Sarah Berry-Flint
May, 2002.

The Politics of Interaction Design: Globalization, Cognition, and Culture

Introduction

In recent decades, computers, software, and interactive devices have become increasingly global commodities. While the local appropriation of alien conventions and technology has long been the hallmark of globalization, Langdon Winner's "theory of technological politics" suggests that the specific forms technology takes can establish significant constraints on human behavior, indicating that such cultural transfers have real political implications. When word processing was introduced to Japan, for example, the Western typewriter was used as a model, even though this required a complete transformation in the formatting and directionality of Japanese writing (Ito and Nakakoji 1996, 106). As Winner points out, once design conventions are established for a genre of technology it's very hard to change them and their social implications:

> In the process by which structuring decisions are made, different people are differently situated and possess unequal degrees of power as well as unequal levels of awareness (Winner 1999, 32).

The social barriers created by technology design can act as long-term gatekeepers to power. For example, Rachel Weber has shown that U.S. military engineers design airplane cockpits with "a bias against women's bodies" by building them to accommodate male anthropometrics, a practice common in commercial aviation and automobile design until very recently. She suggests that these design constraints have a direct effect on women's upward mobility in the field of aviation (Weber 1999, 372).

The design of interactive technologies by large multinational corporations for an increasingly international market may be inevitable given the economies of scale involved, and this makes interaction design a distinctly political activity because of the way such technologies encourage or constrain certain kinds of behavior. This paper will argue that the dominant modes of user research in the field of Human-Computer Interaction (HCI) are methodologically biased against the recognition of cultural specificity, and thus committed to promoting design practices that cannot respect and accommodate culturally situated users. My criticisms are of the way that cognitive science is used to develop laboratory-based "user models" that are often validated as more scientific and knowledge-producing than research involving situated users in real-world contexts. These criticism are far from new, and the field of HCI has long included a minority committed to more qualitative and contextual research methods (Bannon and Bødker 1991, Nardi 1996, Landauer 1991). I will touch on some of the ways that more contextual and empirical approaches to HCI address the issue of cultural diversity and technology use, such as activity theory.[1]

But I also want to suggest that the primary goal of much HCI research, which is to find generalizable rules and metrics for the use of interactive media, has a precedent in the field of communication studies. While much work in that field still bears the mark of early behaviorist attempts to directly measure the communication of meaning, the

[1] The process called "internationalization," or the retro-fitting of an already-designed computer technology for a non-domestic market, is primarily a process of "translating" the semantics of an interface such as character set, date and currency formats, color, icons, etc. (Fernandes 1995). These superficial adjustments take no account of overall user expectations, needs, and context, making errors and frustration highly likely. Internationalization often results in a paint-by-numbers modification that is relatively useless for complex interaction design.

limitations of positivist "effects" research has been increasingly addressed by interpretive cultural studies of media reception. These studies combine aspects of social science empiricism and critical social theory to produce qualitative data indicating, for example, the degree to which cultural factors contribute to widely variant interpretations of specific television programs (Morley 1980, Ang 1985). I will suggest that even the situated-user research of "soft" HCI may not capture the breadth of cultural and historical factors that affect technology use because they are often looking for "commonalities across situations" in order to develop broad, comparative analyses with generalizable results (Nardi 1996, 70). Situated HCI admirably challenges the universalities of lab-based cognitivism along the lines of cultural psychology, which argues that,

> …given the complexities of human life and the importance of culture as a behavioral determinant it obviously behooves psychologists to test the cross-cultural generality of their principles… the scientific study of human behavior requires that they employ a cross-cultural perspective" (Segall et al 1990, 37 cited in Cole 1996, 2).

But what if some of the most relevant factors about the way people interact with technology in a given context are not easily categorized into broader "scientific principles"? Perhaps analyses of culturally-situated technology use should be more akin to history than science; in other words, a research methodology that produces insights into a particular cultural, behavioral, and political situation, but not necessarily generalizable principles or rules.

HCI and the New Media Marketplace

Since the field's inception, most HCI research has focused on helping to produce laboratory-based experiments to evaluate the usability of computer interfaces (Nardi 1996, 95). HCI's dominant cognitive methodologies have so far not only tended to define

"the user" in fairly limited terms, they have also inhibited the development of theories and strategies that might better address the need for culturally specific design strategies. Like military ergonomics, cognitivism takes a "one size fits all" approach to interaction design. As an early critique of laboratory-based cognitive psychology in HCI described,

> …these studies tend to analyze individuals without reference to their community, or their history, performing on a task designed by the experimenter in an unfamiliar environment. The "problem" is defined and valued by the experimenter, not by the subject, who is then expected to perform in certain ways. In some experimental manipulations, even the very nature of the task, or the required behavior, may not be clear to the subject…Performance is measured relative to a certain "ideal," rational model of problem solving, and the deviations of subjects from this abstract logic are noted (Bannon and Bødker 1991, 230).

Cultural psychologist Michael Cole documents the ways such "abstract logic" has been applied across vastly different cultures in the developing world, producing conclusions about local intelligence and learning abilities in contexts that bear no relation to cultural practices (Cole 1996). In spite of such criticisms, the use of cognitive science to design effective computer interaction is still considered the "Holy Grail" of HCI by many, although even its proponents admit that its successes have been limited to evaluating "microinteraction" such as users' short-term memory use and operation speed during routine processes (Sutcliffe 2002, 3; Dix et al 1998, 234). Cognitive metrics such as the GOMS approach ("goals, operators, and methods"), which have also influenced software usability testing, are extremely difficult to apply to complex visual interfaces such as multimedia software or interactive environments like an airplane cockpit, which offer the user many choices and modes of interaction (Sutcliffe 2002, 5). In other words, the cognitive view of the mind as a data and symbol processor lends itself not only to universalized definitions of user behavior, but also to the evaluation of narrowly defined,

repetitive tasks, since cognitivism cannot account for higher-level psychological processes, which are culturally and historically mediated (Cole 1996, 98).

Although cognitive HCI is a complex body of work that cannot, in fairness, be reduced to a single set of research goals, in many instances it bears a resemblance to the work of the 19th century biomechanical efficiency expert Frederick Taylor. Taylor saw the body as a kind of machine that could be maximized for work, while cognitive science represents "the mechanization of the mind" (the title of Jean-Pierre Dupuy's history of cognitivism). Both systems aim to understand humans' innate abilities and limitations in order to make their use of technology more effective. Cognitive psychology was a reaction against behaviorism and an attempt to return to individuals the power of reason rather than simply reaction, but Michael Cole argues that in cognitive psychology, "The dominant methodologies remained well within the framework of methodological behaviorism; what changed was the complexity of the transformations attributed to the structures mediating the interval between input and output" (Cole 1996, 99). Instead of Pavlov's programmable dog we now have a model of the mind as a pre-programmed data processor.

But cognitive science has also been fraught with internal disputes because of the significant gap it attempts to bridge between the physical mechanics of the brain and the higher functions that negotiate meaning. The theoretical roots of cognitive science are, according to Jean-Pierre Dupuy, in early cybernetics of the 1950s, which conceptualized the mind as a computing machine even before the idea of artificial intelligence existed (Dupuy 2000, 5). But early cybernetics did not concern itself with meaning or subjectivity at all – these were introduced by cognitivists who argued that conscious

reasoning processes are, in fact, the result of preconscious physical ones (Dupuy 2000, 12). As George Lakoff and Mark Johnson put it, "Any reasoning you do using a concept requires that the neural structures of the brain carry out that reasoning. Accordingly, the architecture of your brain's neural networks determines what concepts you have and hence the kind of reasoning you can do" (Lakoff and Johnson, 1999, 16). The use of a computational model of the mind is clearly linked to the search for useful models of artificial intelligence, and Douglas Noble has suggested that cognitive psychology was developed because the U.S. military wanted to explore artificial intelligence but had no useful model of human thought and learning to base that work on (Noble 1989). Similarly, much HCI research tends to reflect the R&D needs of both industry and the military.

New theories of "distributed cognition," for example, try to address some of the criticisms of laboratory-based cognitive theory by looking at how people working together can augment each other's cognitive processes. This model expands the boundaries of cognition from the individual mind to a system that includes interacting people and the tools they use to work together – the individual "cognitive system" is replaced by the "functional system" (Nardi 1996, 77). Studies have been done of how cognitive tasks are distributed in the context of ship navigation, airline cockpit crews, and air traffic controllers (Hutchins 1995, Hutchins and Klausen 1996, Halverson, 1995, cited in Hollan et al 2002, 83). But even as it recognizes that cognition cannot be separated from context and culture, distributed cognition reduces culture to a set of "partial solutions to frequently encountered problems" within a very narrow framework of activity (Hollan et al 2002, 78). The focus is on a particular system of teamwork, and

culture is a set of factors and tools that may affect it. As Bonnie Nardi notes, it is very similar to classic systems theory in that it looks for structures and sees people and things as "conceptually equivalent: people and artifacts are 'agents' in a system." She concludes that, "This is similar to traditional cognitive science , except that the scope of the system has been widened…"(Nardi 1996, 86-87). In practice, it simply extends the scope of Tayloristic efficiency metrics from the individual to the team, since one of its main accomplishments has been to generate data on "patterns of work practices in varying areas" (Nardi 1996, 89).

In addition to workplace and military needs, another primary emphasis of much HCI research is the behavior of the user as a consumer. In a recent article a group of participatory design researchers illustrated the increasing tendency of the field to cater to media industries. They describe, with some disillusionment, a major HCI conference at which the director of research for Time Warner Entertainment concluded the closing plenary by offering the HCI community the lofty challenge of designing a remote control that could efficiently browse through 500 TV channels (Arias et al 2002, 350). Instead, they suggest that:

> The challenge to the HCI community is to move beyond an emphasis on interaction that is solely focused on information access to one that supports informed participation. This rests on the premise that one of the major roles for computational media is not merely to deliver existing and predigested information to individuals but to provide the opportunity and resources for design activities embedded in social debates and discussions in which all people can chose to act as designers rather than being confined to consumer roles (Arias et al 2002, 351).

But current HCI methodologies do not look beyond limited user definitions and tasks to inquire about the sort of "social debates and discussions" that might be relevant to new

technology use. Such information is not only considered irrelevant for the most part, it also has little value in the marketplace for user research.

"Hard" and "Soft" HCI

The emphasis in HCI on technology users as workers or consumers is symptomatic of a more structural issue within the field about what constitutes useful knowledge. As I have noted, much HCI research tends to investigate cognition and basic processes of understanding media in a laboratory or "value-free" context. This "desocialization," as Steve Woolgar has called it, of human thought processes is problematic on both theoretical and practical levels (Woolgar 1987, 324). Before the 1970s, human factors research (the main predecessor to HCI) was concerned with testing existing technology systems to determine how best to train expert users. The microcomputer, however, introduced the problem of the non-expert user, initiating the first tentative steps toward user-centered rather than system-centered design (Norman and Draper 1986). The result, Robert Johnson argues, has been an ongoing split between "hard science" and "soft science" approaches to HCI. Hard science proponents value information about the user only insofar as it helps them "understand the scientific principles underlying cognitive processes and how these universal processes can help drive the design of computer systems" (Johnson 1998, 77). Soft science researchers, on the other hand, "focus their research on the problems associated with the psychology of everyday activities: activities that may or may not have any rational, logical, or consistently verifiable processes" (Johnson 1998, 77).

The hard science approach thus values knowledge that can be experimentally verified, used to predict behavior, and incorporated into a system of mathematical logic.

The extent to which this approach de-values other forms of knowledge can be seen in a recent textbook on HCI. The author of the first chapter, Alistair Sutcliffe, supports a distinction among: "1) craft practice with no generalization of knowledge; 2) scientific disciplines that generate new knowledge, and 3) engineering disciplines that systematically apply scientific knowledge in design practice" (2002, 3). Although Sutcliffe dismisses "craft-level experience" as a practice that generates no knowledge he advocates "bringing psychology and other sciences such as sociology to bear upon design" (2002, 3). He argues that these sciences can help produce "reusable interactive artifacts" that are not limited to the specific design task or use scenario that originally produced them. This model of reusable, modular elements is similar to that of object-oriented programming, and he points out that the goal of "reuse" has been taken up primarily in software engineering (2002, 4). Thus, in spite of his stated goal of incorporating psychological and sociological information about the user in the design process, these "sciences" are valued only insofar as they can produce "generic task models" (2002, 4) that will predict behavior across a wide variety of contexts and be used in a design process that is, in fact, modeled on system engineering rather than user-centered design.

As Sutcliffe's approach demonstrates, the incorporation of sociology into HCI has not rescued the field from its origins in system-centered design. Back in 1987 Steve Woolgar predicted this when he argued that sociological critiques of cognitivism did not go far enough in questioning the way knowledge about human behavior could be defined:

> Instead of facing the critical issue of whether or not human behavior can be codified (formalized, reduced to a series of rules such as instructions or to an algorithm) *at all*, critics of cognitivism have pursued the narrower path of debating which kind of codification is the more appropriate… Recent sociological

> critiques of cognitivism pose a strong challenge to theories that conceive of human behavior in terms of its determination by mental states. Although this is to be welcomed…these sociologists' alternative vision of human behavior depends heavily on the same ideology of representation that sustains cognitivism. [They] display the same affinities for producing definitive descriptions of behavior, albeit under a social rather than a cognitive rubric…The battle over whether these descriptions should use the language of mentalism or of sociology may be less important than their common dependence on representative ideology (1987, 325-26).

This ideology that human behavior must be reducible to "desocialized" concepts and rules (Woolgar1987, 324) reflects not only the economic imperative to create design rules that can be recycled with no additional research or testing, but also a more basic desire to isolate people's behavior from the messiness of their specific social, cultural, and political contexts.

As the cultural psychologist Michael Cole has suggested, psychology has become split between a cognitivism concerned with the neurobiology of basic mental functions and a "second psychology" describing higher mental functions that are formed by culture and differ from one society to another (1996, xii). Cole supports the call for a more humanistic approach to psychology, an "interpretive turn" that would undo "a century of mischief engendered by runaway positivism (1996, 100). In the context of HCI, however, there has been limited progress toward a broader framework of knowledge. Bonnie Nardi has surveyed three primary approaches to studying cultural context in HCI, which are activity theory, situated action models, and distributed cognition. I have already touched on the limitations of distributed cognition, but her comments on the other two approaches are also worth noting. Situated action research is an interesting but extremely limited process of observing (via videotape) the behavior of people in a particular setting or framework. This might be a supermarket, a computer workstation or any framework of

activity. There is no attempt to record the subject's thought process through interviews or a running account of what they are trying to do. Only the actual behavior is recorded and analyzed. The theory behind this is the converse of cognitivist arguments that behavior results from some sort of reasoning process. Instead, situated action argues that behavior has little to do with conscious decision making, but is a constantly improvised response to the environment. Nardi notes that this is a welcome critique of rationalist accounts of behavior, but it throws out any information that might be available about what the test subject was actually trying to do (1996, 88, 90). In that sense it is a step backward toward behaviorist views of people as primarily reactive.

By contrast, activity theory is refreshingly interested in what people actually want to do with technology. In fact, one activity theorist has proposed that the term human-computer interaction be changed to "computer-mediated activity," so that the emphasis is on the activity rather than the interaction required to do it (they could go even further and change the term "user" to "doer"). Activity theory is based on the work of the Soviet scholars Lev Vygotsky, Alexei Leontiev, and Alexander Luria, who argued that culture, along with biology and social interaction, were central to psychology (Cole 1996 107). As Michael Cole summarizes, "The central thesis of the Russian cultural-historical school is that the structure and development of human psychological processes emerge through culturally mediated, historically developing, practical activity" (1996, 108). Key principles are 1) that mental process develop in relation to and are mediated by artifacts (tools, language, artworks, etc.), 2) that mental development is inseparable from historical processes of enculturation, and 3) the analysis of mental functions must be based in everyday, practical activity. This principle reflects these scholars' Marxist (Hegelian) aim

of understanding theory in terms of human praxis (Cole 1996, 109-110). In the context of HCI, activity theory provides a framework for looking at what people do with technology, without reducing those processes to the generic HCI concept of a set of "tasks." Tasks tend to narrow activities into linear, bite-sized lists of steps toward a goal. Activity theory instead sees users' objectives as complex and dynamic – people's goals may change in the course of an activity. Unlike task analyses such as GOMS, activity theory doesn't describe each step in a fixed process, but looks at the way activities are subjectively defined, changeable contexts that include both internal and external factors (Nardi 1996, 75). In this sense it is similar to distributed cognition, but with a broader, more historical definition of the mental, socio-historical, and physical factors involved in any particular activity.

Activity theory takes a huge step forward from the universalism of cognitive science toward a more historical materialist understanding of human behavior. It has also been used to support the most progressive branch of interaction design, with is called collaborative or participatory design. Spearheaded in the 1980s by critics of cognitive HCI, participatory design calls for direct, ongoing collaboration with end-users in the design process (Bjerknes et al 1987, Bannon and Bødker 1991, Schuler and Namioka 1993). Such design projects produce "craft-level knowledge" that is, I would argue, highly valuable as methodology even if it cannot establish general design rules. From a theoretical perspective, the problem remains that even activity theorists feel compelled to "develop an appropriate analytical abstraction" (Nardi 1996 70) that "discards irrelevant details while isolating and emphasizing those properties of artifacts and situations that are most significant for design" (Brooks 1991, cited in Nardi 1996, 70). This search for

scientific results, however, rests on a process of sifting through and interpreting the relative significance of observed behaviors and discourses – it rests somewhere between social psychology and "thick description" (Geertz 1973). As Nardi asks, "How can we confront the blooming, buzzing confusion that is "context" and s till produce generalizable research results?" (1996, 70). As I suggested earlier, I think there is room here for research that is more focused on cultural specificities than generalities, and that looks beyond scientific protocols to place ethnographic work in what Raymond Williams called a cultural materialist context (Williams 1975).

Media Reception Theory: from Behaviorism to the "Active Audience"

To support this call for a cultural studies of HCI, a brief look at the history of communication studies is useful. Like HCI, the field has long been split between quantitative, positivist research and openly interpretive, qualitative work, some of which has begun to fall under the interdisciplinary umbrella of cultural studies. Early American communications studies, however, were based on behaviorism, and sought to measure the direct effects that a media message would have on its receivers. As in HCI, much of this research was sponsored by the military and government because of interest in the power of psychological warfare and advertising (Simpson 1994). The media audience was seen as a more or less blank canvas that would absorb any message it was thoroughly exposed to. Behaviorist researchers also sought to scientifically measure viewers' physical responses to, for example, media representations of violence and to "…screen out – laboratory style – all other cultural and social factors besides the 'pure' exposure to audiovisual material…" (Marris and Thornham 2000, 421). By 1960, however, an influential review of research concluded that "mass communication does not ordinarily

serve as a necessary and sufficient cause of audience effects, but rather functions through a nexus of mediating factors" (Klapper 1960, cited in Marris and Thornham 2000, 422). What followed was an inversion of the old behavioral model called "uses and gratifications," which proposed that people absorb only the aspects of a media message that they have some pre-existing interest in or need for.

Studies that attempted to correlate such interests and needs with media habits found, however, that identifying specific uses and gratifications sought from the media was far from simple. For example, one research group found that "people can look to quite different kinds of material for essentially the same gratification and, correlatively, find alternative satisfactions in the same televised material" (McQuail et al 1972, cited in Marris and Thornham 2000, 423). Thus although early attempts to analyze the one-way effects of media reception in a de-socialized context were replaced by the assumption that "media use is interactive," the uses and gratifications approach could not empirically identify which needs led to what sort of media-use. Like "soft" HCI researchers, these researchers were confronted with the "blooming, buzzing confusion that is 'context'" and found it difficult to draw conclusions that hold up under its own epistemology. For example, a recent study quantified both teenagers' exposure to television and their enactment of behavior considered antisocial and found a correlation between the two levels (Johnson et al 2002). The problem is that correlations do not show cause and effect, just as "uses and gratifications" research cannot prove the causality between subjects' media habits and their personal and social needs.

Around the time that this impasse was reached, the new area of cultural studies (based primarily in Britain at the time) began to focus attention on popular media, and

television in particular. British cultural studies looked, for example, at the reception of news programs in relation to viewers' class, gender, and cultural backgrounds (Morley 1980), and eventually moved from focus-group analysis to participant-observation in a domestic context (Ang 1985, Morley 1986). Much of this work was informed by a cultural Marxism that asked not only how and why people watched television, but also how that process relates to the way their lives are structured by domestic, social, and political forces. The early influence of structuralism was modified by both post-structural theory (with its emphasis on the contextuality of meaning) and the cultural materialism of Raymond Williams. Williams argued that social practices, not immutable structures, generate culture, returning a degree of agency to the cultural subject without arguing, from a humanist perspective, that culture is shaped by individuals (Williams 1975). Sociologist Pierre Bourdieu uses the term *habitus* for the way that social practice reiterates convention without being reducible to an inflexible structure. According to Bourdieu, the social subject is neither wholly determined or wholly free, and the constraining factor is the weight of cultural history – conventions about the division of labor, gender, and generational roles, relationships to authority, etc. (Bourdieu 1994, 98). Both Bourdieu's *habitus* and Williams's cultural materialism emphasize the way that people make culture in addition to being formed by it. Human behavior is thus neither determined (neurobiologically or otherwise), nor voluntaristic, but rather the product of a culture that is shaped by its members within the constraints of dominant ideologies. From this perspective, the understanding of and interaction with media can only be understood as a situated phenomenon that manifests available cultural practices (from the domestic to the global) and the dominant forces that shape them.

Cultural studies of media reception have been called "active audience" research because of their basis in post-structural theory. Post-structuralism sees meaning as contextually produced in the process of "decoding" a message rather than as transmitted by or contained within that message. Like social practice theory, it does not thus view all meaning as totally free from determining factors; media users whose media is heavily censored, for example, have access to fewer possible media messages than in a more pluralist context. In addition, some media messages may be strongly biased in favor of a "preferred" meaning (one that corresponds to dominant social ideology), as Stuart Hall suggests (Hall 1993). There are many gradations of meaning short of the "preferred" ones, however, as ethnographic studies of television reception have found. Across cultures, for example, these studies suggest that television texts tend to be understood in terms of local values and practices rather than those of the culture where the text was produced (Miller 2000), and that these readings are informed by the viewers' "contextual variables of family, class, gender, and neighborhood" (Barker 1997,124). This heterogeneity in television reception is highly inconvenient for broadcast industries, however, since they continue to rely on the convenient fiction of a knowable mass audience, subdivided into neat markets (Hartley 1992). Just as the broadcast industry has long tried to find "objective" and quantifiable descriptions of an audience that is, apparently, quite diverse, cognitive studies of human-computer interaction search for a universal and objective description of user behavior. Cultural studies of media reception have complicated that quest, and similar studies of consumer technology have slowly begun to challenge dominant modes of defining interactive media use (Silverstone and Hirsch 1992).

Conclusion

One of the main contributions made by cultural studies to the field of communications is that its foundations in critical social theory allow it to acknowledge the activity of the media user without falling prey to the myth of consumer sovereignty (the media user as all-powerful and free). Rather than seeing power as a one-way flow from either "the media" or "the audience," Ien Ang notes that "cultural studies scholars are interested in understanding media consumption as a site of cultural struggle, in which a variety of forms of power are exercised, with different sorts of effects" (Ang 2000, 485). It has also rejected the positivism behind communication studies that look for scientific evidence about "the audience" in favor of an ethnography that refuses to objectify its subjects:

> …we should try to avoid a stance in which 'the audience' is relegated to the status of exotic 'other' – merely interesting in so far a s 'we,' as researchers, can turn 'them' into 'objects' of study, and about whom 'we' have the privileged position to acquire 'objective' knowledge. To begin with, I think, critical audience studies should not strive and pretend to tell 'the truth' about 'the audience.' Its ambitions should be much more modest. As Lawrence Grossberg has suggested, 'the goal of [critical research] is to offer not a polished representation of the truth, but simply a little help in our efforts to better understand the world' (Ang 2000, 487, Grossberg 1986, 89).

Without this focus on issues of power and cultural politics, cultural studies can quickly deteriorate into impressionistic accounts with neither social theory or social science to clarify the methods and values that underpin the research. Ironically, the depoliticization of cultural studies may, in fact, herald its appropriation as a form of market research.

Market research firms have already appropriated the "rapid ethnography" of cultural studies (as distinguished from the far less rapid anthropological variety) by hiring "participant observers" to document the consumer behavior of a wide variety of social

groups. And just recently, Motorola commissioned Sadie Plant, a feminist cyberculture theorist from the University of Warwick, to conduct an 8-country research project on cell-phone use (Plant 2002). The document, as it appears on the Motorola website, is a mere 45 pages (including many glossy photos of exotic cell-phone users) and almost completely devoid of cultural context or social theory. Given its lack of in-depth study of each culture (if and how she collaborated with "native informants" is not clear), the report is no different from the quick, on-site cross-cultural studies often done by large corporations (Dray and Mrazek 1996). Not only does this process strip cultural studies of its intellectual power to examine local behaviors as they relate to larger issues of power and social formation, it offers nothing to interactive designers that they cannot already get from existing forms of superficial on-site research, interviews, and focus groups. What I think in-depth cultural studies can offer both the academic study of technology and the new media industry is a far more rigorous examination of cultural and historical factors that may not only reveal, but help to shape the politics of technology use.

One of most important ways that such studies might change the current dynamic of interactive commodity design is not only to challenge the cognitive Esperanto proposed by much HCI theory, but also to support the goal of some participatory designers to create systems that are meant to be changed and improved by the people who use them (Arias et al 2002, 352). This goal recognizes the culturally dynamic nature of technology use and the indeterminate activity of users, who are far more capable of adapting tools to their ends than designers are of creating perfect, closed systems. As Ang suggests, the desire to create a fixed, "objective" model of the user reflects more upon the needs of the institutions funding the research than it does the dynamic behaviors of actual

people. To borrow a metaphor from complexity theory, technology users can be seen as producers of "emergent" elements – properties that are not programmed in but arise when feedback is provided to a complex, adaptive system (Hobart and Schiffman 1998, 248). Technology that is "designed for evolution" (Arias et al 2002, 352) not only needs end-users as co-designers, but also as providers of feedback so that the system can evolve. The widespread, collaborative efforts within the Open Source and Free Software movements are excellent examples of this, and this model of product evolution-through-use is starting to appear in a wide range of contexts (Utne 2002). Technology users can no longer be seen simply as consumers of predefined content or cogs in a system of productivity.

Unfortunately, some interactive media developers do not seem to want users to know just how smart they are, since they continue to produce artificially "intelligent" functionality that just annoys most people (e.g. the hated Microsoft "Clippy"). How many PC users know that the personal computer was invented by a guy in his model-rocket hobby shop in Albuquerque and made available to readers of *Popular Electronics* for $400? As Paul Ceruzzi comments,

> Its utter improbability and unpredictability have led some to credit many other places with the invention, places much more sensible, such as the Xerox Palo Alto Research Center, or Diigital Equipment Corporation, or even IBM. But Albuquerque it was…" (Ceruzzi 2000, 226-27).

Popular knowledge of and interest in digital technology is apparent not only from the proliferation of personal web sites, on-line communities, and "lab sites" that share interactive programming solutions and tutorials, but also the "hardware hacking" sub-culture of consumers who buy products like the I-opener or Audrey digital appliances in order to transform them into objects with significantly different interfaces and

functionality. Like the "ham operators" of early radio culture (a name which may have been derived from *Home Amateur Mechanics* magazine), creative participation by end-users of technology is often seen as a threat by developers rather than a force to be designed for. The best hope for the future of usable technology, however, is the rejection of top-down, scientific design theory and the recognition of culturally-situated and creative end-users as the source of real knowledge about how to make interactive media work.

References

Ang, Ien. 1985. Watching 'Dallas': Soap Opera and the Melodramatic Imagination. London: Methuen.

_____ 2000. "Wanted: Audiences. On the Politics of Empirical Audience Studies." Media Studies: A Reader, Second Edition. Marris, Paul and Sue Thornham, Eds. New York: New York University Press. 482-491.

Arias, Ernesto G., Hal Eden, Gerhard Fischer, Andrew Gorman, and Eric Scharff. 2002. "Transcending the Individual Human Mind: Creating Shared Understanding through Collaborative Design." Human-Computer Interaction in the New Millennium. Ed. John M. Carroll. New York: ACM Press and Boston: Addison-Wesley.

Bannon, Liam J. and Susanne Bødker. 1991. "Beyond the Interface: Encountering Artifacts in Use." Designing Interaction: Psychology at the Human-Computer Interface. Ed. John M. Carroll. Cambridge: Cambridge University Press.

Barker, Chris. 1997. Global Television: An Introduction. Oxford: Blackwell Publishers.

Bjerknes, G., P. Ehn, and M. Kyng Eds. 1987. Computers and Democracy: A Scandinavian Challenge. Brookfield VT: Avebury.

Bourdieu, Pierre. "Structures, Habitus, and Practices." The Polity Reader in Social Theory. Cambridge: Polity Press and Oxford: Blackwell Publishers.

Brooks, Ruven. 1991. "Comparative Task Analysis: An Alternative Direction for Human-Computer Interaction Science."

Ceruzzi, Paul E. 2000. A History of Modern Computing. Cambridge, MA: The MIT Press.

Cole, M. 1996. Cultural Psychology: A Once and Future Discipline. Cambridge, MA: The Belknap Press of Harvard University Press.

Dix, Alan, Janet Finlay, Gregory Abowd, and Russell Beale. 1998. Human-Computer Interaction, Second Edition. London: Prentice Hall Europe.

Dray, Susan and Deborah Mrazek. "A Day in the Life: Studying Context Across Cultures." International User Interfaces. Ed. Elisa M. del Galdo and Jakob Nielsen. New York: John Wiley & Sons. 242-256.

Dupuy, Jean-Pierre. 2000. The Mechanization of the Mind: On the Origins of Cognitive Science. Translated by M.B. DeBevoise. Princeton: Princeton University Press.

Fernandes, Tony. 1995. Global Interface Design. Chestnut Hill, MA: AP Professional.

Geertz, Clifford. 1973. The Interpretation of Cultures. New York: Basic Books.

Grossberg, Lawrence. "Critical Theory and the Politics of Empirical Research." Mass Communication Review Yearbook, vol. 6. Ed. Michael Gurevitch and Mark R. Levy. Newberry Park, CA: Sage.

Hall, Stuart. 1993. "Encoding, Decoding." The Cultural Studies Reader. Ed. Simon During. London: Routledge.

Halverson. C.A. 1995. "Inside the Cognitive Workplace: Air Traffic Control Automation." PhD thesis, Department of Cognitive Science. San Diego: University of California.

Hartley, John. 1992. Tele-ology: Studies in Television. London: Routledge.

Hobart, Michael E. and Zachary S. Schiffman. 1998. Information Ages: Literacy, Numeracy, and the Computer Revolution. Baltimore: The Johns Hopkins University Press.

Hollan, James, Edwin Hutchins, and David Kirsh. 2002. "Distributed Cognition: Toward a New Foundation for Human-Computer Interaction Research." Human-Computer Interaction in the New Millennium. Ed. John M. Carroll. New York: ACM Press and Boston: Addison-Wesley.

Hutchens, E.L., and Klausen, T. 1996. "Distributed Cognition in an Airline Cockpit." Cognition and Communication at Work. Ed. Y. Engeström and D. Middleton. Cambridge: Cambridge University Press.

Hutchins, E. 1995. Cognition in the Wild. Cambridge, MA: MIT Press.

Ito, Masao and Kumiyo Nakakoji. 1996. "Impact of Culture on User Interface Design." International User Interfaces. Ed. Elisa M. del Galdo and Jakob Nielsen. New York: John Wiley & Sons. 105-126.

Johnson, Jeffrey G., Patricia Cohen, Elizabeth M. Smailes, Stephanie Kasen, and Judith S. Brook. 2002. "Television Viewing and Aggressive Behavior During Adolescence and Adulthood." Science Magazine vol. 295 no 5564, March 29. 2468-2471.

Johnson, Robert R. 1998. User-Centered Technology: A Rhetorical Theory for Computers and Other Mundane Artifacts. Albany: State University of New York Press.

Kaptelinin, Victor. 1996. "Activity Theory: Implications for Human-Computer Interaction." Context and Consciousness. Ed. Bonnie A. Nardi. Cambridge, MA: The MIT Press. 103-

Klapper, Joseph T. 1960. The Effects of Mass Communication. Glencoe, IL: Free Press.

Lakoff, George and Mark Johnson. 1999. Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought. New York: Basic Books.

Landauer, Thomas. "Let's Get Real: A Position Paper on the Role of Cognitive Psychology in the Design of Humanly Useful and Usable Systems." Designing Interaction: Psychology at the Human-Computer Interface. Ed. John M. Carroll. Cambridge: Cambridge University Press.

Marris, Paul and Sue Thornham, Eds. 2000. Media Studies: A Reader, Second Edition. New York: New York University Press.

McQuail, Denis, Jay G. Blumler and J.R. Brown. 1972. "The Television Audience: A Revised Perspective." Sociology of Mass Communications. Ed. Denis McQuail. Harmondsworth: Penguin.

Miller, Daniel. "The Young and the Restless in Trinidad: A Case of the Local and the Global in Mass Consumption." Media Studies: A Reader, Second Edition. Marris, Paul and Sue Thornham, Eds. New York: New York University Press. 503-515.

Morley, David. 1980. The 'Nationwide' Audience. London: BFI.

Morley, David. 1986. Family Television: Cultural Power and Domestic Leisure. London: Comedia.

Nardi, Bonnie A. 1996. "Studying Context: A Comparison of Activity Theory, Situated Action Models, and Distributed Cognition." Context and Consciousness. Ed. Bonnie A. Nardi. Cambridge, MA: The MIT Press. 69-101.

Noble, Douglas D. 1989. "Mental Materiel: The Militarization of Learning and Intelligence in U.S. Education." Cyborg Worlds. Ed. Les Levidow and Kevin Robins. London: Free Association.

Norman, Donald A. and Stephen W Draper. 1986. User Centered System Design: New Perspectives on Human-Computer Interaction. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Plant, Sadie. 2002. "On the Mobile." Motorola Web Site: http://www.motorola.com/mot/documents/0,1028,296,00.pdf

Schuler, D. and A. Namioka Eds. 1993. Participatory Design: Principles and Practices. Hillsdale, NJ: Erlbaum.

Segall, M.H., Dasen, P.R., Berry, J. W., and Poortinga, Y.H. 1990. Human Behavior in Global Perspective: An Introduction to Cross-cultural Psychology. New York: Pergamon.

Silverstone, Roger and Eric Hirsch, eds. 1992. Consuming Technologies: Media and Information in Domestic Spaces. London: Routledge.

Simpson, Christopher. 1994. Science of Coercion: Communication Research and Psychological Warfare 1945-1960. New York: Oxford University Press.

Sutclliffe, Alistair. 2002. "On the Effective Use and Reuse of HCI Knowledge." Human-Computer Interaction in the New Millennium. Ed. John M. Carroll. New York: ACM Press and Boston: Addison-Wesley.

Utne, Leif. 2002. "Free at Last!" Utne Reader May-June, no. 111. 14-15.

Weber, Rachel N. "Manufacturing Gender in Military Cockpit Design." The Social Shaping of Technology, Second Edition. Ed. Donald MacKenzie and Judy Wajcman. Buckingham: Open University Press. 372-381.

Williams, Raymond. 1975. The Long Revolution. Harmondsworth: Pelican.

Winner, Langdon. 1999. "Do Artifacts Have Politics?" The Social Shaping of Technology, Second Edition. Ed. Donald MacKenzie and Judy Wajcman. Buckingham: Open University Press. 28-40.

Woolgar, Steve. 1987. "Reconstructing Man and Machine: A Note on Sociological Critiques of Cognitivism." The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology. Ed. Wiebe E. Bijker, Thomas, P. Hughes, And Trevor J. Pinch. Cambridge, MA: The MIT Press.