Qualitative Methodologies
December 2008

The Influence of Situated Action on HCI and CSCW

Lucy Suchman's *Plans and Situated Actions: The problem of human-machine communication* (1987) introduces a novel way of thinking about the social world and the forces that compose it. Since the time of her first writing, Suchman updated her work in 2007 and retitled it *Human Machine Reconfigurations: Plans and Situated Actions*. Suchman's work became very influential outside her own field of sociology. In fact, it has become one of the seminal works in several computer design fields. This essay will discuss the influence of *Plans and Situated Actions* on the fields of human-computer interaction and computer supported collaborative work.

What Suchman set out in *Plans and Situated Actions* was a detailed analytical critique of the then-dominant paradigm for imagining human behavior in expert computer systems. In focusing on the problem of "human-machine communication," she also provided the building blocks for a reorientation of the role of social science in the development of interactive computer systems.

According to Suchman, traditional computer system design perpetuates a gap between systems and users because its assumption of "purposeful action" is overly restrictive. Most cognitive scientists (and many artificial intelligence researchers and computer scientists) believe that human action consists of the execution of predetermined mental plans. Yet, designing interactive systems on the basis of this assumption has resulted in recurrent problems. Displays of "intelligent" copiers, in Suchman's case, often disregard that statements can be interpreted in different ways in different situations. Likewise, copiers that attempt to "sense" what the user is doing (by sensing whether a drawer is opened or whether the document cover is closed) often assume a clear intent to such user actions, as if users indeed followed preconceived "plans" and were not in fact tinkering toward a practical solution by trial and error.

The planning model, at the time of Suchman's writing, was the dominant understanding of human behavior in the development of interactive computer systems. What Suchman did was to show how this model failed to account for the way in which ethnomethodology, her research tool, had revised our understanding of human action. Her model contrasted the cognitivist notion that saw features of the world as stable, objective phenomenon. She put forth the idea that supposedly objective phenomena were instead "active interpretations of the world formed in response to specific settings and circumstances" (Dourish, 10). In her model, a "plan" is considered one of many communication resources that guide individual action. To Suchman, behavior is a sequential and on-going organizational practice.

Suchman's work had an immediate impact on human-computer interaction (HCI) and a similar field, often referred to in the literature as CSCW, computer-supported collaborative work. It is very widely read and cited in the HCI/CSCW literature, and it firmly established the relevance of sociological and anthropological reasoning for the problem of creating effective, intelligent, interactive computer systems. Her argument and analysis drew strongly on the ethnomethodological tradition and introduced it to the computer design community. In a book collecting essays on different social perspectives on HCI (see *The Social and Interactional Dimensions of Human-Computer Interfaces*), as Dourish and Button have pointed out, 11 out of the 12 essays cite Suchman's work (Dourish, *op. cit.*)

Situated Action in HCI

Human–computer interaction (HCI), sometimes man–machine interaction (MMI) or computer–human interaction (CHI), is the study of interaction between people (or users) and computers. As a field, it incorporates computer science, behavioral sciences, and design. Traditionally, interaction between users and computers occurs at the user interface (or simply interface), which includes both software and hardware. More recently, however, sociological perspectives have begun to permeate HCI. Within HCI, sociological methods complement (and sometimes challenge) the technical and psychological perspectives around which the field was originally organized and have become increasingly accepted and even expected as a component of HCI research (Thomas, 1995).

In broad terms, Suchman's work directly influenced HCI by helping to create user-centered design (UCD). UCD is a design philosophy and a process in which the "needs, wants, and limitations of the end user of an interface or document are given extensive attention at each stage of the design process" (Benyon, 2002, p. 180). User-centered design is a process that includes many stages requiring designers to analyze and foresee how users are likely to use an interface, but also to test the validity of their assumptions with regards to user behavior in real world tests with actual users. Such testing is necessary as it is often very difficult for the designers of an interface to understand intuitively what a first-time user of their design experiences, and what each user's learning curve may look like. The chief difference from other interface design philosophies is that user-centered design tries to optimize the user interface around the communication resources already available to the users, rather than forcing them to change how they work to accommodate the system or function (*Ibid.)*.

User-Centered and Participatory Design

Models of a user centered design process help software designers to fulfill the goal of a product engineered for their users. In these models, user requirements are considered from the outset and included into the product cycle. The process includes the active participation of real users, as well as several iterations of design solutions. Several subgenres of UCD exist including cooperative, participatory, and contextual design.

One particular computer design group that has been particularly influenced by Suchman is of special attention: "participatory design." Within HCI, there has been a strong and vocal group that has argued consistently that the requirements for technology should be developed directly around the work situation of the technology's users. The participatory design movement (PD), in particular, has made considerable strides in developing methods and perspectives on interactive systems design from this position, for both practical reasons - concerning the efficient and fluid accomplishment of work and supporting the acceptance of technology - and political ones - emphasizing the importance of the worker's voice in issues of workplace management and development (Ehn and Lowgren, 1997, p 309).

Early participatory design recognized that people's actions are not easy to anticipate without direct study or direct user participation. PD originated in Scandinavia in the early 1970's and seeks to include users in the design of the systems they will eventually use. Early PD practitioners advocated that when introducing technologies into the workplace, workers should

be involved (*Ibid.*). This involvement of users in design is both a means for promoting democratization in the organizational change process, and is also a way to ensure that the resulting computer system adequately meets the needs of the users (Bannon, 1991, p. 38). The core PD perspective – where end-users are directly involved in the development of digital artifacts – contrasts with traditional HCI development methods where the "user input is sought only after the initial concepts, visions, and prototypes have been developed" (Carroll, 2002, p. 373). PD is not rational, nor does it follow a sequential process. For the most part, participatory design methods have been applied in an individual or stop-gap fashion. "Methods are seen more as a resource for designers to use as they deem appropriate and are not gathered into a coherent framework" (Brown, 1997, p. 34). Throughout the process, as findings emerge, the researcher must make adjustments according to the discovery. Brown further claims that "there is recognition that no two situations are alike," an echo of Suchman.

Situated Action in CSCW

Sociological understandings and methods, like those presented in *Plans and Situated Actions*, have been used to study the settings in which work is conducted, to inspire and guide the design of expert computer systems, and to evaluate those systems in actual working conditions. This inclusion of sociological research has been quite pronounced within the domain of CSCW, where sociological approaches lend themselves well to a primary focus on interaction between individuals and groups, rather than simply between the "human" and "computer" of HCI. In fact, Lucy Suchman herself has maintained an ongoing affiliation with the CSCW community. CSCW research has highlighted the social setting of computer use and so set up for itself a framework within which sociology has direct applications. Many within CSCW have taken up Suchman's concern with work settings and the detail of everyday working practices.

In a paper for the first issue of the journal *Computer Supported Cooperative Work*, Kjeld Schmidt and Liam Bannon address this notion and argue that proper CSCW applications should support articulation work (Schmidt and Bannon, 1992). This means, for instance, that the system should "support the management of work flows" by workers themselves, and not enforce one predetermined work flow model. It should facilitate communication and negotiation about work flows, rather than implement them. And the system should "support the management of a common information space" (*Ibid.*). This does not merely mean sharing a common database, but allowing the development of common interpretations of the shared information – however local and temporary.

The Suchman and Schmidt/Bannon approaches share a critique of rationalistic design methodologies. First, they all predict that by ignoring the users (practically and/or theoretically), such technologies will function poorly in concrete workplaces. Second, they both warn that traditional computer system design tends to produce technologies which embody the managerial perspective. Schmidt, for example, emphasizes the erasure of low-valued work, while Suchman pleads against detached and nonresponsive "design from nowhere." Finally, they both stress the importance of studying work as it actually takes place in a working environment. As Schmidt and Bannon argue, "information systems cannot be designed independently of empirical knowledge of workplaces" and "in order to accurately represent the open systems' properties of workplaces we should study them and incorporate tacit knowledge and articulation" (*Ibid.*).

Suchman's work heralded the beginning of interaction between CSCW thinkers and ethnomethodologists. This interplay of disciplinary issues is well articulated in Mike Robinson's "criteria for successful CSCW applications," where success implies creating a system that works and embodies a distinctive normative ideal about how work practices should be organized:

1. Equality: "there should be equality in terms of who benefits from, and who does the work in the application." A system that reduces the work load of some at the expense of others is "unlikely to be accepted"; rather "shared benefits" are the proper goal.
2. Mutual influence: "participants should be able to retract, restate, change, or take a totally different position in the light of views and feelings expressed by others." The fluidity and context-dependence of organizational communication and negotiation should be recognized and supported by the system. "Freezing viewpoints is the best way of rendering them meaningless," and the option to modify one's position should be equally open to all.
3. New competence: "an application that allows people to do something they could not do before (a new competence) has a great advantage over an application that enhances…an existing ability or practice or skill."
4. Double-level language: "applications should support at least two interacting levels of language": a "cultural" (informal) and a "formal" level, which are complementary. The "formal" level (e.g., a spreadsheet tool) provides clarity, predictability, and a "common reference point"; the "cultural" level (e.g., conversations between the users of the spreadsheet) provides room for interaction and interpretation, "doubt and imagination." (Robinson, 1991, pp 36-45)

While these interactions between social theory and design acknowledge the user as a "competent practitioner" (Greenbaum and Kyng 1991, 15), the empowerment of the worker argued for in the ethnomethodologically-informed CSCW approach is of a rather different nature than the empowerment advocated within corporate or institutional studies (Agre, 1995). Similarly, the agenda of CSCW is continually debated. For some, CSCW is about computer technology for people who work together. For them, any e-mail application, any group decision supported tool is a CSCW application, no matter how "rationalistic" or un-situated its design. For others, CSCW cannot be disentangled from socio-political concerns and from the philosophical critique of "rationalism." According to another article in the first issue of *CSCW*, "an appropriately designed CSCW system…should increase horizontal lines of communications within an organization and potentially undermine hierarchical levels of authority" (Jirotka, Gilbert, and Luff 1992, 99).

The Future of Situated Action: Artificial Intelligence

Specifically on the project of creating intelligent machines, Suchman's work has also had an influence, albeit inconsistent. As Suchman herself points out, the AI projects of the 1990s, "played down the personification of machines in favor of cybernetically-inspired computer science and engineering initiatives aimed at recreating artificial life forms, via the technologies of neural networks, genetic algorithms, situated robotics, and the like" (Suchman, 2001). However, her ethnomethodolical take on HCI/CSCW has influenced the trajectory of artificial intelligence by questioning the boundaries of human and non-human, with specific regard to

human/non-human agency. It has also challenged the assumptions of what will constitute the next phase of HCI/CSCW. Her work has greatly influenced the idea of ubiquitous computing (sometimes called "everyware"), meaning computing that has been integrated into "non-computer" objects. This draws attention away from the act of computing to a more situated approach. Likewise, multimodal interaction and devices draw on situated action to more effectively utilize a range of communication resources available to the user (e.g. visual and voice).

Conclusion

Taken together, Suchman's ethnomethodologically-informed approach to action has produced a strong critique of the design of technology at work. It has displayed the fact that technology, at best, often fails to support the work it is designed for and, at worst, does not allow people actually to engage in their work, because the technology is not aligned to the practices through which they organize their actions, interactions, and work. Jirotka, Gilbert, and Luff summarized this conclusion for CSCW (which also applies to HCI):

> Despite impressive technological developments in CSCW, it is widely recognized that there are relatively few examples of successful applications in real world settings…It is suggested that the lack of success of CSCW systems derives not so much from their technological limitations, but more from their insensitivity to the organization of work and communication in real work environments. (p. 110)

Suchman's contributions to HCI/CSCW are in challenging the assumptions of an entire field. This is no short task. In spite of *Plans and Situated Actions* sometimes counterintuitive logic, her work has influenced a generation of designers. Design techniques in both HCI and CSCW that rely on situated action and ethnomethodology have produced important workplace digital tools (such as Google Docs, whose designers attend the CSCW conferences). It is therefore likely that Suchman's work will continue to create discussion in these and other fields into the future.

Works Cited

Agre, P. (1995) "From high tech to human tech: Empowerment, measurement, and social studies of computing". *Computer Supported Cooperative Work*. Vol. 3, pp 167-195.

Bannon, L. (1991) "From human factors to human actors: the role of psychology and human-computer interaction studies in system design." In J. Greenbaum (ed.), *Design at work: Cooperative design of computer systems.* pp 25-44. Hillsdale, NJ: L. Erlbaum Associates.

Brown, J. (1997) "HCI and Requirements Engineering: Exlporing human-computer interaction and software engineering methodologies for the creation of interactive software." In *ACM SIGCHI Bulletin*. Vol 29, Iss 1. pp 32-35.

Carroll, J.M. (Ed). (2002). *Human-computer Interaction in the New Millenium.* New York: ACM Press.

Dourish, P. and Button, G. (1998) "On "Technomethodology": Foundational Relationships Between Ethnomethodology and System Design." *Human Computer Interaction*. Vol 13. pp 395-432.

Ehn, P. and Lowgren, J. (1997) "Design for quality-in-use: Human-computer interaction meets information systems development." In M.G. Helander (ed), *Handbook of Human Computer Interaction.* pp 299-313.

Greenbaum, J., and M. Kyng, eds. (1991) *Design at work: Cooperative design for computer systems*. Hillsdale, NJ: Lawrence Erlbaum.

Jirotka, M., N. Gilbert, and P. Luff. (1992) "On the social organisation of organisations." *Computer Supported Cooperative Work.* Vol 1, pp 95-118.

Robinson, M. (1991) "Double level languages and cooperative working." *Artificial Intelligence and Society.* Vol. 5, Iss 1. pp 34-60.

Schmidt, K., and L. Bannon. (1992) "Taking CSCW seriously: Supporting articulation work." *Computer Supported Cooperative Work*. Vol. 1. pp 7-40.

Suchman, L. (2001) "Human-machine reconsidered" Working paper. Available online at http://www.comp.lancs.ac.uk/sociology/soc040ls.html.

Thomas, P. (1995) The social and interactional dimensions of human-computer interfaces. Cambridge, England: Cambridge University Press.

Bibliography

Agerfalk, P. and Eriksson, O. (2006). "Socio-instrumental usability: IT is all about social action." Journal of Information Technology. Vol. 21, Iss. 1, pg. 24.

Benyon, D. (2002). "Representations in Human-Computer Systems Development." Cognition, Technology & Work. Vol. 4, Iss. 3, p. 180.

Berg, M. (1998). "The Politics of Technology: On Bringing Social Theory into Technological Design." Science, Technology, & Human Values, Vol. 23, No. 4, Special Issue: Humans, Animals, and Machines (Autumn, 1998), pp. 456-490.

Crabtree, A. and David M Nichols; Jon O'Brien; Mark Rouncefield; Michael B Twidale. (2000) "Ethnomethodologically informed ethnography and information system design." Journal of the American Society for Information Science, Vol. 51, No. 7, pg. 666.

Hess, D. (2007). "Crosscurrents: Social Movements and the Anthropology of Science and Technology." American Anthropologist. Vol. 109, Iss. 3, pg. 463.

Kogan, S.L. and Muller, M.J. (2006). "Ethnographic study of collaborative knowledge work." IBM Systems Journal. Vol. 45, Iss. 4; pg. 759.

Lieberman, H. and Selker, T. (2000). "Out of context: Computer systems that adapt to, and learn from, context." IBM Systems Journal. Vol. 39, Iss. 3/4; pg. 617.

Wasson, C. (2000). "Ethnography in the field of design." Human Organization. Vol. 59, Iss. 4, pg. 377.