12   "The Intersection of Culture, Gender, and Technology"

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In recent years the idea that gender and technology shape one another has come to the fore. The gender relations prevailing in a society may influence the design and direction of technology and vice versa, the introduction of a new technology may affect gender relations. In this chapter, Hopkins outlines several different types of relationships between gender and technology. He argues that specific technologies are often associated with women or men; that technology can reinforce a gender system; that technology can allow individuals or groups to subvert an existing gender arrangement; and that technology can alter the very nature of sex and gender. Using gender as a social category, Hopkins demonstrates a variety of complex ways in which the social and the technological are interwoven and shows how misleading it can be to force such distinctions. Hopkins's analysis is similar to Lessig's in the sense that it also suggests that in order to get a future world that we want, we will have to pay attention to technology. Ideas about gender are so intertwined with technology that if we want a more equitable gender system, we will have to change technology, and vice versa. Although Hopkins limits his analysis to gender, his approach could be extended to other categories that affect our society such as race, class, politics, or religion.

- In a small Tennessee city, a divorcing couple argues about abortion. One claims that their embryos are unborn children with a right to life; the other argues they are just lumps of disposable tissue. Standard legal reasoning about abortion, privacy, and the right to control one's body doesn't help much in the argument, however—because the embryos are not inside anyone's body. They never have been. They sit frozen in a small cylinder on the other side of town. The abortion debate is raging and no one is even pregnant.
- In Sri Lanka, well-meaning innovators import water pumps to ease the drudgery of women's long, hot walks to wells—but they only teach men how to repair the devices. When the pumps break, the actual users, women, don't know how to fix them. So the pumps sit there unused while women lug water back and forth.
- Medical technologists figure out a way to choose the sex of a baby—and make it available to a culture which prefers their firstborn children to be male. Could an entire generation of firstborn male children make a difference?
- Women try to take advantage of a new invention, the automobile—but they find out that only electric cars are considered appropriate for women. Gasoline cars are for men.

- The entire abortion controversy might be put to rest, some feminists argue—if only we could find a way to get machines pregnant, rather than women.
- Healthy babies are born all the time that are neither male nor female, or that are perhaps both—but they don't get out of the hospital that way. Someone chooses what sex they will be.
- A lesbian feminist is called an "intruder" and an "oppressor" by other lesbian feminists—because she used to be a man.
- A researcher suggests using amniocentesis to test fetuses for homosexuality—and then "curing" them with androgen injections.
- On the Internet, you can fall in love with a clever, articulate, beautiful young woman—and then find out that her personality was generated by a dull, laconic, unattractive, middle-aged man. Have you been lied to? Or does your version of reality serve you poorly?
- Scientists come up with a way to get men pregnant—and are swamped with requests.
- A theorist looks toward science fiction novels for inspiration—and argues that the best way to be a feminist is to become a cyborg.

These situations only hint at the degree to which issues of gender and technology are complex, far-reaching, and fascinating. As powerful interacting social and physical forces, gender and technology shape our experiences, cultures, and identities—sometimes in such comfortable and subtle ways that it takes effort to appreciate them; sometimes in such conspicuous and explosive ways that everyone recognizes their importance. Delving into these issues is an opportunity to discover how technology promises or threatens to rewrite our ideas about sex, sexuality, and gender identity. It is an opportunity to debate ethical and legal issues at the very core of human experiences—procreation, labor, sex, our bodies. It is the chance to find out how sex role restrictions prevent each of us from using certain technologies, or require us to use others.

Examining these topics can be both illuminating and unsettling, particularly because we discover how our own lives are and will be affected by shifts in ideas of gender and by changes in technology. In my classes on these issues, students often remark that they never realized how much their daily lives, their career choices, their thoughts on ethical and social issues, and even their self-concepts have been affected by assumptions about technology, sex, and gender. What seemed like little things before (so little they were ignored)—why a student's husband automatically gets into the driver's side of their car, or why she tends to think of hunting as a technological activity, but not cooking—take on larger significance. Topics that previously attracted little attention or seemed like science fiction—sex selection, ectogenesis, cloning, or concepts of personal identity on the Internet—now have the potential to produce culture shock.

The issues in this book, then, are both global and personal. Like race, age, religion, science, culture, and politics, gender and technology form and transform society and individuals. Questions about these forces and their interactions get at the multiple hearts of major philosophical and social problems—questions of ethics, social justice,

epistemic constraints, personal and social identity, economics and labor, realism and irrealism, and ideas of human nature. Since these sorts of questions have generated such exciting, interdisciplinary work, it is time to create a single text large enough to give readers a taste of the issues and methods that exist at the intersection of gender studies and technology studies. This book attempts to meet that goal, showcasing the variety of perspectives that inform this diverse field of study. Although approaches and topics are varied, there is enough information here for me to generate a useful classification for considering the ways in which technology and gender interact.

I begin with the givenness of both technology and gender. Humans (like many other animals) are a technology-using and technology-producing species. Technology is always present in variegated forms, both subdued and obvious, and is always fundamental to the basic structure and activity of society. Similarly, humans are always already embedded in some sex/gender system, some ideological framework that varies in significant detail from culture to culture and time to time, but which layers vast cultural meaning on the evolved sexual dimorphism of the human organism, setting different roles, expectations, assessments, and values for members of different sexes.

Neither technology nor gender is static, of course. They are both dynamic, though material technology has a way of building upon itself so that its kind of dynamism is often seen as "progressive," not necessarily in the sense of getting continually better (even cancer can be diagnosed as "progressive"), but in the sense of developing finer, greater, and different kinds of manipulability without losing earlier effectiveness. Typically then (though not always), technology increases, and does not merely change into other forms. As such, there is a strong tendency (at least in historical spurts) for technology to "arrive," for technology to be "new" (whether or not "improved"). This important, ever-present association of newness with technology has itself grown stronger. While technology has always been around, it has increased in power and capability exponentially in the nineteenth and twentieth centuries. In the late twentieth century, at least in "high"-tech areas of the world, people have come to expect newer and newer technologies, faster and faster. Much of the debate over technology in general, and technology's effects on gender roles and identity in particular, is generated by the fear that new technologies are moving too fast, or too far, or in the wrong direction from traditional, or at least temporarily established, gender norms.

Gender, on the other hand, though certainly dynamic and in some ways capable of being developed into new and improved forms by inventive experts, does not have the material quality that most technologies do. Changes in gender, even if parallel to changes in technology in many substantial ways, are typically not subject to the kinds of economic distribution or production that technologies are. Changes in gender (as an ideological system) are less likely to be available through a catalog, or at a local factory, or at a trade show. They are less likely to be instantly upgradable or purchasable. The upshot of this is that new technologies are at least somewhat more likely to arrive in existing gender systems than new gender ideologies are to arrive in existing technology systems (though the latter can and does happen). For my purposes here, this means that a significant part of the study of technology and gender is the study of how new

technologies are evaluated through the lens of an existing gender system and how new technologies alter existing concepts and practices of that system for better or worse. There are at least four ways in which these sorts of evaluations and alterations can occur—either separately or in various combinations—all of which are examined in this volume.

Technology's Association with Gender

The very concept of technology, as well as its practices, may be more or less strongly embedded in a gender framework itself. Since most gender arrangements are dichotomous, with fairly fixed categories of masculine and feminine, it is not surprising that various other concepts and phenomena get associated with one or the other of these poles. In Western culture men have historically been associated with technology, while women are more typically associated with "nature," perceived (incorrectly, I would argue) as the opposite of technology. Layering these dichotomies on top of one another—man/woman, nature/technology, nature/culture—tends to influence assessments of technology and gender in particular and often contrary ways.

For instance, if men are associated with technology and masculine psychology is considered technology-oriented, then technological development may be interpreted as predominantly a masculine act, the outcome of a masculine drive. This is rather weighty when cashed out in historical, anthropological, and moral terms. As a matter of historical appraisal, when advances in technology such as spears, knives, hammers, and other hunting and building devices are understood as innovations of male hunters, then major leaps forward in human cultural evolution are attributed to men. Male psychology itself is seen as pushing culture ahead. Women, on the other hand, are often assumed to be absent from technological history and cultural evolution, stuck in their primeval homes giving birth, raising children, and gathering food while males roam the countryside, building, warring, changing, and disrupting human society.

As a matter of moral discourse, these associations can lead to conflicting and influential judgments. While some may valorize men's purported technological drive as a positive force, indispensable to intellectual and cultural progress, others may vilify it, claiming that male technophilia is dangerous, and is responsible for environmental destruction, war, the nuclear threat, and alienation from "nature." Some feminists have argued, for example, that men's obsession with technology is a form of "womb envy," a degraded and inferior attempt to imitate women's more purely "natural" creativity. Women, closer to "nature" and more concerned with healthy, authentic lives, may be idealized as moral exemplars in this view, which counters the androcentric dichotomies of *male/technology/cultural/progress* and *female/procreation/cultural/stasis* with the gynocentric dichotomies of *male/technology/bad* and *female/nature/good*.

Whatever the consequences of these long-standing associations, they need to be deeply and critically examined. In fact, the very definition of technology needs to be scrutinized because cultural ideas about gender and technology may detrimentally constrain and bias historical and moral assessments on all sides. The technological

character of traditionally "feminine" activities may be ignored—as with technologies of gathering, cooking, and sewing. Female inventors may be disregarded or their inventions attributed to men, gestures that further the idea that women are not technologists. Potentially beneficial technologies created by men (such as some reproductive technologies) may be reflexively rejected because of the assumption that the technology is tainted by male worldviews or the drive to conquer "nature." Technologies that blur the distinctions between the sexes may be automatically interpreted as "threatening" because of their blurring effects.

Technology Reinforcing Gender Systems

New technologies that arrive in existing gender systems (which are almost always hierarchical and typically male-dominated) may be used to shore up those in power, entrench current standards, or extend the ideals of the system. This can happen in several ways, sometimes consciously, sometimes reflexively. Most explicitly and crudely, technology may be used simply to enforce gender roles and restrictions. A chastity belt is a simple device for controlling women's sexual activity and extending the property status of wives. Cosmetic surgeries may be aggressively marketed to magnify sexual differences and ideals—breast implants for increasing women's sexual attractiveness to heterosexual men, or pectoral and bicep implants for increasing men's apparent physical strength. Sex-specific toys encourage children to model particular sex roles—family and dating for girls, war for boys. In more extreme forms, technologies may be used to ensure other cultural gender ideals, such as identifying and eradicating homosexuality through genetic testing or guaranteeing firstborn male children through sex selection techniques.

Another kind of reinforcement occurs when one's gendered social position limits access to technology (new or old). This is likely to happen when there is a strong sexual division of labor or when cultural roles are sharply divided along gender lines. For example, if women are not permitted to work outside the home, particularly in management positions, and a technology like the telephone or computer is marketed primarily as a business machine, then their access to these technologies will be limited. If cooking and sewing are seen as feminine tasks, then microwave ovens and computerized sewing machines may be seen as frivolous expenses by male heads-of-household, or if such devices are purchased, men may be so reluctant to learn how to use them that they are unable to perform the simple tasks of stitching up a seam or baking a potato. If women's social spheres are limited to church and home, they may be refused access to the "family" automobile because it is thought they simply have no reason to drive.

Unequal access is also sometimes the result of beliefs about the "natural" abilities of the sexes. Some technologies are seen as psychologically or physically inappropriate for members of a particular sex—something they could not operate or could not understand. For example, if women are perceived as passive, physically weak, and technically inept, it may be seen as inappropriate for them to use guns, and thus their experience with guns will be limited, despite the fact that lightweight materials and automatic

innovations have made guns easy to use or that women might have the need for guns in the first place (e.g., for defending themselves against dangerous men). If men are seen as clumsy, hotheaded, and useful mainly for brute-force manual labor, particularly in cheap export labor markets, they may be excluded from high-tech electronics manufacturing jobs which are thought to need the "delicate" fingers, patience, and task precision of women.

Restricted access also occurs when particular technologies retain their gender connections in the form of cultural prohibitions, even after formal obstacles have been dropped or previous rationales for restrictions (such as physical strength) have been surmounted. The "masculine" or "feminine" aura may still linger, making it more difficult for someone to approach a technology. For instance, cars are still often seen as men's machines and responsibility, even though the computerization of cars has left many formerly "mechanically-minded" men as ignorant of how to fix them as supposedly "non-mechanically-minded" women. A woman who knows how to fix her sewing machine may not be lauded as "technically-minded" even though contemporary sewing machines are complex, computerized devices. Men, on the other hand, can be praised for their technical know-how for replacing the blade on a power mower, a task that requires minimal technical knowledge. Female fighter pilots are still a rarity, even though the old military concerns about upper-body strength and hand-to-hand combat are hardly relevant.

Technology Subverting Gender Systems

While technology can be used to reinforce particular gender roles, it can also be used to subvert them. Technologies can open up options for challenging sex-based restrictions, allowing people to "break out" of proscribed roles and limited spheres of action. This can occur when technology permits people to enter labor markets and professions from which they had previously been excluded because of an actual or perceived sex-based lack of ability. For example, in the military and police, on assembly lines and farms, in construction and landscaping, and in other professions, brute strength was often a (sometimes specious) requirement excluding women from participation. When machines begin to perform most of the hard labor, or in the case of the military, when they vastly decrease hand-to-hand combat in favor of machine-to-machine or machine-to-soldier combat, then the job of the humans involved is to assist, manage, program, or take care of the machines rather than to labor directly themselves. This allows women either to enter professions that no longer require (if they ever really did) assumed male-specific strength, or to extend their previous roles—today's female technician "nurses" fighting machines as the female nurse of yesteryear "repaired" fighting men.

Another kind of alteration occurs when technology changes or eliminates a profession outright, including sex-segregated ones. Sometimes mechanization or other technological shifts eradicate specialized positions, such as typists, gas station attendants,

and blacksmiths. If not eradicated, sometimes jobs are changed in ways that elimi-nate their masculine and feminine associations. For example, the difficult and time-consuming procedure of carrying water from a well often gets cast as a woman's job, because much of the water's use is for domestic chores. However, when indoor plumb-ing arrives on the scene, the task of water collection is simply abolished and most of its gender connotations along with it. Femininity does not make it through the transition. Turning on a faucet is not considered woman's work, though the water-using domestic chores are still likely to be hers.

Technology can also subvert gender roles by permitting activities which cross re-strictive cultural, social, ethical, and interpersonal boundaries, expanding one's move-ments, social scope, and access to information. For example, women might use automobiles to get out of their house and see a bit of the world. Women might use guns to protect themselves while traveling (the "great equalizer"), lessening their sense of vulnerability. And while television can reinforce gender roles by bringing Donna Reeds and Carol Bradys into the household, it can also open up new possibilities by bringing Mary Tyler Moores, Cagneys and Laceys, and Captain Janeways into the household.

More extensive technologies can shake our assumptions about gender in other ways by opening up the very biological correlates of sex to alteration. Women and men can be turned into each other, at least on a certain anatomical and hormonal level, which generates the very important concept that sex and gender can be divided into kinds or levels, such as anatomical, genetic, hormonal, social, psychological, and sartorial. Women can modify their experiences of childbirth, and the various cultural values that go along with the act, by using anesthesia (considered a sinful technology early on) when giving birth, using reproductive technology to overcome infertility, schedul-ing C-sections for particular days to work around their calendars, or using treatments which can allow a sixty-three-year-old, post-menopausal woman to have a healthy baby.

As a matter of politics and morality, these gender-subverting uses of technologies are particularly interesting because they are both resisted and demanded. Depending on which ideals of gender are dominant, these technologies can take on an aura of per-version for allowing men and women to step out of their "natural," traditional, and socially legitimated roles, or they can take on a salvific role, offering release from toil, drudgery, and the limitations of social and biological sex.

Technology Altering the Very Nature of Gender and Sex

These last examples begin to get at issues which go beyond merely challenging gender roles and restrictions. They point toward the possibility of a more radical challenge to gender by the technological transformation of sex and of the human body itself.

For some time now, gender studies and feminist theory have been involved in a de-bate over the meaning of gender and sex, over the very character of gender and sex.

Divided roughly into camps of "essentialists" versus "social constructionists," the debate parallels older realist and idealist battles. The essentialist position may be oversimplified this way: some core, objective property (typically understood as biological or biopsychological) defines what it means to be a woman or a man, and the categories of male and female are thus culture-independent and mind-independent "natural" kinds. The social constructionist position may be oversimplified this way: the categories of male, female, man, and woman are not "natural" kinds but are rather culturally constructed ideals, irreducible to biological or psychological properties, which change demonstrably in meaning and practice over time and across cultures.

The political outcome of these positions is that essentialists tend to view gender differences as innate and immutable, closed at some fundamental level to modification by education, parenting, or ideological movements, with some basic differences in gender roles pragmatically and objectively justified. Social constructionists tend to view gender differences as created, learned, and alterable, with gender role divisions always historically relative, contingent, and ultimately unwarranted by appeal to an objective reality outside human culture. While both sides of this debate can marshal compelling evidence for their general claims, neither is unassailable. The dominant criticism of essentialism is that it does not account for actual observed variability in these "natural" categories and ignores a tremendous amount of conceptual fuzziness and empirical counterexample in its biologistic definitions. The dominant criticism of social constructionism is that it simply seems to rule out any influences of the physical body on behavior, social categories, and self-concepts, treating human beings as if they were only pure minds, exempt from the biological and evolutionary forces that constrain all other organisms.

Irrespective of the theoretical merits of these two positions, technology threatens or promises to circumvent the political heart of the debate by altering the connection between the premises and conclusions of both sides. Essentialists move from the belief that sex and gender differences are hardwired, largely immutable, and socially valuable to the conclusion that attempts to ignore or eradicate them are futile, harmful, and sexually confusing. Social constructionists move from the belief that sex and gender differences are culturally produced and often socially detrimental to the conclusion that they can be radically altered for the better through education, legal reform, and improved theoretical understanding.

While both sides depend for these moves on the assumption that "biological" equals "immutable," technology increasingly erodes that assumption. Taking seriously the essentialist idea that gender identity, behavior, or cognitive and personality traits may be sex-linked physical characteristics of the body does not mean that they are fixed. "Genetic," "biological," and "bodily" do not imply "unchangeable." Even if we doubt the simplified social constructionist claims that sex and gender are categories unconstrained by objective, empirical bodily facts, we have to grant that technology can nonetheless allow us to alter the body in such ways that gender's "naturalness" or "reality" no longer has any permanent sway. Categories of gender and sex, regardless

of their possible "essentialist" foundations, are as open to change and difference as the categories of social constructionism.

At proximal technological levels, the "natural" or "biological" constraints of sex are already being modified as reproductive technology permits procreation without sexual intercourse, removes menopause as a barrier to pregnancy, and allows gender-disorienting or gender-ignoring personal interaction through Internet technologies and virtual reality. At slightly more distal levels, technologies such as cloning and *in vitro* gestation allow reproduction without either sexual dimorphism or pregnancy. At more speculative levels, radical bodily changes produced by genetic engineering, cybernetic implants, nanotechnological reconstruction, and artificial intelligence uploading open the possibility of a completely postgendered cyborgism and perhaps even a post-human subjectivity altogether.

As with the use of technology to more mildly subvert existing gender systems, these potential effects on gender identity and sexual being are both resisted and invited. However, these radically disruptive effects on sexual biology and gender identity seem to be more anxiety-producing and politically explosive than mere gender-role shifting technologies because altering the very physicality of sex appears to get at the heart of some cherished and previously unalterable correlates of human social and personal identity. This can be received as a great liberating step forward, or rejected as a great and dangerous loss. It is in response to these sorts of radical technological changes that familiar social and political alliances realign in odd ways. Religious conservatives and radical feminists can find themselves on the same side responding to reproductive technologies, or gender-bending virtual technologies, while gruff old male science fiction writers can find themselves being theorized as postmodern feminists.

This classification system may not exhaust the possibilities for studying technology and gender, but it does get at the core of many debates, evaluations, hopes, and anxieties.