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Abstract. *Through the case of a particular organization devoted to technological research and development, this paper investigates how values of the 'new' operate in what Appadurai (1986) has characterized as the social life of objects. Drawing on previous scholarship in anthropology and science and technology studies, I adopt the trope of the 'affiliative object' to describe the relational dynamics of association (and disassociation) that characterize the identification of objects and persons. This perspective emphasizes the multiplicity of objects within the unfolding and uncertain trajectories of organizational life, as both problem and resource for organization members. The paper examines how 'object-centered sociality' (Knorr-Cetina, 1997) is enacted as a strategic, but also contingent, resource in the alignment of professional identities and organizational positionings.* ***Key words.*** *identity; invention; materiality; multiplicity; object-centered sociality*

> 'The more adept the West has become at the making of copies, the more we have exalted uniqueness. It is within an exuberant world of copies that we arrive at our experience of originality.' (Hillel Schwartz, *The Culture of the Copy*, 1998: 212)

This paper explores the affiliative powers of objects and their implications for organizational life. By affiliative powers I mean the ways in which objects are not innocent but fraught with significance for the relations that they materialize.[1] Conversely, because relations with objects simultaneously are relations of affiliation, a desire to differentiate ourselves from others often requires that we distance ourselves from

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objects as well. In focusing on relations of affiliation, I hope to contribute to the articulation of object-centered socialities not fully accounted for by received conceptions of the object as either instrument or commodity. In this respect I follow Knorr-Cetina's injunction that '[t]o understand the binding role of objects, personal object ties, object-centered traditions and collectives, and object-created emotional worlds all need to be considered' (1997: 9). Knorr-Cetina posits a turn to what she names the 'objectualization' of social relations, in which objects progressively displace persons as relationship partners and increasingly mediate human relationships (1997: 1). This paper adopts a more anthropological approach, suspending the question of trajectories of change in favor of an exploration of the forms that object-centered sociality takes in a particular site of contemporary organization devoted to technology research and development. It is here as well that values of original and copy, new and old, come into play.

The anthropological evidence raises questions about the premise of a progressive (or regressive) turn toward the object, expressed in terms of increasing displacements and mediations. In his exploration of the workings of what he names the 'enchantments' of objects, anthropologist Alfred Gell proposes that we think of technological and other efficacious artifacts as devices 'for securing the acquiescence of individuals in the network of intentionalities in which they are enmeshed' (1992: 43). Crucial to Gell's argument is a recognition that the efficacy of artifacts is at once directly tied to their particular materialities and contexts, and not reducible in any determinate way to the object 'in itself'. Investigating the case of art objects, from the Trobriand prowboard, designed to confront and disarm an exchange partner, to the contemporary impressionist painting, Gell develops a theory of objects deeply informative for thinking about their affiliative powers. This includes the identifications that objects afford for both their creators and their audiences, as well as the reverse—the 'disenchantments' by which objects become alienated as undesirable, devalued or obsolete. Gell suggests, moreover, that the enchantment of technologies is tied in important ways to their mystery, to questions remaining unanswered about just how they came into being and what kinds of virtuosity were involved in their creation (1992: 71). This argument has resonance with the trope of 'black-boxing' developed within social studies of technology, with its implications of inner workings now hidden from view (Latour, 1987: 131). And it applies as well to objects in the making, not only in the sense that their makers may have an interest in their mystification, but insofar as the contingent practices of their production escape the bounds of even their makers' storytelling or analysis (see also Jordan and Lynch, 1992).

A focus on the affiliative powers of objects orients as well to their multiplicity (see Law, 2002; Mol, 2002), both in the more obvious sense that complex objects can be understood as the alignment of their parts, and in the sense that objects are constituted always through specific sites

and associated practices. The singularity of an object, correspondingly, is an outcome of discursive practices that render it coherent and stable, rather than a property that inheres in it *sui generis*. The materialities of artifacts participate in these processes of course: they 'bite back' in a myriad of ways (see Barad, 1998). But if our project is to understand objects-in-action, the material resistances of objects are inseparable from the arrangements through which they materialize in practice. This is perhaps particularly the case with the contested objects of technoscience. Philosopher of science Lorraine Daston traces the origins of the word 'object' to the root meaning of a throwing before, putting against or opposite; that is, objects are those things that present themselves to us as self-evident. She points out, however, that '[i]n contrast to quotidian objects, scientific objects are elusive and hard-won' (2000: 2). On the other hand, various sites that have been the focus of science and technology studies—the laboratory, the infertility clinic, the trading room—share the characteristic that 'a coherent narrative requires ontological heterogeneity' (Cussins, 1998: 169).[2] That is, it is precisely the multiplicity of objects, artifacts and bodies that makes complex organization possible. Based on her study of the clinic, Cussins argues that it is the 'genius' of such settings, through their technical practices, to allow for ontological variation in a way that extends the possibilities for persons and things.

I want to elaborate these arguments in what follows by examining some of the ways in which the constitution of objects is a strategic resource in the alignment of professional identities and organizational positionings. Knorr-Cetina points out that the rise of knowledge and expertise is seen, by sociologists at least, to be a distinguishing characteristic of contemporary sociality, and that research and development is a paradigmatic case in point (1997: 7). Within organizations dedicated to technology research and development, a central value that informs these alignments is that of 'invention', understood as the act of bringing objects into being for the first time. Objects identified as new are preferred over those already in existence, acts of innovation over those of reproduction. At the same time, particularly for those engaged in the creation of information and communications technologies, it is increasingly evident that technologies are never created *de novo*. Rather, 'new' technologies comprise reconfigurations, extensions and other modifications of elements already in circulation. A central problem for organization members as well as for this discussion then becomes to understand the practices through which objects can effectively be constituted not as copies of previous objects but as observably original.[3] In the context of research and development, the constitution of original objects is not simply a definitional problem but a requirement of organizational membership. Successful claims for the originality of objects and affiliated persons are mutually constitutive, as is, conversely, their failure.

The setting for my investigations is an organization charged with innovation in its charter, the Xerox Corporation's Palo Alto Research Center (PARC), created in 1970. The mandate for PARC was figured by some as the reinvention of the corporation itself (Brown, 1991). By the end of the 1970s, the time of my own arrival at PARC, Xerox had successfully branded the copier and was, in turn, branded by it. Faced with rising competition brought on by the expiration of its monopoly patent over the xerographic process, along with increasing signs that computing constituted the next open space for expansion, the brand of copying machine was threatening to lose its potency. Both the corporation and its products needed to be transformed, reinvented as original and as digital, and PARC's founding 10 years before was to effect that transformation.[4]

The process of reinvention was by no means a straightforward one, however. Perhaps the most direct fulfillment of the mandate that PARC transform Xerox into a 'digital document company' was the development of the laser printer. But although the technology of software-controlled electronic printing might constitute a logical next step from the light lens copier, the latter was supported through an extensive social and technical infrastructure, which had been under development since Xerox's founding as the Haloid Xerox Company in 1950s.[5] By the 1970s, the company's principal revenue streams were based in the photocopier and associated supplies and services, not only in North America but throughout the world. The prospects for a comparable market in electronic printing in the early 1980s were, at the very least, uncertain. As a case in point, in August of 1980 I made notes on a lunch with one of my Xerox colleagues who had moved from research and development into the newly created Printing Systems Division.[6] He expressed frustration with his new job and, when pressed, formulated it as an inability to see anything come to fruition. He attributed this to a problem of fragmentation among the numerous organizations involved in printing, from the Reprographics Technology Group in Rochester, who he said knew everything there was to know about xerography, to the various organizations involved in laser and other printing technologies and their associated marketing groups (e.g. the Information Systems Group, the Office Products Division and the Systems Development Division). His complaint was that the perceived leanness of resources and support resulted in competition rather than collaboration among these groups, with a corresponding redundancy and inefficiency in their operations. My colleague summed this as a problem of technology transfer; that is, getting from the design of prototypes to products and applications.

The photocopier, then, was at once an iconic and a deeply ambivalent object for Xerox. At the same time, the affiliation of the photocopier with the Xerox Corporation as brand frames the object's particular ambivalence from the perspective of PARC. Some sense of this is provided by popular histories of Xerox's failure to exploit the technologies developed

at PARC (Smith and Alexander, 1988), but I want to look more closely at just how the particular object of the photocopier figured in the identities and imaginaries of PARC researchers. As indicated above, throughout PARC's history the photocopier and its descendants, in the form of computationally enhanced 'document machines', have comprised the revenue-generating mainstream of the corporation, including its ability to continue funding of research. At the same time, it was precisely a non-orientation to the photocopier and its displacement by the computer that formed PARC's reason for being. PARC researchers were drawn from the ranks not of mechanical engineers but of electrical engineers and computer scientists. The photocopier in this organizational context stood for the currently available rather than the newly invented, the product rather than the research program, the past rather than the future. On my arrival at PARC, the photocopier was notably absent from discussion and research practice as other than an unremarkable element of established infrastructure, similar to that which could be found in any other organization at the time.

In sum, however useful as a bit of office equipment and a source of revenues for Xerox, the photocopier as technological object was an anachronism from the perspective of PARC. The objects valued at PARC were drawn from the worlds of computer science, electrical engineering, physics and the emerging cognitive sciences. The cognitive sciences were concentrated in the Systems Science Laboratory (SSL), where I became a research intern in 1980. Research in SSL in the 1980s took as its focus a variety of artifacts and technologies, from new techniques for modeling office information systems, to new programming languages, to applications of human 'information-processing psychology' in the design of computer interfaces. In every case, the focal object was not the photocopier but the computer. In the fall of 1980, however, the photocopier shifted for a small number of researchers in SSL from a quotidian piece of office equipment to a scientific object (see Daston, 2000: 2). In what follows, I look at how that shift occurred and at the complex political and personal affiliations that this refiguring of the copier entailed.

The Problematic Product

As the market for reprographic technologies became more competitive throughout the 1970s, Xerox was pressed to respond. A case in point was the 8200 copier, a machine released in 1981 to secure the company's position in a particular market niche under threat by its competitors. The machine was distinguished, among other things, by the novel relationship between its technical configuration and its market positioning. Like all new products, the 8200 technically was a hybrid, combining components appropriated from already existing machines with various elements of redesign and transformation. In this case, however, exceptional time pressures tied to the machine's release date led to a greater than usual degree of appropriation of previous technologies. The contingency

of the 8200 on this process of dis- and re-aggregation was reflected in the designation of 'chainsaw' as its codename during development. Although machines like the photocopier are increasingly comprised of components developed semi-independently (in the form of input devices, central processors and output devices or 'finishers'), the integrity of the 8200 was sufficiently fragile that this sense of its 'multiplicity' was clearly recognized by its designers. Bringing these components together quickly and making them work as an integrated, coherent whole defined the task for product development.

The 8200 was distinguished as well by the introduction of components and features not previously seen on machines of its size and 'volume'.[7] These included most notably a device designed to feed pages of an original automatically, intended to ease the task of copying multi-page documents. The Recirculating Document Handler, or RDH, was an element that most photocopier users outside of centralized print shops had not previously encountered. The mechanism for paper handling was redesigned to enable copying on two sides of a page, and the output component was developed to include not only collating but also stapling of the finished document. All of these enhancements implied as well a greatly elaborated 'user interface', including not only aspects of industrial design, the lay-out of the machine's control panel and its instructions for use, but the actions required of the user herself.

At the same time that the 8200's functionality and associated requirements for its operation were extended, the machine was positioned in a new market for a machine of its kind, aimed at the 'casual' or 'walk-up' user. Whereas previous machines of its size and complexity would be located in a copy shop or centralized reprographics department, staffed by so-called 'dedicated' users whose job it was to operate them, the 8200 was positioned as a machine that would sit in a hallway or the corner of an office, available for use by anyone.[8] To be successful, the machine had to appear to its prospective users as the kind of object for which that positioning was appropriate—an object at once rich with new functionality but usable without dedicated training. The marketing campaign that accompanied the 'launch' of the machine targeted this potential contradiction between the 8200's appearance as a large, complex and intimidating machine, and its desired identity as a mundane, useful and approachable piece of office equipment. The industrial design, similarly, was aimed at 'black-boxing' the multiple components and inner workings of the machine, presenting the impression of a singular object without elaborate controls. Where Xerox advertising had previously assumed the usability of machines and focused on the quality of copies, the emphasis now—important just to the extent that the usability of the machine was in question—was on ease of operation.

Like the long line of copiers before it, the 8200 might have passed without much notice from anyone at PARC into the realm of the mundane furnishings of the office.[9] Instead, in a kind of reversal of the classic

trajectory posited for new technologies, it moved from the world of customer installation and product development back into that of research. Its appearance in the research center as a potential object of science was initiated by its failure as equipment for the office. Specifically, soon after its launch the company began to receive a wave of complaints from customers, summed as an assessment that the machine was 'too complicated'. And that assessment, in turn, became the basis for a new organizational object, named by product development 'the operability problem'.

Concerns over the 8200's operability problem were sufficient to prompt a delegation of customer support and product development managers to turn to PARC for assistance. The visit of the Reprographics Technology Support and Development Division (RTSDD) required that PARC management convene a relevant audience, and the most likely candidates were those of us in the Systems Science Laboratory interested in the 'human side' of the technological encounter. The research group of which I was part took as its primary disciplinary affiliation the cognitive sciences, particularly artificial intelligence and models of human learning and problem-solving, as well as a concern with the design of the user interface to complex systems. My presence as an anthropologist in the group—albeit at the time a PhD student in a temporary internship—added a further dimension to the premise that the group might have resources appropriate to address the problem. Most importantly, perhaps, it was politically advisable that someone in the research center demonstrate concern, such that doing so represented a form of service to the community. At the same time, it would be politically inadvisable from the point of view of PARC for us, as researchers, to become too entangled in a problem with a particular, already existing product. To become a scientific object, in other words, the 8200 copier would have to be made into something else.

The Research Object

With encouragement from our group manager, two of my colleagues and I began to explore the question of just how the 8200 copier might be remade into a legitimate object for research. The machine's starting qualification, as mentioned earlier, was its failure as a product, but that was only a start. To be recognizable as a scientific object, the 8200 had to be rendered interesting in the terms of the disciplinary communities with which the group, and each of us as individuals, were affiliated. One of my colleagues, R, was an expert in artificial intelligence; the other, A, was a computer scientist of broad experience but with a growing interest in questions of human interface design. My own position was as a PhD candidate in anthropology, strongly influenced by ethnomethodology and studies of face-to-face human interaction. With these orientations in play, we began to rework the operability problem as presented to us into the

Operability Project, a research effort to which R, A and I would be the primary contributors.[10]

My own starting place—informed by both an anthropological commitment to empirical fieldwork and an ethnomethodological orientation to the respecification of members' formulations—was to propose that we look more closely at the question of what actual experiences were glossed by the reported complaint that the machine was 'too complicated'. I pursued this, along with A, through visits to Xerox customer organizations in which the machine had been installed. These 'field' trips confirmed the bewildering behavior of the machine in its intended settings of use, but left A and me just as confused as those whom we witnessed attempting to operate it. Quite simply, would-be users would walk up to the machine, enter what seemed a reasonable set of commands via the control panel, and then be confronted by output that bore no intelligible relation to what they had asked for. Our presence to these events, identified as we were with the product's manufacturer, required some careful negotiation on our parts. That is, we needed to disaffiliate ourselves from the machine in order to (quite genuinely) maintain our status as no more knowledgeable about it than those who were attempting to use it. Somewhat ironically, we were able to do this by affiliating ourselves with Xerox research rather than product development. More specifically, we explained that we were engaged in a broader inquiry into the problem of operability but had no direct knowledge ourselves of this particular machine. Through this positioning we were able to offer sympathy for users' problems, without being enrolled in the quite different task of providing immediate solutions.

We concluded from these initial observations in the 'field' that our only hope of understanding the operability problem in detail would come through returning the machine to the more captive environment of the research laboratory. My colleague A then set to work to arrange for the installation of one of the machines at PARC, in a room designated for its analysis. The first phase of our investigation involved inviting our coworkers around PARC to try to use the machine for their own copying tasks, with agreement that we would make video records of their efforts. My analyses of the troubles evident in these video-taped encounters with the machine, including by pre-eminent scientists, led me to the conclusion that its obscurity was a function more of its users' unfamiliarity with this particular machine than of any lack of general technological sophistication. Far from being self-evident, as the product marketing campaign had suggested, the machine presented itself as an obscure object along multiple dimensions, including its parts (the RDH, the Bound Document Aid, or BDA, the 'output trays', etc.) and its operation. The problems reported by customers in making sense of the 8200 copier, moreover, had initially been met by a proliferation of instruction sets. These included not only the standard instructions attached to the machine in the form of a 'flip chart' and various displays presented on the control panel, but also

an assortment of labels affixed to the machine at various other locations. In addition, in response to the early complaints, customers had been provided with more schematic instructions in the form of a large poster to be hung on the wall behind the machine. My analysis suggested that this proliferation of instructional texts, rather than rendering the machine's operation more transparent, presented yet another 'system' to be deciphered as a prerequisite to its use. To operate the machine meant successful use of this collection of texts and the discovery of their relevance to it. This was not to suggest that the instructions were useless, but rather to indicate that their usefulness—like the object that they were designed to explicate—presupposed their successful reading and enactment as actions vis a vis the machine.

My colleague R, meanwhile, had embarked on the project of developing an 'intelligent, interactive' computer-based interface to the machine that would serve as a kind of coach or expert advisor in its proper use. Working within the context of mainstream research in artificial intelligence (AI) at the time, R adopted an approach based in a 'planning' model of human action and interaction, in which plans are taken as the equivalent of controlling algorithms that structure associated courses of action. As stated in a memo from R describing his project:

> We are taking the point of view that the system functions as an expert at doing copying tasks, rather than simply as a device for doing some of the steps in the task. It not only has the basic mechanical functionality of making copies, collating, stapling, etc., but also has expertise about the procedures to use for various types of copying tasks, and about instructing users in the performance of these procedures. (Design Notes, 23 November 1981)

To this end, the Operability Project introduced a new element to the photocopier assemblage; namely, a display-based, 'expert system' intended to replace its previous instruction set. To become a platform for expert systems development, moreover, the 8200 had to be coupled with a high-performance computer, and the choice of a limited-production machine designed at PARC further aligned the project with research.

For us as PARC researchers, in sum, the photocopier could not be an object that was of interest in its own right; it was of interest only as a vehicle for the pursuit of other things. This was true not just as a matter of how we understood the object or what it meant to us in any kind of private sense. Rather, the work of constituting the photocopier as a legitimate scientific object set the terms for the everyday enactment, with more and less difficulty, of our research agendas and identities. To become a scientific object within the context of the Systems Science Laboratory, the photocopier had to be constituted as relevant to recognized problems in the social and cognitive sciences, artificial intelligence and user interface design. The problem posed by product development needed to be reworked in the context of the research at PARC, from one of customer dissatisfaction to that of the invention of the self-explicating

system—the machine that includes a model of itself, that serves as a basis for analyzing, configuring and instructing the user.

The Object as Research Site

My own analyses of the 8200 as a problematic object were designed as a set of stories oriented to multiple audiences. First and foremost, my findings needed to strengthen my affiliation with relevant scientific colleagues, particularly academic researchers in the social sciences. To that end, as noted above, I worked to turn the 8200 into an appropriate site for an investigation of 'members' methods', and more specifically of a central object for ethnomethodological studies designated the problem of 'instructed action'. Formulated first by Harold Garfinkel and Harvey Sacks (1970), the observation was that the production of social order through everyday activity has, as both a primary resource and an ongoing, practical problem, the work of bringing various forms of occasioned instruction into productive relation with specific circumstances of action. Common examples include maps and written directions for how to get from place to place; recipes, procedures and the like; and, more generally, learning to become a competent societal member in a plethora of ways. The central insight from ethnomethodology is that, far from determining courses of action in any strong sense, instructions of whatever form presuppose competencies for their enactment that the instructions themselves do not fully specify. Applied to the case of the 8200, this insight provided a rich starting place for an analysis of problems at the human/machine interface. More generally, the photocopier could be approached as a relation between instructed action and its objects.

This set the stage, moreover, for the relevance of my research to a second, crucial audience; that is, Xerox product designers located in Rochester, NY. My starting place with respect to that audience was to work at making the machine, so familiar to them, strange in such a way that they could begin to grasp the nature of the user's experience in encountering it for the first time. Within ethnomethodology, the idea that objects are not self-evident has been developed through studies in a variety of areas. Garfinkel's notorious 'breaching experiments' were aimed at rendering mundane settings and their furnishings strange in the interest of recovering the members' methods through which they were made intelligible (see Garfinkel, 1984). I accordingly created a videotape compiled from my research footage with careful editing and narration. The video, titled 'The Machine Interface from the User's Point of View', was aimed at conveying the message, first, that the machine for the user was not the kind of transparent object that it was for its designers and, second, that the provision of instructions in the use of the machine did not simply eliminate the labor of sense-making on the part of the user but set up a kind of 'meta' field of action with its own prerequisites. The summary point was not that the designers had simply failed at their task in the case of the 8200, but rather that the 8200, and the 'operability

problem' more generally, made visible the profound challenges of designing a usable machine.

A further but equally critical audience for my research, given my location at PARC, was researchers in the cognitive sciences. More specifically, the manager of my research group and several of his protégés were interested in questions of learning and reasoning about complex systems, including the premise that these involve the acquisition and use of 'mental models' of the domain in question. At the same time, my manager was interested in questioning received wisdom within AI, and the cognitive sciences more generally, and saw my work as a potential source of provocative challenges. The orientation that I brought, away from a mentalistic account to one emphasizing the social and material bases of practical reasoning and action, aligned with this agenda. Taking plans as another 'formal analytic device' (Garfinkel and Sacks, 1970), my own project became a critique of the idea that plans determine actions in any strong sense. Instead I reframed them as yet another form of artifact, created in the course of situated activities of planning, and brought to bear on subsequent actions (see Suchman, 1987, 2003).

For researchers in cognitive science at this time, however, the phrase 'self-explanatory machine' was coming to take on new meaning. Along with the more traditional notion that an artifact is self-explanatory just to the extent that a prospective user is able to reconstruct how its designer intended it to be used, my colleagues were interested in the prospect that an artificially intelligent machine might actually be able to explain itself in something like the sense that a human being does. In this second sense the goal was not only that the artifact should be *intelligible* to the user as a tool, but that it should be *intelligent*—that is, able to understand the actions of the user and to provide for the rationality of its own operation. My project became a close study of a second series of encounters, now with the interactive, computer-based interface designed by R and A. I took as my focus the question of interactivity and assumptions about human conversation within the field of AI, working those against findings that were emerging in studies of face-to-face human conversation.[11]

My strategy was to take the premise of interaction seriously, and to apply a similar kind of analysis to encounters with the machine to those being done in conversation analysis. The trope of 'human–computer interaction' invited this affiliation, and I used Harvey Sacks's early paper 'On Sociological Description' to set the stage (Sacks, 1963). In this paper, among other things, Sacks imagines a trade show at which there is a machine that, as it is operating, provides a running account of its own operations. At the show as well are several paradigmatic observers, each of whom has a particular stance toward this self-explicating machine. Sacks develops his paper around the differences among the observers. But their differences were of less importance, for my purposes, than their common problem: for each of them, the relevant issue in making sense of

the machine is the relation between what the machine says and what it can be seen to be doing.

Metaphorically, the observers at the trade show and the machine observed are all members of the society, their common problem being that of construing the coherence of talk and actions. Through this metaphor Sacks is pointing, among other things, to something that is uniquely identifying of the social world. That is the fact that humans have the peculiar ability not only to act meaningfully but also to comment on the meaning of their actions. What is more, we not only construct such accounts about ourselves, but are also continually engaged in building second-order accounts about each other. We are self-explicating, in short, and treat others as such. And that is a fundamental premise for the intelligibility—and mutual intelligibility—of our actions. My colleagues' project was to realize Sacks's allegorical story in the form of a machine that would advance the AI agenda, while at the same time offering a practical solution to the problem of providing the user with instructions in its operation.

Although the troubles that people encountered in trying to operate the machine shifted with the use of the 'expert advisor', the task seemed as problematic as before. The result of my analysis of this second round of encounters was a renewed appreciation for some important differences, and more particularly asymmetries, between humans and machines as interactional partners, and for the profound difficulty of the problem of interactive interface design.

The Photocopier as an Ambivalent Object

The translation of 'the operability problem' into 'the Operability Project' reflected the requirement that research activities themselves, in order to be visible and reportable, be constituted as organizational objects. To appear on an agenda, or in an annual report on research progress, there must be some thing that can be named. The naming in this case, and more particularly its echoing of the problem as named in product development, signaled a commitment to current, and urgent, concerns of our sponsoring corporation. As mentioned above, one opportunity for demonstration of that commitment was the recurring occasion of visits to PARC from corporate management, when the photocopier acted as an affiliative object between research and business concerns. A subsequent example from my archive to the visit that initiated our investigations of the 8200 was a visit in early 1982 by senior managers of the Reprographics Business Group, of which RTSDD was a part. The agenda for their visit shows that the day involved demonstrations of research in progress, including the Alto computer and new imaging technologies for digital printing. But it included as well a presentation on the '8200 Operability Study Project' by my colleague A and the manager of our research group.[12] Agendas for such visits were carefully designed to have specific effects, combining some pedagogy (educating business division

managers on the technologies of the future that they *should* be attending to) with demonstrations of the relevance of research to recognized business interests. Among the initiatives presented on this particular occasion, the Operability Project clearly stood as the most directly relevant to the company's established concerns.

At the same time, being positioned as a representative of business relevance was an ambivalent assignment—crucial in maintaining PARC's good standing with some powerful representatives of the parent company, but questionable with respect to the research center's mandate to 'invent the future'.[13] Unlike engagement with the personal computer and associated technologies, affiliation with the photocopier by the 1980s meant marginality from the point of view of things valued at PARC—an identification with already existing products rather than emergent research objects, with analogue rather than the digital. And even visits from corporate management involved some uncertainty in this respect, insofar as relevance to existing concerns could always be read instead as a failure to take up the charge of defining future directions. So, on the occasion of a previous visit from the then manager of Corporate Industrial Design/Human Factors and a favorite consulting group, a presentation on the Operability Project was received with reported consternation at finding 'folks in the most advanced research arm of the corporation talking about copiers, rather than office information systems' (field notes, 11 June 1981).

The Digital Document Machine

At the same time that work at PARC was proceeding on the creation of new digital objects, wider initiatives were under way throughout the corporation. Although the photocopier continued as the basis for Xerox's revenue stream throughout the 1980s and 1990s, those decades saw as well a growing preoccupation with the question of how to move the company from being a producer of stand-alone, hardware-based devices to a producer of networked, software technologies and associated consulting services. Framed by senior management as a question of wholesale transformation, this effort was seen to require thoroughgoing changes not only in the company's technology offerings but in its workforce as well. These elements—new products, a redirected workforce and market repositioning—comprised the pieces from which a new corporate identity was to be constructed.

The first concerted wave in Xerox's reinvention of itself from a light lens copier manufacturer to a producer of digital systems began in the early 1990s, when the company launched a new 'corporate identity program'.[14] This process involved the adoption of a secondary descriptor, The Document Company, following the company name. This descriptor was intended, among other things, to define a territory for the company's products more open-ended than that suggested by the traditional copier

product line. The company name ensured recognition, while the descriptor 'The Document Company' afforded a strategic ambiguity amenable to expansion across new document forms and media.

In the mid-1990s the new corporate identity initiative entered a second phase, marked by engagement of a public relations firm, which delivered a comprehensive 'identity program' and prescriptions for its implementation. Three central elements of the program were a new color, a new logo and, most intriguingly, an inversion of the company name. Now, instead of occupying the position of descriptor, 'The Document Company' became the leading signature, with Xerox as a secondary clause. Through this process, organizational identity, in the form of a corporate image, was cast as something to be designed and implemented like the new technologies that were the company's products. The projects of innovation in identity and products went hand in hand, insofar as the new image was deemed necessary to successful marketing of a new product line. In this sense, image followed product, directed by the needs and desires of participation in new markets. At the same time, the creation of a new corporate identity led the production of new technologies, insofar as it worked as a kind of directive to organization members in how their own work should proceed. In this sense, new objects and new subjects were co-constructed, as digital technologies defined the entrepreneurial terrain into which the company and its products should be placed.

In order to succeed within the territory defined by this new terrain, however, Xerox needed not only to reinvent its identity but also to offer products identifiable as digital. The Document Systems announced in the mid-1990s represented the first of what promised to be a lineage of digital products. Management wisdom within the company assigned central responsibility for the success or failure of these products to sales personnel, specifically their willingness and ability to grasp the implications of the new digital product line and convey it effectively to customers. Instructions for how to sell the product were provided in the form of 'The Knowledge Kit', a collection of scripts packaged in three-ring binders with accompanying video, CD-ROM and diskette of PowerPoint slides. The key message of the kit was that the Document Systems were unlike previous company offerings: they were 'a totally new category' of machine. The marketing of these new products was oriented less to the problem of their functionality (though of course that is part of what sales people needed to learn) than to their identities. In particular, the products were to be presented to the customer as 'new', as qualitatively different from either the company's previous products or the offerings of the competition. Like the corporate identity package, the sales training kit became a kind of technology—an assemblage of artifacts and techniques for image management, treated in turn as a central aspect of the positioning of new products (including their positioning *as* new). Through these practices, identity creation was rendered as a kind of new

technology to be implemented, just as objects were assigned new identities in the social world.

Conclusion

In his introduction to the collection *The Social Life of Things*, Arjun Appadurai posits that 'commodities, like persons, have social lives' (1986: 3). To grasp the life of objects, he suggests that we embrace a strategic form of 'methodological fetishism', in which things-in-motion act as disclosing agents in studies of the social world (1986: 5). This requires that the study of objects be extended beyond the question of systems of economic exchange narrowly defined, to explore the different 'regimes of value' within which objects circulate. This essay has sketched the beginnings of an exploration of how a central, but at the same time deeply ambivalent, technological object moved through a particular organization. The case of the Haloid xerographic copier and its descendants, including its refiguring as the digital document machine of the 1990s, evidences the multiple trajectories of interest and action that give rise to 'new' products, and the latter's hybrid status between appropriation and invention. In the case of the 8200 copier more particularly, the problematic relations among the parts assembled to constitute the object, and between the object and its projected subjects, returned the 8200 from customer installations and sites of product development to the research laboratories of Xerox PARC. Once there, the 8200 was disaggregated and multiplied as an object—into more than one but less than many, in Law's terms (2002: 3)—comprising various sites for research, including artificial intelligence, user interface design, human cognition and learning, ethnomethods of the machine-in-use, human–machine interaction, and the enterprises of cognitive science and product design themselves. The 8200's failure as a quotidian object laid the grounds for its reinvention as an object of scientific research.

To succeed as a research object, however, the 8200 had to be affiliated with others. The design of the expert system undertaken by R quite literally joined the copier to a state of the art minicomputer, as well as aligning it with techniques current within the AI research community, while A's focus was on research in the area of 'soft', display-based user interfaces. My own efforts joined the 8200 with contemporary theorizing regarding questions of practical action and interaction, citing discussions within ethnomethodology and conversation analysis both to analyze human–machine encounters and to question basic assumptions within the cognitive sciences. Through these practices of material and discursive assemblage, we affiliated the 8200 as an object with our own interests and desires as scientific subjects, as well as with our audiences (see also Suchman et al., 2002). That our stories about the machine were various and generally failed to cite each other is a sign not of duplicity or dissembling but of the variety and multiplicity of

our own subject positions and the multiple possibilities that the object afforded us in living them. To be a competent researcher was to find those possibilities, to craft our stories and align them effectively with relevant others.

To transform the copier into a scientific object required reworking its boundaries: for R, into a vehicle for knowledge representation and the creation of an associated expert system; for A, into an instance of the larger problem of user interface design, leading to the creation of an innovative programming environment. For me, the copier became a research object studied 'in the field' and in a laboratory, surrounded by video cameras and encountered by research subjects. This placed it in the service of studies of the ethnomethods of machine operation and practical action more generally, as well as of a critical ethnography of the fields of artificial intelligence and human–computer interaction. But none of these positionings of the copier was achieved once and for all. Although the copier's mundane status was the thing that made it relevant for users and for the majority of the company, this very commonality continually threatened to undermine its, and our own, scientific standing. The ambivalence of the photocopier as an affiliative object arose from its positioning between past and future, analogue and digital, product and research object. The progressive differentiation of the company's products from light lens copiers to digital 'document machines' required a systemic effort on multiple fronts, including marketing and reinvention of the Xerox brand, of subject and object identities. This is another sense, then, in which 'artefacts have politics' (Winner, 1986), enacted not on the grand scale but in the micro politics of everyday organizational life.

If we start from the premise that objects are radically situated and correspondingly multiple, the question shifts from how to explain differences across sites to that of what holds 'an object' together in practice. The answer proposed by Mol and Law (2002: 10) is that this requires enormous efforts of coordination, through an array of other objects and practices or, perhaps better, in relation to those things. Singularity comes not from the separateness of objects but from their ongoing, contingent connections. Singularity and separateness are not inherent properties but effects, achieved through particular pragmatic arrangements; through 'interferences' or overlaps across multiplicity (Law, 2002: 126). As Mol and Law write of the patient's body:

> In practice, if a body hangs together, this is not because its coherence precedes the knowledge generated about it but because the various coordination strategies involved succeed in reassembling multiple versions of reality. (2002: 10)

This is a radically contextual view, in which objects and their positions are inseparable, subjects are always located, and subjects and objects mutually implicate each other. It joins with others (e.g. Haraway, 1991; Pickering, 1995; Strathern, 1999; Verran, 2001; Mol, 2002; Law, 2002;

Barad, 2003) in exploring the inseparability of ontology and epistemology. Methodologically, it means that the value of a case such as that offered here lies not in its instantiation of a general theory but in its suggestions for further—comparative and contrastive—investigation. Cases, like objects, are multiple, affiliative and subject to mutual interferences as well as partial connections (Mol and Law, 2002: 15).

My aim in presenting this case has been to consider some of the various forms that object-centered affiliations can take. The case would seem to raise questions regarding the premise that object relations have somehow displaced person-centered sociality, at least in organizations such as the one considered here. Instead we find the evidence for intensified forms of affiliation (and contest) among persons that arise through common object orientations. Knorr-Cetina suggests as well that an attraction of objects might be their relative safety: '[i]n this scenario, objects may simply be the risk winners of human relationship risks and failures' (1997: 23). But this case again would indicate that, insofar as object relations always imply associated relations among persons, an object-centered sociality by no means ensures safety. Rather, the constitution of objects and subjects, risk and certainty, failure and success, and other aspects of object-centered sociality in contemporary sites of technoscientific practice is contingent, enacted within culturally and historically specific fields of persons and things. Within those fields, the multiplicity of objects affords ever ramifying, but always equivocal, opportunities for organizational, personal and technological reproduction and transformation.

Notes

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1 Although strong cases have been made for the intimate relationship between material things and the conceptual 'objects' of activity, the focus of this paper is on objects as understood in the more colloquial sense. I assume, however, that objects in this sense are always constituted in activity, and imaginatively as well as materially. See also Lynch and Woolgar (1990), Goodwin (1994), Goodwin and Goodwin (1996), Heath and Hindmarsh (2000), Law (2002), Callon (1986), Latour (1993), Pickering (1995), Knorr-Cetina (1997), Barad (2003), Daston (2000), Smith (1996), Engeström (1995), Bucciarelli (1994).

2 For an overview of laboratory studies, see Knorr-Cetina (1995). See also Knorr-Cetina and Bruegger (2002).

3 The question of the originality of objects has been extensively addressed in discussions of intellectual property (see, for example, Coombe, 1998).

Although members of the organization described here were increasingly enrolled in projects of patenting, the focus of this paper is on a broader repertoire of practices through which the 'newness' of objects is asserted and contested.

4 For popular histories of PARC's founding and first decade, see Smith and Alexander (1988) and Hiltzik (1999).

5 For this history, see Schwartz (1998: ch. 6).

6 This and other observations in this paper are drawn from field notes that I maintained between August 1980 and June 1981, along with observations, experiences and documentary records collected over the subsequent 20 years of my employment as a research scientist at PARC.

7 Copiers were classified for both development and marketing purposes along a scale of production, as 'low', 'mid' and 'high' volume. As discussed below, these categories implied as well particular scenarios of placement and configurations of user.

8 In practice, most copiers, particularly of the size of the 8200, are placed in store rooms or other dedicated spaces to contain the noise and associated stocks of paper, toner, etc. that they bring with them. The 'hallway' or other open space nonetheless was the paradigmatic setting for the 'casual' user.

9 In his cultural history of practices of copying, Schwartz traces practices of copying back to a time when they were not mundane but sacred, specifically in the religious orders of the 10th century (1998: 215). Even then, however, pressures were on to speed up the process, increasing accuracy while decreasing human labor.

10 For a critical analysis of the trope of the 'project' in technological research and development, see Law (2002). See also Button and Sharrock (1996).

11 The main observation of studies of face-to-face human conversation was that human conversation does not follow the kind of message-passing or exchange model that formal, mathematical theories of communication posit. Rather, humans dynamically co-construct the mutual intelligibility of a conversation through an extraordinarily rich array of embodied interactional competencies, strongly situated in the circumstances at hand (which are, in turn, unfolding through that same interaction).

12 The decision as to which researchers would participate in such presentations was directly shaped by the position of visitors in the organizational hierarchy, the importance of the researchers marking assessments of the relative importance of the visitors, and vice versa. The making of agendas, in terms of both what projects would be featured and who would be enrolled to represent them, was a deeply political matter.

13 The ambivalent status of corporate management was evident, for example, in references to those most resolutely committed to the company's reprographics business as 'toner heads'.

14 For more on this initiative, see Suchman and Bishop (2000).

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