Cyborg Theories and Situated Knowledges:
Some Speculations on a Cultural Approach to Technology

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INTRODUCTION

While technology is one of the most rapidly changing and frequently discussed subjects in the academy today, its meaning in architectural education, in other than afunctional sense, has gone largely unexamined. Technological education should expand to become *dually focused* on both a socio-cultural approach to technology as well as cover the basics of function as it relates to design. In some architecture programs an inordinate amount of coursework is spent teaching the principles and conventions of traditional technology often under the guise of enabling the student to pass the licensing exam. This is not, however, what a university education is for. Technological literacy is more than passing a standard exam. Technologies change so rapidly that what is current one year may be obsolete the next. Something *in addition* to an instrumental approach to technology is called for if students are to have a deeper understanding of the technoscientific world they will face as professionals in the coming decades.

There has been much attention in the popular press paid to the decline of science and technology literacy in the United States. Educators studying technoscientific literacy have reached some important conclusions. For example, in an exhaustive study of the topic educator Morris Shamos found that most technoscientific education does not remain in any meaningful way with a student after they leave school. Second, he found that curricular change does very little to alleviate this problem.' And third, both activity-based and content-based technoscientific programs faredequally badly.? Keep in mind the kind of science and technology these scholars are studying is of the traditional sort; by adding fact upon fact, one truth or proper application can be found. It seems the problem lies not in the student's learning ability, but in how we define technology and science towards better and more meaningful ways of teaching and learning about technoscience as it relates to the human environment.

Often technology is discussed as if it were a free-floating set of ideas and applications that are removed from the material, social, and cultural practices through which they were established.' Technology viewed in this way is referred to as a black box; a hypothetical unit defined only by its function leaving the dynamics of its internal systems unexamined. The religious awe of technology as evidenced in the ideas of some International-style architects form yet another version of the black box . Mies van der Rohe once said that "where technology reaches its fulfillment it transcends into architecture[w4] The problem with this belief is twofold. First it is deterministic; this belief assumes that technology has a drive all its own to reach some predestined state. And second, Mies van der Rohe's reference to technological transcendence implies that an unearthly perfection is achieved in architectural form when technology is implemented in some ideal fashion. This form of metaphysical black-boxing is as equally uncritical as the instrumentalist's input-output version of technical systems.

Engineer Peter Rice, in refuting this deterministic version of technological systems writes that there is a:

> myth about technology. The feeling that technological choiceisalways the result of a predetermined logic.*[sic]* The feeling that there is a correct solution to a technical problem....What is often missing is the evidence of human intervention, the black box syndrome."

According to Kenneth Frampton, Peter Rice "understood only too well that a technological device is a cultural choice and not simply a matter of reductive logic.""

BEYOND THE CARTESIAN PARADIGM OF USE

Timothy Kaufman-Osborn, a theorist of technology, believes that we have unwittingly become victims of what he calls the Cartesian paradigm of use. In this view of technology the human being is conceived of "as an instrumental actor standing astride the world of discrete external objects awaiting manipulation in accordance with the dictates of the subjective will."' Instead he argues, technology is not a 'thing' to be manipulated but instead is part of who we are; an extension of what it means to be human. In the late twentieth-century we are co-evolving as organism/machine hybrids and lack the descriptive metaphoric tools for understanding our technologically embedded and embodied selves.[8] To fully illuminate his thesis Kaufman-Osborn tropes the spider and her web

as follows: The spider spins a web each night. The web has many uses. It catches food for nourishment and morning dew for hydration. It also protects her and her nest from predators, both as a trap and as a warning device that vibrates upon contact. "What is this thing? Is it an implement, or is it a system? A home or a trap? Is it inanimate or is it alive?" Kaufman-Osborne furthers his story-metaphor:

> Like some odd contraption composed of so many elongated surrogate limbs, the web dramatically extends the reach of her otherwise circumscribed sensorium. A spiderweb is continuous with its creator in these senses and so confuses the mutually exclusive distinction a Cartesian draws between tools and their users.'

According to Merleau-Ponty humans are the "fabric into which all objects are woven."[10] Using an example of a blind man he asserts that "the blind man's stick has ceased to be an object for him, and is no longer perceived for itself; its point has become an area of sensitivity, extending the scope and active radius of touch, and providing a parallel to sight."" Thus the division between human subjects and their objects which structures the Cartesian paradigm of use does not represent the activities of everyday life. While the arbitrary bifurcation of humans and technology may serve to efficiently transmit the mechanical workings of the latter it ignores the nuanced ways in which subjects and objects interact to shape contemporary life.

In Elaine Scarry's book, The Body in Pain: The Making and Unmaking of the World, she proposes an intricate reciprocal relationship between humans and the artifactual world they make. She proposes that a room is:

> an enlargement of the body. . .[its]windows and doors act as crude versions of the senses [enabling]the self to move out into the world and to allows the world to enter. But while the room is a magnification of the body it is simultaneously a miniaturization of the world, of civilization. Although its walls, for example, mimic the body's attempt to secure for the individual a stable internal space - stabilizing the temperatures so that the body spends less time in this act; stabilizing the nearness of others so that the body can suspend its rigid and watchful pastures; acting in these and other ways like the body so that the body can act less like a wall - the walls are also important objects, objects which stand apart from and free of the body, objects which realize the human being's impulse to project himself out into a space beyond the boundaries of the body in acts of making. . .[12]

Although her account contains residual Cartesianism, the person and the room are each accorded agency, culminating in an interrelationship that is difficult to dissect into proper subjects and objects.

To understand the political dimensions of technology, Foucault's notion of the inextricable relationship between power and knowledge provides a tool with which to analyze the socio-cultural context of technoscience within the built environment. Given that technology occupies a privileged place in our society and that technoscientific knowledge is highly regarded, questions the students might ask would be: How do certain technologies tend to concentrate or disperse power? Who is empowered and disempowered in the choice of certain technologies? What kinds of places are made possible by our technological choices in the built environment? And do these systems enhance personhood and citizenship in democratic societies?

In order to bring the social, cultural and political aspects of our relationship to technology together, theorist Donna Haraway invents her version of a cyborg. He/she is a hybrid of organism and machine constructed to describe our actual and potential lives at the end of the twentieth century. It is a metaphoric subject, an imaginary, meant to reconceptualize our world along the lines of the spider and her web or the blind man and his cane. She posits the cyborg as a material-semiotic actor, a composition that radically subverts the Cartesian paradigm of use. This boundary creature is a metaphor for recombinant and emancipatory uses of technology in locally meaningful ways; a co-evolution of humans and machines from a grassroots perspective. Unlike the spider, Haraway's cyborg is a deeply political actor, a renegade from corporatist conceptions of robotics and the like, committed to the realization of shared power and social justice. It is an imaginary intended to shape new horizons of thought and action into the next millennium.

Architecture schools need to teach the social, cultural, and political nature of technology as it shapes and is shaped by the built environment. Students should be given the basic tools of analysis needed to assess technology in more than instrumental terms thus becoming more effective designers and citizens in the complex world in which we live. While function-oriented technology education has been creatively reinvented by projects such as Vital Signs, the socio-cultural side of technology has remained unproblematized.[13] Through completely dismantling the black box, beyond monovalent functional explanations, the student can begin to ask second and third order questions about technology and the places they are designing for human habitation. They can begin to see interconnections between architecture and a multitude of other disciplines and practices that were before occluded by blind assumptions shadowed in the black box.

Kenneth Frampton in his book Studies in Tectonic Culture concludes that, due to the complexity of technological systems in the built environment, the architect will have to coordinate these systems with a new cybernetic approach to fully realize the interrelationships between them. In addition, through his lens of critical regionalism he envisions the architect's orchestration of technology as being regionally inflected while at the same time responding to the "transformed techno-economic character of building."[14] This, according to Frampton, will determine whether the profession will be able to reposition itself in the culturally diverse, global

information age, or cease to exist at all. The *cybernetic* approach and the *regionally* inflected approach to architecture form the basis for the following two speculative accounts of a new cultural approach to technology.

SITUATED PRACTICES

Science and Technology Studies (STS) is an emerging field that examines the social, cultural and political nature of technoscience. This lens on technology is necessary if technology is to positively advance the goals of achieving a deeply pluralist and participatory democracy. A critical approach to an analysis of technoscience begins with questioning the very foundation of instrumental reason: abstract expert knowledge with its claim to rationality and objectivity.[15] In this schema, technical facts and artifacts are no longer understandable within the average person's sense-making capacity and experience; they are both created and deployed by the expert cultures that funded and generated them in the first place. Furthermore, this entire technoscientific construction reinforces the autonomous subject, who at a distance, manipulates his world; it reenacts the Cartesian paradigm of use in ways incongruous with lived, embodied experience. Recovering the epistemic authority of non-technically trained people is important if technology is going to be publicly guided instead of being used to co-opt people into lifestyles that they did not choose. Teaching students about the context-laden nature of technology in the built environment will go a long way towards an understanding that there are choices to be made; average citizens and designers are capable of participating in shaping human/technology relationships.

Transforming the Cartesian subject in poststructuralist terms by problematizing the very notion of objectivity itself, STS scholar Donna Haraway introduces the idea of a situated subject with situated knowledge. This open ended, hermeneutically-dependent technoscience questions the very foundation of *one* technological literacy. Haraway refers to these local inflections of global information as *situated knowledges*.[16] This is a fully embodied view of the world as seen from the perspective of the specific viewer. Because it does not conform to the Cartesian all-encompassing gods-eye view, it is necessarily partial and thereby privileged. It is privileged because it represents a decoding of global technology from a local perspective providing an opportunity for transformative use in radically contingent ways. From the ground, citizens redraw the boundaries of technology in ways that experts could never imagine. This is a regenerative practice leading to richer, more inclusive accounts of the world and greater participation in its making.

How can architects participate as co-generators of regionally inflected technologies in the built environment? First of all technology should be taught as multiple material, local, and global practices rather than only as immutable black boxes. Secondly, the field of technoscience has been extensively researched by many scholars within the disciplines of sociology, anthropology, philosophy, history, and political science. This material can provide a starting point for investigating technology in the built environment from other than an instrumental perspective. Mapping the concerns of architectural education onto this emerging field of technoscience study (STS) will undoubtedly yield exciting new paths for design exploration. This will be one of architectural education's contributions to technology and innovation within the profession.

A few years ago a technologist well known for his groundbreaking environmental conservation workvisited our school in south Louisiana. Being from an mountainous urban place he spoke at length about the importance of the "view" for both economic and cultural reasons. Part of the problem with "views" was having a technique whereby everyone could have one and at the same time have an energy-efficient place to live. He further elaborated his case about energy consumption and building orientation as well as presented new scientific approaches to glazing and heat gain. After a while a student raised her hand; she wanted to know what a "view" was. It became apparent that many in the class did not understand our guest's discussion as there are no panoramic views in this densely wooded, semi-tropical, bayou region. He asked the students what local people place the highest value on in a residence if not a view. They responded that in this region many people have large extended families and a love of food, music and dancing at family gatherings. What people want in this area is the ability to open up their house to an outdoor room to accommodate this type of large active social gathering. On the part of the architect, this would mean rethinking energy-related spatial issues from a different perspective.

While this is a very simple example based on a small design problem, the single family home, applying situated knowledges becomes more complex as the scale becomes urban or regional. It does not follow that a simple technology applied to a small project is easily expanded. Technologies are not easily extrapolated in this way. This is where social studies and cultural theories of technology can provide a greater understanding of technoscience discourses as they circulate in a multiplicity of contexts. These theories are storied structures explaining the workings of an otherwise chaotic environment. They provide a means for the student's greater flexibility in traversing a variety design contexts and scales.

A few years ago Father Bill, the local priest on a nearby Indian reservation noted that his parishioners were becoming increasingly financially burdened by the rising cost of electricity. After researching the solar literature and talking with some local architects he realized that the tribe did not have the financial means available to properly solarize the reservation. What the people did have free access to was piles and piles of junk. Using some of the principles from the solar literature, the community began to build solar greenhouses and other solar additions using refuse from building sites and a variety of other discarded objects for construction materials. Proud of his accomplishment, lessening the people's reliance on the

utility companies and giving them a sense of self-reliance, Father Bill told me that he "could even solarize a refrigerator carton!"'' Reactions of some local architects in the area who were promoters of proper solar houses were less than enthusiastic about this eccentric approach to the subject. They felt that because the structures were visually chaotic and therefore unappealing to the trained 'expert's' eye, that it would give solar design a 'bad name.' I disagree. These people have, using their situated knowledge and locally available means, refashioned solar technology in radically contingent ways that at the same time undermines the power of the seemingly impenetrable giant utility company.

CYBORG SUBJECTS

Art theorist William Mitchell states: "We make our tools and our tools make us: by taking up particular tools we accede to desires and we manifest intentions."[18] We see examples in the glossy trade magazines of architects like Gehry and Eisenman for whom computers are active generators of design concepts. Talk of the "end of history" and the "end of science" permeates popular culture; this is the idea that all the discoveries have been made and we are now simply inventing new applications for our ingenious tools and ideas. This is the world of the situated cyborg-subject. In the field of design, the possibilities for discovering new webs of connectivity between humans and their environments, coordinated by the architect and his or her computer prosthesis, are endless.

Donna Haraway takes the cultural manifestation of Frampton's "cybernetic approach" even further. She sees the computer as:

> metonymic for the articulations of humans and non-humans through which potent things like freedom and justice, skill, wealth and knowledge are variously re-constituted. The computer is a trope, a part-for-whole figure, for a world of actors and actants.[19]

It is productive to imagine artifacts as agents, enmeshed in a web or continuum with humans, acting together to co-create the complex places where we live. Rather than trying to dissect the parts, thus loosing the nature of the whole environment, we should ask questions that enable us to better understand the various ways in which humans and non-humans interact to form our environments. Understanding relationality, rather than reified objectness, would be useful knowledge; a knowledge in which everyone participates in its making. The pragmatist philosopher William James once said:

> What really exists is not things made but things in the making... But put yourself in the making by a stroke of intuitive sympathy with the thing and, the whole range of possible decompositions coming at once into your possession, you are no longer troubled with the question which of them is more absolutely real... Philosophy should see this kind of understanding of the movement of reality, not follow science in vainly patching together fragments of its dead results.[20]

Understanding postmodern hybrids such as the cyborg are important for the architect of the next millennium as the boundary between human and machine has become further blurred by new technologies; emergent characters and material-semiotic actors begin to reframe categories within the discursive practices of technoscience. The enlightenment subject predicated on methodological individualism is no longer the salient actor as client or inhabitant of the built environment; new agent-imaginaries for future designers must be envisioned.

Not far from my university is a small, rural, predominantly African-American town surrounded by numerous polluting industries. For many years the people were frustrated, not knowing when and if it was safe to: open windows, turn on air-conditioners, play and visit outside, plant gardens, etc. Many people barricaded themselves indoors in fear of their surroundings. In the 1980's right-to-know legislation was passed making the Toxic Release Inventory from polluting industries available to everyone. It was soon put on the internet and people could simply "click" on their town and find out what was being released into their environment and what these effects were. But in order to plan their activities the residents needed to know which of the surrounding industries were polluting, with what, at any particular time. They applied for and received a grant for a neighborhood-controlled air quality monitor. The citizens were then informed in a timely way of hazardous pollution and its direction of travel. At this point the people had enough information, not only for day-to-day activities, but also for legal and planning purposes to insure a safe neighborhood for their families in the future. Between the global internet and local applications of universal technologies these cyborg-citizens had turned the power of surveillance on its head; the people now had a tool for significantly reshaping their community. Recently, another neighboring African-American town having similar concerns has even used their locally inflected technical knowledge to incorporate their town and begin re-zoning procedures as well as other infrastructure improvements made possible by their new citizen-controlled industrial tax base.

These communities' endeavors fit with yet another version of the cyborg actor located in spatial terms by African-American cultural theorist bell hooks. She proposes the notion of "homeplace" as a "site of resistance;" a place coextensive with the techniques of productive struggle and emancipation." Homeplace is both a literal and metaphoric construction of solidarity and identity, the joining of many into one, armed with the technologies of power and political agency. In hooks conception, spaces, objects, and humans, are subsumed within the web of homeplace, a space of both action and recovery. This culturally-situated political sensibility that hooks calls "yearning" promotes "the recognition of common commitments and serve[s] as a base for solidarity and coalition."[22] According to Haraway "yearning in technoscience is for knowledge projects as freedom projects – in a polyglot, relentlessly troping, but practical and material way..."[23]

CONCLUSION

To conclude, for purposes of this argument, technologies can be artificially divided into two categories: material technology- the thing itself, and socio-cultural technology- how the thing is constituted by and constitutive of socio-cultural conditions and practices. These are large overarching categories that can inform the teaching of technology in architectural education in a number of ways. The first category, the technology or the thing-in-itself has been the predominant focus of courses taught in architectural schools. The social and cultural or *situated* aspect of technology is either mentioned only in passing or dismissed all together. Privileging of one form of knowing technology over another is a power move which effectively elevates expert, insider ways of knowing over local and non-expert understanding of technology.

Another concept that serves as a corollary to situated knowleges is *standpoint theory*. This theory asserts that the knowledge originating at the grassroots should be given careful consideration towards an understanding of the function of technology in everyday life whereas knowledge from the experts should be scrutinized for the bias of using technology in the service of the professional or power elite. According to standpoint theory those who are in the elite circle of technoscience are often blinded by their beliefs about their work and its application; their insider status occludes knowledge that may question the very foundation of their work.?" Outsiders, like people living in inner-city neighborhoods, for example, are neither blinded by, nor funded because of, the promises of technoscience and tend to have different views of instrumentality. They are concerned with the way things actually work in everyday life. This local cyborg is an amalgam of standardized technologies and local practices shifting what counts as knowledge from some rarefied foundational discipline to the experience of citizens in their environment. As architects, this awareness of the public's understanding of technoscience has been virtually absent from our curriculum What we need are thick ethnographic accounts of everyday spatial practices as they intersect technologies towards a heterogeneous technological literacy.

Technology education should provide an opportunity for speculative practice, whereby students understand its contingent and situated nature. Technology can also offer critical points of entry into discussions of: social and cultural theory, environmental issues, and analytical and critical views of the history of the built environment. Technology in the broadest sense is an extended network, objectivity is situated knowledges, theory is storytelling, and socio-cultural issues saturate every technological decision about a project. The technologies-in-themselves are not lost; they are just not privileged outside of the context of their making.

In architecture we need to develop classes and seminars to broaden the student's understanding of our political/social/cultural relationship with technology within the built environment. We also need to devise studios within which both the design process and the design problem expand the student's awareness of the powerful interrelationships engendered by contemporary technology. By looking at technoscience as both discourse and practice we move beyond the strict divisions and dichotomies that structured modernity such as : subjects and objects, natural and artificial, culture and nature, human and machine toward understanding technoscience as constitutive of who we are. This is the diffracting lens of the student-cyborg-architect practicing at the beginning of the twenty-first century.

NOTES

[1] Morris H. Shamos, *The Myth of Scientific Literacy* (New Brunswick, NJ: Rutgers UP, 1995), pp. 132-34. He makes this claim for students in non-science disciplines. He also tries to make a division in his research between science and technology but fails to draw any definitive dividing lines between the two disciplines. For my purposes, I have chosen to label it a hybrid pursuit "technoscience," in order to avoid the largely unilluminating science vs. technology debate.

[2] The education models that Shamos studies looks at classroom lecture and lab situations for transmitting technoscientific knowledge. The proto-professional environment of the studio is not covered and would make an interesting comvarison for the transmission of this kind of knowledge.

[3] Joseph Rouse, "What are Cultural Studies of Scientific Knowledge," *Configurations* vol. 1, no.1 (1993), p. 11.

[4] Quoted in Kenneth Frampton's *Studies in Tectonic Culture* (Cambridge, MA: MIT P, 1995), p. 186.

[5] Frampton, pp. 386-87.

[6] Frampton, pp. 386-97.

[7] Timothy Kaufman-Osborn, *Creatures of Prometheus: Gender and the Politics of Technology* (Lanham, MD: Rowman & Littlefield, 1997), p. 101.

[8] According to Kaufman-Osborn (p. 31), a metaphor is an artifact of language and as such acts as a tool to extend the range of knowledge and understanding. My own position is that language, or the ability to frame something in order to communicate about it, precedes and often shapes later action. Thus reframing agency within language can promote a change in agency and action "on the ground."

[9] Kaufman-Osborn, p. 20.

[10] Kaufman-Osborn, p. 235.

[11] Maurice Merleau-Ponty, *Phenomenology of Perception* (London: Routledge & Kegan Paul, 1962), p. 143.

[12] Elaine Scarry, *The Body in Pain: The Making and Unmaking of the World* (New York: Oxford UP, 1985), pp. 38-39.

[13] *Vital Signs* was a hands on technology project developed at UC Berkeley in collaboration with numerous other institutions. Its purpose was to further learning environmental control systems in a more engaging and meaningful fashion. There has even been some discussion among members of the Society of Building Science Educators of extending this format into teaching structures as well. These programs, however, are not the focus of this paper.

[14] Frampton, p. 386.

[15] The emergence of modern era science was predicated on a universal subject to empirically verify scientific truth-claims; this was the *modest witness*. This person was a transparent subject, a mirror of the truth they were witnessing, an embodiment of scientific objectivity. My version of the modest witness comes from Steven Shapin and Simon Schaffer's account of Robert Boyle's experimental practice in *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life* (Princeton:

Princeton UP, 1985). It is further illuminated for current day use by Donna Haraway in *Modest_Witness@Second_Millenium. FemaleMan_Meets_OncoMouse* (New York: Routledge, 1997), pp. 23-39.

[16] The concept of situated knowledges first evolved as standpoint epistemology in the work of Nancy Hartstock, "The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism," *Discovering Reality: Feminist Perspectives on Epistemology, Methodology, and Philosophy of Science,* edited by S.Harding, M, Hintikka (Dordrect/Boston: Reidel, 1983), 283-310. Donna Haraway revised the theory for postmodern technoscientific purposes in "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," in *Stmians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), pp. 183- 201.

[17] This community is located on the Chittimacha Indian Reservation in Charenton, LA and its priest is Father Bill Crumley with whom I have spoken extensively.

[18] William J. Mitchell, *The Reconfigured Eye: Visual Truth in the Post-photographic Era* (Cambridge, MA, 1992), p. 59.

[19] Haraway (1997), p. 126.

[20] William James, *A Pluralistic Universe* (Cambridge: Harvard UP, 1977), pp. 117-118.

[21] bell hooks, *Yearning: Race, Gender, and Cultural Politics*, (Boston: South End Press, 1990).

[22] hooks, p. 27.