Bras, closets, collars, bathrooms: Judith McGaw begins with a series of artifacts not often included in common definitions of technology. She calls these "feminine" technologies because they are either used by or predominantly associated with female people. This piece was originally written for archaeologists, who are often left to draw conclusions about entire cultures from surviving objects and house plans. McGaw argues that the issues raised by studying these sometimes invisible modern technologies will shed light on technologies we may think of more readily—cars, electricity, and so forth—as well as on our understandings of technologies of earlier times. How does gender analysis influence McGaw's perspective on technology? In what ways have gender ideologies shaped the technologies she discusses here? McGaw is deliberately provocative in this piece—what do you think about her conclusion that "feminine technologies matter because they disclose the system's fatal flaws"?
What can we learn about gender and technology by subjecting contemporary artifacts to the close material and cultural scrutiny we generally reserve for prehistoric and precapitalist objects? Can the gender conscious study of modern, Western technology offer archaeologists analyzing gender and technology in earlier eras a salutary comparative perspective? This essay demonstrates the utility of such an approach. It carefully examines several objects—the brassiere, the closet, the white collar, and the bathroom—selected to represent what I call "feminine technologies." I argue that unearthing the cultural context and artifactual precursors of such feminine technologies exposes pervasive aspects of our society's relationship to technology—aspects that as scholars and as citizens we ignore at our peril.

Although informed by perspectives drawn from historic and industrial archaeology and physical and cultural anthropology, the following is the work of a historian of technology rather than an archaeologist. Archaeologists face the perennial challenge of being sufficiently self-critical to avoid reading personal cultural conditioning into the artifacts of other times and places. Turning to a new area of concern—the archaeological study of gender and technology—creates a new responsibility to become aware of the intertwined assumptions about gender and technology that inform our modern, Western perspective. Ideally, the historical study of recent technology promotes such cultural awareness. And research such as mine—shaped by the desire to address general public concerns—is especially suited to provoke personal reflection among Americans who are also archaeologists.

My concern to reach an audience that includes the literate lay public also raises issues germane to this volume's emphasis on teaching about technology and gender. Like most Americans, our students often feel disenfranchised in the realm of technological decision-making because they lack the requisite expertise. In fact, my commitment to research and write so as to communicate with a broader audience stems from my growing conviction that, in asserting their claims to expertise as befits a rapidly professionalizing group of scholars, historians of technology merely deepen the central dilemma of modern technology—the pervasive conviction that most of us do not know enough to participate in technological decision-making; that we have to trust technology to the experts.

My guess is that, like most of us, when it comes to understanding technology and gender, archaeologists and their students know too much rather than too little. For example, one of my principal arguments is that when we consider modern American technology, we are most constrained by our narrow preconceptions of technology. We start off on the wrong foot because we hear the word "technology" and immediately envision complex mechanisms, sophisticated electronics, or mysterious molecular combinations. In any event, our initial image is of technology as hardware. We may, as historians of technology generally do, notice the "-ology" in technology and concede that it includes knowledge as well as tools, but, again, we tend to imagine most of that knowledge as the purview of engineers and their corporate and government managers.3 Hence my title: "Reconceiving Technology." My largest contention is that we will continue in the squirrel-wheel of current technological thinking as long as we construe technology so narrowly.

My subtitle—"Why Feminine Technologies Matter"—is meant to point the way toward a broader outlook. There are, of course, lots of reasons why the technologies associated with women should matter to scholars and citizens. Feminist scholars have already articulated many of them. At the very least, a full picture of technology has to include the tools, skills, and knowledge associated with the female majority. Moreover, in societies such as ours in which women do most child rearing and tending, our subconscious, unarticulated technological convictions must derive principally from our early preverbal experience around technologies selected and manipulated by women. It is also true that until we began to study women and technological change, we were able to remain unaware and ignorant of technology's masculine dimensions—we studied inventors, engineers, and entrepreneurs as though they were simply "people," oblivious to the ramifications of the overwhelming masculine predominance, both numerically and politically, in the so-called technological professions.

Thus, there is an abundance of good reasons to study women and technology. In what follows I emphasize yet another reason: looking at feminine technologies makes visible precisely those aspects of technology that we need to examine if we seek alternatives to a modern, Western technology that appears to be self-destructive, self-justifying, and self-perpetuating. By feminine technologies, I mean those technologies associated with women by virtue of their biology: tam-
pons, brassieres, and IUDs, for example. And I mean those technologies that almost all American women use by virtue of their social roles: kitchen utensils, household cleaning products, and sewing needles, for example. Beginning with a look at such items, I hope to suggest a broader view of feminine technologies as well.

Archaeologists, anthropologists, and historians of non-Western technology might readily argue that studies of prehistoric and non-Western technologies serve equally well to make visible aspects of technology that we fail to see when examining more familiar examples. Although this is certainly the case, archaeologists also recognize how inextricably intertwined are technologies and their cultures. Indeed, many have learned from their own experiences how formidable is the challenge of disentangling their personal cultural sense of technology from the assumptions they deploy when associating prehistoric or non-Western technology with its culture. For Westerners generally and for archaeologists who are also Westerners, then, the more idiosyncratic features of our technological beliefs and practices may best be observed by working with Western examples. Feminine technologies have the advantage of already being domesticated, in both senses of the word: they are Western, but outside the masculine mainstream.

Moreover, an accessible study of feminine technologies promises an immediate practical payoff. It can help to persuade the people in our society most convinced that they lack technological expertise—namely women—that, to the contrary, they know more than enough to contribute intelligently to any discussion of technology policy. Simultaneously, it can challenge archaeologists and other scholars with an interest in gender to recognize unexamined and unsupported assumptions about the sexual division of technological expertise in the past.

In what follows, I discuss briefly several of the case studies that form the backbone of my current work. In so doing I will delineate some of those neglected aspects of technology that we suddenly see clearly when we look at feminine technology. In general, by calling our attention to the technological knowledge associated with the selection and use of products, the study of women's technologies reveals technological choice and technological knowledge to be pervasive, not confined to a corps of experts. It shows that neither tools nor professional technologists determine the ultimate form of a technological activity: purchasers and users do.

Looking at feminine technologies also means looking especially at the relations of technology and biology. In the process, it suggests how extensively modern technology has been driven by the impulse to obscure the reality that we are animals as well as intellects. And, because feminine technologies are often the technologies of the private sphere, bringing them to light exposes how intertwined with modern technologies are novel conceptions of privacy, conceptions very much at issue in current political debates. At the same time, examining women's technological activities helps expose the deep and obscure ties between public and private, linkages that ultimately make the distinction problematic, linkages encapsulated in such an oxymoron as the "right to privacy."

Finally, and perhaps most importantly for archaeologists and other students of the past, studies of feminine technology give us a novel perspective on that most troublesome of notions in technological history: progress. Although historians of technology have made a major commitment to eradicating this value-laden concept, what they have mostly done is to reveal technology's social construction. They have demonstrated, that is, that technology has no inherent logic of its own, but embodies the perspective of its creators: that it gets "better" only in the sense that it better serves the interests of those empowered to make technological decisions. This is a long and laudable step away from the "march of progress" story that historians generally made of technology several decades ago. Nonetheless, it leaves untouched the notion that there is such a thing as a "better" technology: one that would materialize if only a better social system governed technology's development.

Mechanizing the Biological: The Brassiere as High-Tech

Close scrutiny of feminine technologies reveals that our whole notion of "better" may be specious. Consider, for example, the brassiere. The brassiere is one of the many feminine technologies about which technological history tells us virtually nothing. Yet in other respects—other than being used by women, that is—the brassiere falls into precisely those categories that scholars have deemed most worthy of study. Judging from the word brassiere's initial appearance in our language—1911—according to the OED supplement—this undergarment is a thoroughly modern invention. Like many of the technologies historians of technology have deemed especially worth studying—automobiles, industrial research labs, and electric light and power systems, for example—it evidently originated during the late nineteenth and early twentieth centuries, the era often designated the Second Industrial Revolution. As clothing goes, the brassiere qualifies as "high tech,"
incorporating relatively early on such sophisticated products of the chemical industries as rubber and synthetic fiber. And its inclusion of such components as wires to stabilize it and adjustable straps and fasteners to modify it makes it visibly more complex than we expect of mere clothing. Indeed, early brassieres frequently list patent numbers on attached labels, underscoring their technological character.

Those of us who lived through the early years of the contemporary women's movement, when feminists were often dismissed as "bra burners," will immediately recognize one way in which the history of the brassiere renders progress a profoundly dubious notion. The avowed purpose of the brassiere is to support the breast tissue, yet there is no convincing evidence that breasts need support. Even breasts so large that they quickly droop in the absence of support cannot be said to "need" support; at best we are discussing a preference. Clearly, the brassiere serves essentially cosmetic purposes; changes in it are closely associated with changes in fashion, changing definitions of feminine beauty, and changing prescriptions for feminine behavior.

Our first impulse, then, might be to dismiss brassieres as not "real" technology, like such functional technologies as automobiles, industrial research labs, and electric light and power systems, for example. Yet if we are willing to take this feminine technology seriously, we may be pushed to ask important neglected questions about "real" technologies. How much, for example, do automobiles serve a cosmetic purpose, especially a purpose associated historically with enhanced masculinity? Do they in fact provide the freedom and speed of travel often considered as their function, or merely the illusion of freedom and speed? Likewise, how much of the role of industrial research labs is "real" and how much part of projecting the image that DuPont wants us to experience "better living through chemistry" and that GE devotes itself to bringing "good things to light"? For that matter, although anyone who knows the history of industrial fires or of domestic cleaning can recognize important safety and labor-reducing functions of electric light and power systems, how much of their early and continuing output has gone to uses best described as decorative, cosmetic? How bright do our homes and offices "need" to be, for example?

Looking at the brassiere more closely makes the notion of technological progress problematic at yet another level. The heart of my study of this technology has involved talking with women, focusing on a single question: How do you know that your bra fits? When women's answers are combined with the accounts of saleswomen and gynecologists, and with prescriptive literature on the subject, articles in girls' and women's magazines, for example, one large conclusion emerges: it doesn't. No one's bra fits. When asked, women talk in terms of making the best of a limited array of choices or of finding something less unsatisfactory than their previous choice. They may even wax enthusiastic about the latest innovation: a more comfortable fabric, less irritating strap width, more accommodating cup size, less inconvenient fastener. But although no one says it directly, it is implicit in everyone's responses: brassieres don't fit. At best, the real experts in this field—individual consumers and saleswomen—learn to know what brands come closest in particular cases.

The central problem with this feminine technology goes beyond issues of capitalist exploitation of the consumer or patriarchal disregard for women's concerns; arguments to which analysis through social construction readily leads. The central problem is that you cannot make a bra that fits. You cannot because breasts are living things, not standardized commodities. Any given woman's two breasts are never exactly the same size and shape. And the size and shape of any given woman's breasts change continuously—as she ages, as she gains or loses weight, as she goes through pregnancies, as she experiences her monthly hormonal cycles. Added to the underlying problem with all ready-to-wear clothing—that people do not come in standard sizes—these considerations make the brassiere an especially stark example of modern technology's inherent inadequacy in the area to which it has increasingly turned its attention: standardizing the biological.

Myths of technological expertise to the contrary notwithstanding, ordinary women are the great experts in this area. They make the compromises and create the knowledge that permits a deeply flawed system to work. In the case of brassieres, they begin in adolescence to build and maintain a highly personalized body of information (technology as knowledge) that serves to adjust a standard system to individual difference. Thus far, I have found little evidence that women have ever gained much of this expertise from their mothers, probably because adolescence—the time when a woman would be most likely to need it—is, in this culture, a time when communication between the generations is especially difficult—and nowhere more so than in decisions about personal appearance. Peer exchanges and individual experimentation serve as the principal sources of technological development, with professional expertise—either from saleswomen or from written materials—playing a distinctly minor role.
knowledge about the best brands and styles for the individual; the necessary adjustments, including structural modifications and additions; and the variations that suit particular outergarments and activities needs continuous modification because the options available for purchase change frequently. And, as women who want or need to avoid synthetic fabrics make especially clear, there is little to suggest that, even within the inherent limitations of the technology, brassieres exhibit technological progress.

Brassieres are only one of many technologies intended to suit the mechanical to the biological. And women's knowledge plays a crucial role by compensating for the inadequacies of many of these technologies. Women do a disproportionate share of the society's clothes shopping and clothing modification, an area in which their labor is economically and socially invisible and is further obscured by jokes about their propensity to shop. Likewise, women work hard to offset the deficiencies of the various foods suited to mechanical harvesting and long-term storage, devising ways to create flavorful meals while relying on products such as canned vegetables, iceberg lettuce, and Delicious apples, to name but the most obvious examples, and acquiring the continuously changing knowledge of how to assess food's probable freshness, potential longevity, and possible safety. And they have developed the skill that has modified several generations worth of new and standardized diapering products to variously shaped and rapidly changing infants and toddlers.

Thus, beginning with a simple technology like a bra and asking a simple question like, "How do you know it fits?" leads us rather quickly to some important reconceptualizations of technology. First, we find that, although we usually associate technology with utility, its actual role is often decorative or cosmetic. Its kinship to the visual arts, heretofore recognized mostly in studies of inventors, may turn out to be its most important relationship. Second, we recognize that, where living things and people are concerned, apparently functional technology is inherently flawed; that the services which the producers of goods apparently render actually serve us only because goods are made serviceable through women's invisible bodies of knowledge— the technology of consumption and modification.

In sum, these observations reveal technology to be far less solid, substantial, and straightforward than we commonly assume in our discussions of technological progress or technology policy. Assessing whether technology is "better" seems a pretty dubious enterprise once we see how much of it is smoke and mirrors, how illusive are its boundaries and intentions.

Inside the White Box: Closets, Cupboards, and the Technology of Filing

Feminine technology proves equally provocative when we turn to an older, simpler, and more clearly utilitarian example: the closet. For those acquainted with early modern Anglo-American material culture, the story of closets begins as a familiar one. In fact, its history offers an abbreviated account of technological development from the late medieval and early modern era through the Industrial Revolution. Judging from surviving structures, house plans, inventories, and the linguistic history of terms such as "closet," "cupboard," "dresser," "bureau," "pantry," "larder," and "cabinet," closets and other storage spaces were comparatively rare until the century or so just before the onset of the British and American Industrial Revolutions. Earlier usage of terms denoting the technologies of storage expresses that closets and other built-in or wooden containers were limited to the dwellings of the extremely affluent or privileged: royalty, the church, and those with plate, jewelry, or similar goods requiring specialized storage.

Beginning in the seventeenth century, this situation began to change. Words such as closet and cupboard came increasingly to be used in their modern sense, as storage spaces for utensils, provisions, and other, more common goods. Inventories confirm that storage furniture such as cabinets and dressers grew more pervasive. They also reveal that storage technology had developed at least in part because more and more people had more and more goods to store. Thus, the growing commonness of closets and cabinets highlights something histories of industrial technology too often ignore: the Industrial Revolution was, in the first instance, a response to rising consumption—to a growing market among people of the middling sort for goods such as ceramics, woodenware, textiles, and iron implements. Consumer initiative directed the activity of those who came to invent, develop, and invest in the new manufacturing technology.

By the early nineteenth century the Industrial Revolution was in full swing, lowering substantially the real cost of most of the items people had come to store in closets. Not surprisingly, closets proliferated. Indeed, the abundance of closets—built-in storage spaces—is one key technological change evident in Victorian house plans. Building technology abetted this innovation. By the nineteenth century, Americans generally employed balloon-frame construction, a system using light two-by-fours and nails in lieu of heavier timbers of irregular dimensions that
had been specially notched and pegged together. The new system dramatically reduced building costs, permitting house purchasers not only to have more rooms, but also to have more ells, bay windows, closets, and similar small nooks set apart within larger rooms.

Linguistic clues show that, within the new context of abundance, storage technology was also transformed—we might even say reinvented. Historically, the various sorts of storage spaces had been highly specialized. The “-ology” part of the technology—the rules governing use of closets, larders, and pantries—had circumscribed their contents. Thus, larders, as the word echoes, originally housed pork products in particular and came to serve as meat storehouses. Pantries, as the word’s French derivative might signal, were bread rooms, a use broadened to include other foodstuffs by the seventeenth century. Cupboards originally held cups and other vessels, as one might guess from looking at the word. Cabinets, historically meaning “little cabins,” were repositories with locks for storing valuables such as jewels or documents.

By the eighteenth century these distinctions were clearly breaking down. Cupboards had come to hold meat, money, bread, and books; larders stored food of all sorts; and pantries might contain plate and linen, as well as provisions generally. Nineteenth-century usage suggests even more overlap in function. Nor was the re-invention of storage technology confined to its software: the rules governing what might be stored where. At the close of the eighteenth century, that mistress of precise word use, Jane Austen, wrote of “A closet full of shelves...it should therefore be called a cupboard rather than a closet.” Her attempt to reassert traditional usage signals its decline. Clearly, closets—separate tiny rooms—now sometimes contained shelves, whereas formerly shelf storage had characterized cupboards, pieces of furniture often placed in a room’s corner or recess.

The most pervasive change in the hardware of storage was the shift from open display to total enclosure. Originally the cupboard was a board or table on which plate and ceramics were displayed. Likewise, “dresser” designated the kitchen table on which food was dressed and the hall or dining room table from which dishes were served and on which empty dishes were arrayed. Both word usage and surviving artifacts show dressers and cupboards becoming more cabinet-like, more enclosed. Simultaneously, the terms “closet” and “cabinet,” originally signifying separate rooms, increasingly referred to mere storage enclosures.

Although the axiom “necessity is the mother of invention” might explain the proliferation of storage spaces, the abundance of new things to be stored did not necessitate their enclosure, much less their increasingly promiscuous arrangement. Indeed, one might more easily imagine that having more things to keep track of would encourage people to place them where they could be seen and to array them in specialized containers.

Making sense of the new storage technology begins by remembering who performed the work of storage. In late medieval and early modern England, where larders and cupboards and closets were confined to palaces and monasteries, specialized servants supervised and manipulated the technology of storage. Terms such as “butler’s pantry” or “housemaid’s pantry” indicate the linkage of specialized technology with specialized laborer. By contrast, as household goods grew more numerous in common people’s homes on the eve of industrialization and, later, as they gradually filled the residences of the new industrial middle class, a single, unspecialized worker—the housewife—supervised disposition of the entire array and performed much of the manual labor of storage and retrieval as well.

Housewives, because of their multiple concerns, brought new considerations to decisions about how to array goods. For example, eighteenth- and nineteenth-century housewives could expect to spend a substantial part of their careers supervising small children while performing their work. Storing goods so as to keep them away from infants and toddlers must have been important to such women, whereas the butlers of the noble or affluent could expect nursemaids to keep children away from ceramics, foodstuffs, and linen.

Similarly, as unspecialized domestic workers, housewives performed cleaning as well as storage tasks. Storing goods in enclosed spaces greatly reduced the work of cleaning by separating linen and utensils from the soot and ash pervasive in houses containing the innumerable fires necessitated by eighteenth- and nineteenth-century cooking, heating, and lighting technologies. Indeed, as Ruth Schwartz Cowan has observed, modern notions of household cleanliness are only conceivable where most items are no longer left on the table but have separate places where they can be stored. Only where goods and implements can be moved to cupboards or closets can table and counter surfaces be kept free from food debris and dust.

So much for the hardware of the closet, what of the software? Why wouldn’t it still make sense to keep the contents of closets homogeneous? Judging from household inventories, the answer, once again, lies in the fact that closets had become women’s technologies. And what housewives needed most from their storage tech-
nologies was to find the implements of their work proximate to their workplaces. Food, cooking implements, and seining dishes belonged together in the kitchen pantry or dresser. Dining linen was handiest when placed with china and glassware, whereas bed linen was most accessible if stored in bed chamber closets alongside the clothing and personal goods of the chamber’s occupant. Whatever their original uses, broken goods, obsolete tools, and worn-out items could be consigned to attics or spare rooms.

This new technology of filing did not emerge overnight. Household inventories from the eighteenth century suggest a diversity of arrangements although, as Robert St. George has noted, rules of appropriate order become increasingly evident. By the mid-nineteenth century, the process was sufficiently complete, at least in the mid-Atlantic states, that inventory takers could merely list “Sundries in the Kitchen,” “Sundries in the Pantry,” and “Sundries in the Chamber” in the certainty that people knew roughly what items belonged there.

But only the housewife knew precisely what belonged where. As with all filing systems, the knowledge part of the technology had to be idiosyncratic to function successfully. No two households had the same array of goods, users, or storage spaces, or the same chronology of acquisition. So only the housewife knew where to find and where to replace all of the family’s diverse and growing inventory of possessions. By the late nineteenth century virtually all middle-class girls must have received domestic training in this sort of filing. Thus, it is hardly surprising that, once government and corporate bureaucracies came to require extensive filing systems, they could find an abundant supply of female employees to perform the labor skillfully, yet at low pay, just as manufacturers had experienced little trouble finding cheap female labor to perform supposedly unskilled sewing tasks.

Ironically, then, like the complex household appliances of the twentieth century, the eighteenth- and nineteenth-century closet began by promising to be labor saving—to reduce cleaning, that is—but ended up creating more work.

Anyone who has kept house knows how much time is spent in picking things up and putting them away. And, like most twentieth-century household appliances, the work of nineteenth-century storage technology came to be used not to reduce cleaning, but to permit higher standards of cleanliness.

Anyone who has performed housework also knows how hard it is to delegate tasks such as cooking to someone who does not know where to find the tools and ingredients, or tasks such as laundry to someone who does not know where to put things away. In other words, comic strips and sitcoms featuring the inept husband dependent on his wife to find necessary items of dress or grooming point to real skills housewives need to have. The extensiveness and social invisibility of these household filing skills help explain why housework has remained so resistant to the division of labor, even where husbands and wives have attempted more equitable arrangements.

White Collar: On Cleanliness and Class

Since women’s work often employs apparently simple technology, such as closets, that actually entails extremely complex bodies of knowledge, such as filing, study of feminine technology makes us especially aware of how much resistance to technological change derives from our investment in the invisible software that is generally the largest aspect of technology and the aspect we most frequently miss when attempting to comprehend the technology. Not only does the knowledge and skill part of technology help account for the persistent gendered division of labor that remains inexplicable in terms of economic rationality, it also helps explain many other apparently irrational aspects of technological choice. Why, for example, has there been the desire for greater cleanliness inspired extensive innovation in household technology and household labor for more than two centuries? The answer to that question is multifaceted and largely beyond the scope of this essay.

A full answer will certainly require that we examine the profound influence of evangelical Protestantism in our avowedly secular culture. It is no coincidence, for example, that the belief that “cleanliness is next to godliness” was first articulated on the eve of industrialization. And it is no surprise that the originator of the axiom was John Wesley, writing in a tract entitled “On Dress” that was especially directed to women.

Understanding the driving force of cleanliness also involves tracing the association of cleanliness and class, especially in America where geographic mobility and ethnic diversity made external markers more essential than in most other Western societies. Ruth Cowan’s work conveys with particular clarity the dynamic linkages between class, cleanliness, and twentieth-century household technology. My window on the process is a single artifact—the white collar—whose history encapsulates central themes in the history of women’s domestic work.

Although specific features of the white collar’s history differ from anything archaeological evidence is likely to reveal, at least two aspects of its history are germane to interpreting archaeological evidence. First, the case of the white collar
directs our attention to a prerequisite for technology’s adoption and diffusion that scholars rarely consider: maintenance. The diffusion of the white collar—a clothing technology employed to signify class—cannot be understood without comprehending the nature of laundry technology—the maintenance tools and procedures that assured the white collar’s social utility. Second, study of the white collar indicates that we cannot simply write off changes in a garment’s form as superficial matters of fashion. As in this instance, fluctuations in form may be firmly linked to a garment’s shifting social function. Thus, where archaeologists have reason to suspect the presence of social hierarchy, engendering archaeology may call for close attention to technology’s possible symbolic functions. Or it may require imaginative reconstruction of maintenance procedures that were the work of very different people from those who deployed the technology.

The history of the white collar may be recounted briefly. Among early modern English people and colonial Americans, almost no one wore collars, or anything we would consider white. The starched white ruff or collar band had long symbolized gentility, because, unlike the rest of the shirt, its quality and condition were visible. Keeping a collar starched and white required considerable labor, despite the general practice of making ruffs and collars detachable, a practice that at least limited the laundress’s most heroic efforts to collars alone. A white collar signified that someone, usually a female servant supervised by the mistress of the house, had performed the following tasks: making soap, hauling water, filling and emptying washtubs a number of times, building a fire and heating the water, soaking the clothes, rubbing the clothes against a washtub, wringing them out several times, soaking dirty spots several times, boiling the clothes, rinsing them, making starch, dipping collars and other parts to be stiffened in the starch, hanging the clothes to dry, dampening them, heating irons on the hearth, testing the irons, and ironing the garments.

During the late eighteenth and early nineteenth century when industrial and political revolutions were transforming Anglo-American class structures, the white collar reflected that social instability in its exceedingly diverse forms. Among the elite, the collar was now generally attached to the shirt, underscoring the owner’s ability to pay someone to render the whole garment white. Its size varied considerably. In the early nineteenth century, fashionable men’s collars might be so large that before folding they hid the face entirely. Contemporaries clearly recognized what large white collars represented in women’s work. One early nineteenth-century periodical commented that when Beau Brummell first sported the new fashion, “dandies were struck dumb with envy and washerwomen miscarried.” At the same time, many men eschewed the display of the collar as undemocratic, wearing neckcloths that hid it completely. This was also the era when the “dickey” or false shirtfront with attached collar appeared to accommodate those who couldn’t afford to launder entire shirts. Although out of favor among the genteel, detachable collars also persisted. In sum, during an era of enormous social change and unrest, collars reveal the guardians of gentility struggling to maintain “the thin white line which cut the community in two, separating the gentleman of leisure from the manual worker.”

Part of the difficulty, of course, was the proliferation of ambiguous jobs whose occupants were neither leisured nor manual laborers: professionals, factory owners, and, especially, clerks and salesmen of various sorts—people who came to be designated white-collar workers. By mid-century the vast majority of those sporting white collars fell into the latter category. What distinguished white-collar workers was that, despite their modest incomes, their work entailed close proximity to employers or customers who required assurance of their social respectability. White collars continued to testify that the wearer could afford their maintenance, which remained considerable. The technical aspects of keeping white collars white had changed little by the mid-nineteenth century save that women now often purchased ready-made soap and they increasingly used cast iron stoves to heat their water and irons. They also generally subjected white garments to an extra rinse in water containing bluing, requiring an extra wringing as well. In general, then, wearing a white collar showed that a man paid a laundress, but also supported a full-time housewife who supervised the labor. In other words, white collars signaled adherence to the basic tenets of Victorian middle-class life.

As the nineteenth century wore on, the tenuous hold many white-collar workers had on middle-class status was recognized by the increased acceptability of detachable collars, although the existence of disposable paper collars reveals that maintaining white-collar respectability remained a struggle for many. It also remained a struggle for their wives, although by the late nineteenth and early twentieth centuries increasing numbers of women had indoor running water, eliminating the heaviest washday chore. At the same time, however, burgeoning white-collar demand made good servants harder to find. One response was to send at least some laundry, especially the breadwinner’s valuable white collars and cuffs, to one of a growing number of commercial establishments.

Only in the post-World War I era did detachable shirt collars disappear, mean-
ing that someone had to keep the whole garment white. Initially, that someone was likely to be a woman tending a machine in a commercial laundry; men’s shirts were the one item even hard-pressed white-collar households managed to send out. After commercial establishments had underwritten the development of a washing machine technology that could be modified and marketed to middle-class households, however, the someone in question was increasingly the housewife who washed, starched, and ironed the family’s shirts. White-collar families could not have sent any laundry outside the home. We all know the end of the story. By the 1960s and 1970s, household technology and clothing technology made ironing and starching relatively unnecessary. Instead, housewives laundered many more shirts and blouses in an increasing array of fabrics and hues, requiring more extensive software in the form of washing procedures and chemical agent selection. The progressive extension of standards of cleanliness is nicely summarized in our ability to concern ourselves with the hidden rings inside our collars.

For me, the persistent extension of the white collar and its associated technological and labor system nicely captures the powerful, largely unexamined role of women’s maintenance labor in defining who qualifies for white-collar work. Perhaps part of our current preoccupation with “the decline of the family” stems from our inability to rely on such external evidence to assess and avoid those whose family structures we deplore. After all, we cannot really see inside people’s collars. Like the mass-produced calicoes that made it possible for early nineteenth-century working girls to dress like ladies—a phenomenon their contemporaries found simultaneously attractive and unnerving—modern household technology had rendered traditional markers of class increasingly obsolete. Although our culture generally applauds cleanliness, we are made uneasy by its pervasiveness. How can we tell whose homes our children can safely visit? Who can we trust in front of our classrooms? Is there a way to use databases and electronic technology to screen potential life partners?

From Closet to Water Closet: The Technology of Privacy

To comprehend more fully this aspect of technology, let us return to the closet. Or, to be more precise, let us consider what returning to the closet has come to signify. Clearly, in modern parlance, the notion of people being in closets conveys the sense of something amiss. People are being forced to hide something, usually their sexuality, that should not need to be hidden and, thus, in a real sense, to hide themselves. The very choice of the phrase announces that among the many acceptable uses of closets, the housing of people is not one.

Originally, by contrast, that is precisely what closets were meant to do—assure people privacy. All of the early uses of the word refer to small enclosed spaces where people performed acts that early modern English people deemed best carried out in private: sleeping, dressing, praying and meditating, studying and speculating. Indeed, so strongly were closets associated with privacy that in the seventeenth century “closet” served as an adjectival synonym for “private,” in the full and positive sense of that word. “Cabinet,” the other general term for an enclosed storage space, has a similar history. Only in the seventeenth century, on the eve of industrialization, that is, did closets and cabinets become places for things rather than for people. And part of the software of enclosed spaces that was transposed from people to things was the emphasis on privacy, a linkage succinctly conveyed in one of the industrial era’s favorite phrases: “private property.”

Neither the limits of the essay form nor the state of my researches permits an attempt to explain how the shifts in who and what deserved privacy played out. One thing is clear: the increased relegation of women to the private sphere was only one of several redefinitions of privacy’s role that coincided with the great technological revolutions of the eighteenth and nineteenth centuries. Again, paying attention to feminine technologies matters because the association of women and privacy has been so visible and because women have often been especially associated, rhetorically at least, with other increasingly private aspects of life.

One especially arresting embodiment of the technology of privacy, and one of more than passing interest to archaeologists, is the bathroom. The bathroom ranks as a truly remarkable technological development because of the rapidity with which this utterly new room assumed its standard modern form—a process completed within a few decades in the late nineteenth and early twentieth centuries. The invention of the bathroom meant more than just privatizing excretion by moving it inside the house. It also meant use of a new piece of hardware, generally denominated a “water closet,” a term that also applied to the room in which the toilet, to use more modern parlance, was housed. After a few decades in which closets had been deemed appropriate receptacles mostly for things, new standards of privacy made it appropriate to return at least some human activities to the closet.
Moreover, the original hardware of the bathroom makes clear that all, excretion—sweating and menstruation as well as urination and defecation—grew increasingly private. The growing social value assigned to hot water baths to remove sweat and sebaceous excretion was the other principal motive for creating the new room, a motive embodied in the sink and bathtub installed together with the toilet in the standard American bathroom. Simultaneously, the early development of disposable menstrual products permitted the gradual confinement of menstrual blood to the water closet rather than permitting it in the laundry.

The other significant cultural function of the water closet was to “eliminate waste,” a phrase worth paying attention to. Environmentally, of course, there was nothing particularly novel about Americans’ using the continent’s abundant pure water to carry away waste; early American factories were situated on rivers as much for their utility in removing industrial byproducts as for their water power. What was remarkable about the bathroom was the growing conviction that humans could be rendered immaculate, divorced from the aromas and physical evidence of their status as animals. It is both ironic and unsurprising that a people intent on denying their biology created a system of waste removal that helps to threaten our survival as animals, both through its excessive use of and its extensive pollution of water.

Nor is it coincidence, I think, that the era in which Americans committed themselves to eliminating evidence that humans excrete ushered in the era in which engineers became obsessed with eliminating industrial waste. What they meant, unfortunately, was not the elimination of industrial pollution, but the reduction of production workers to automatons through time-motion studies, and the elimination of white-collar and managerial discretion through the wholesale introduction of new record-keeping forms and quantitative assessment techniques. As in the bathroom, so also in scientific management, eliminating waste meant denying the full range of human behavior.

Here, as elsewhere, feminine technology matters, because the technology of women’s work made both odor-free bathrooms and paper-filled offices possible. In the process, of course, women, at least, remained fully cognizant that family members excreted and that proliferating forms did not make bosses scientific. Of course, women were creatures of the private sphere—schooled through the decades to launder, rather than air, the dirty linen. It seemed safe to trust them with the secrets.

No wonder women’s growing unwillingness to stay in the private sphere or keep the customary secrets has created such a backlash. Far more is at stake here than who changes dirty diapers, although this act, too, has wider technological, social, and environmental implications. What is at stake is an entire economic, technological, cultural system in essence, the society erected through the Industrial Revolution. That revolution has been widely touted as a great miracle: creating abundance, leisure, longevity, and a host of other good things. Certainly, critics have noted the inequity of the system, but by confining their focus to masculine, public technology they have tended to limit their critique as well. They have mostly been concerned with who runs the machines versus who manages, and with how the spoils are divided. They have generally missed such important and central issues as the qualitative inadequacy of the system’s products—such as brassieres or iceberg lettuce; the inherent tendency of the system to create more work—such as putting everything away in closets or rendering whole garments spotlessly clean; or the frightening prospect that a system so divorced from biological reality inevitably threatens the biological—as do water closets and scientifically managed factories. Feminine technologies matter because they disclose the system’s fatal flaws: it threatens and reduces natural abundance, necessitates increased labor, and promises longevity at best only to the current occupants of the planet.

For archaeologists, I expect that the lessons of these cases will be as diverse as their researches. Certainly many will find my concern with distinctive feminine attire, storage technology, class-specific household labor, and technological activities shrouded in privacy directly applicable to the era and culture they study; they are certainly technological features common to many times and places. Certain themes that surface in my research also seem broadly relevant.

First, because software, the knowledge component of technology, predominates in our society’s feminine technologies, it requires a special effort to make the nature and implications of that technology visible. It is especially easy to dismiss women’s technological knowledge—filing items in closets and cupboards or selecting and modifying garments, for example. Although it is certainly possible to recognize in other cultures what we fail to see in our own, our tendency will be to miss precisely those aspects of the past that we miss in the present. Given the nature of artificial evidence, seeing the software will always require greater commitment than seeing the hardware. Gender bias can only exacerbate our blindness.

Second, because the public/private dichotomy in our society is pervasive and emotionally charged, and because technology is culturally associated with public,
masculine endeavor, it takes an extra effort to identify as technological those artifacts associated with the private, feminine aspects of culture. Neither the brassiere nor the closet comes to anyone’s lips when asked to list some technologies. Rather, we put up a bit of a struggle before conceding their relevance to the topic. Given the nature of the archaeological enterprise, this challenges us to avoid reading such associations into the remote past. Even where we recognize the irrelevance of our culture’s public/private dichotomy, we may still tend to see activities currently denoted private as inherently less technological.

Third, the persistent association of Western, feminine technology with human biological functions also tends to render these technologies less visible—to naturalize them in a sense. Whereas we know that we don’t need automobiles, industrial research labs, and electric light and power systems, for example, we assume some level of need for food, clothing, shelter, and hygiene and we inadvertently extend the aura of necessity to the technologies that serve those functions. We are less likely, that is, to view human creativity and social choice as just as free ranging when it comes to producing technologies tailored to biological needs. We reason as though the need dictated the shape of the technology. Coming from a Western perspective this may make us especially blind when a culture gives low priority to technologies closely linked to the body, especially the female body.

Finally, if, as I think they do, these case studies of feminine technologies raise fundamental and troubling questions about the entire modern, Western technological enterprise—questions very different from those raised by the technologies we usually study—the lesson for archaeologists and other students of technology seems especially clear. Paying attention to technologies associated with women can neither be dismissed as a luxury nor written off as a concession to political correctness. Some might argue that neglecting feminine technology means telling only half of the technological story. I submit that it means missing the most important parts.

NOTES

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2. This “high-tech” bias is evident in the history of technology as well as in popular thought. See Judith A. McGaw, “Introduction: The Experience of Early American Technology,” in Early American Technology: Making and Doing Things from the Colonial Era to 1850, ed. Judith A. McGaw (Chapel Hill, 1994), 2–7; see also John M. Staudenmaier, Technology’s Storytellers: Reweaving the Human Fabric (Cambridge, Mass., 1989). Needless to say, an emphasis on technology as the purview of engineers and managers means telling a story with an overwhelmingly male cast of characters.


4. Here and hereinafter, in the interest of brevity, I use the term “feminine technology” to mean “modern, Western, predominantly American, feminine technology.”

5. Staudenmaier, Technology’s Storytellers (n. 2 above). The popularity of the rhetoric of social construction becomes apparent from even a cursory reading of recent volumes.

6. R. W. Burghfield, ed., The Compact Edition of the Oxford English Dictionary: Volume III, A Supplement to the Oxford English Dictionary, Volumes I-IV (Oxford, 1987). Feminine technology throws into high relief the gradual, incremental nature of most technologies' development and, hence, the relative meaninglessness of precise dates of origin. Here and in what follows I will often rely on word origins to supply a good rough chronology. The virtue of this approach is that word use signals the time by which a technology not only was in existence but also had sufficient cultural visibility to warrant linguistic innovation to permit discussion of it. By contrast, other frequently used measures such as patenting or initial production do not guarantee that anyone other than the patentee or the manufacturer had any awareness of the technology.


8. Although it is beyond the scope of this discussion, one of the more fascinating aspects of this technology is the mythology that has grown up surrounding it. That feminists burned bras is one such myth. Virtually everyone I discuss my research with knows that feminists burned bras in protest. Indeed, I also knew it. Nonetheless, there is no evidence that anyone in the women's movement ever burned a bra. The power of this image, probably "coined by some feature writer searching for a clever phrase," says volumes about gender and technology in America. Susan Brownmiller, Femininity (New York, 1992), 45-46. See also Susan Faludi, Backlash: The Undeclared War against American Women (New York, 1992), 75. Of course, brassieres are not unique among technologies in the elaborate mythology surrounding and partially obscuring them, an aspect of technological history that has attracted little serious scholarly attention. Here and in what follows I draw on the rich and growing body of literature derived from probate inventories, described more fully in my own study of such materials. See Judith A. McGaw, "So Much Depends upon a Red Wheelbarrow": Agricultural Tool Ownership in the Eighteenth-Century Mid-Atlantic" in McGaw, Early American Technology, 328-57. I also draw on several decades worth of visits to historic structures, principally in New England, the mid-Atlantic states, and Virginia. Sources cited here form the basis for many of the observations that follow.


10. As with mother-daughter exchanges of information, young women's distrust of older women as a source of information about dress and appearance makes them unlikely to seek advice from saleswomen or to accept advice when it is proffered. It is easy to see how American culture helps young women develop their suspicion. To take but one example, "wardrobe engineer" John T. Malloy, in his first Dress for Success book, offered only a few comments on women's dress, under the heading "How to Set Dress Codes for Women Employees." After noting that men's and women's perceptions of what is good and beautiful in clothing are "diametrically opposed," Malloy adds, "By the way, fifty-five-year-old female executives are no better or only slightly better qualified to choose the clothing for young female employees than are their male counterparts." John T. Malloy, Dress for Success (New York, 1973).


14. McGaw, "Red Wheelbarrow"; Furnivall et al., eds. The Compact Edition of the Oxford English Dictionary (Oxford, 1993); Dell Upton and John Michael Vlach, eds., Common Places: Readings in American Vernacular Architecture (Athens, Ga., 1986). As archaeologists certainly know, storage technology has a long history and prehistory. Thus, it is important to note that my phrasing here is not, meant to assert the novelty and/or rarity of storage technology generally. Certainly, many early modern houses had attics or cellars where an array of items was stored, and they held barrels, ceramic containers, and other items used to store food in particular. Of course this is on a particular type of storage technology that consisted either of a separate small room built into the living areas of the house or of substantial pieces of furniture that fulfilled similar functions. In the interest of succinct exposition, I will sometimes refer to particular class of items by the more general terms "storage technology" or "storage spaces.


16. Clifford Edward Clark Jr., The American Family Home (Chapel Hill, 1986); Sally McMurtry, Families and Farmhouses in Nineteenth Century America (New York, 1988). Despite its increasing evidence in the floor plans illustrating most histories of American family houses, the closet has evoked virtually no comment from historians of American building. The word is, for example, absent from all of the indexes I consulted, offering additional testimony to the relative invisibility of technologies associated with women's work.


19. Ibid., 162-63.

21. It is still true, as I noted more than a decade ago, that we lack a history of filing as a technology. The overwhelming predominance of software over hardware, combined with its feminization, readily explains its neglect. See McGaw, "Women and the History of American Technology," 811.


24. This is an especially challenging question to answer for American domestic technology. Whenever I talk about the history of domestic technology for an audience that includes Europeans, someone invariably asks about the apparent American obsession with cleanliness, submitting their personal experience as evidence.


27. Historically, the shirt was a male undergarment, so displaying the whole garment was not customary. Attitudes informed by the shirt's history still clearly undergird rules of male business and formal attire. See Cunnington and Cunningham, Underclothes.

28. In general, my account here and below of changes in shirt form relies on Cunnington and Cunningham, Underclothes, modified to take account of American variation as necessary. Given the considerable gulf between early modern behavior and our own, it is probably worth stating that there was no need to keep the shirt body particularly clean. It was not visible, and any odors that permeated it would hardly be perceptible since no one bathed very often. Indeed, the practical function of the shirt was to protect the outer garments from bodily filth.

29. Quoted in ibid., 100.

30. Ibid., 99.


32. Here and elsewhere, my research reflects my conviction that the historian's task is to look to the past for insight on contemporary social, political, or cultural concerns; that history is never merely about the past; antiquarianism is. Although not peculiar to feminists, this is an approach especially suited to feminist scholarship because of our commitment to the relevance of personal experience. At least some archaeologists committed to the study of gender share my perspective. See Gero and Conkey, "Tensions, Pluralities, and Engendering Archaeology," 22–23.


Why Masculine Technologies Matter

RUTH OLDENZIEL

In contrast to McGaw's non-obvious technologies and female perspective, making the invisible visible, Ruth Oldenziel begins with a very visible kind of technology: the automobile. She argues, however, that the fondness of boys for cars and the nature of male technophilia in the twentieth century are anything but obvious, that boys learn to love their toys with the help of auto manufacturers and others who have mobilized extensive economic and cultural resources in the interests of shaping what is partly a consumer relationship. Like McGaw, Oldenziel insists that we do not assume boys should like machines any more than girls should like putting things away in cupboards, cabinets, and closets. In what ways has technological knowledge been transmitted and nurtured?

How does Oldenziel treat the gendered associations of production and consumption categories in an age when consumers were increasingly being coded female?

To our intellectual foreparents

and to the scholarly community called
Women in Technological History (WITH),
in the Society for the History of Technology.