design practice, and validation of new theories based on how well they resonate with existing practices.

We examined existing potential theories, and illustrated the intricacy and complexity of practice in three vignettes. We discussed the requirements from a methodological and theoretical point of view for the field to improve when it comes to understanding practice. We concluded by reflecting on the requirements for an “ideal” theory of interaction design practice.

In conclusion, we want to clarify what we see as the straightforward argument that this paper as its overall contribution: that a solid understanding of existing practice must ground research aimed at supporting interaction design practice. HCI research on users offers a clear counterpart that must be matched theoretically, otherwise interaction design practice will continue to be eclipsed and under-theorized. Underlying the theoretical depth of much HCI research is a shared epistemological grounding in science and empirical study. With agreement on core concepts, the concepts are open to revisions and subject to vigorous and critical debate that grows the field intellectually. This strength in focus and epistemology creates coherence around principles that in turn allow for flexibility and experimentation with methods of research, validation, and the means to verify claims. Further, HCI research has mobilized a theoretical understanding through communication and flexibility of methods. In many respects, interaction design practice research needs to match this standard in its own theory-making about its practice. An “ideal” theory can never exist – but our hope is that in raising an initial set of criteria, we can move closer to a theorizing that is useful to its potential constituencies: researchers and designers.

ACKNOWLEDGMENTS

Research contributing to this paper was funded by a National Foundation Graduate Fellowship and an Intel Corporation PhD Fellowship.

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