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The Technology Enterprise: Systemic Bias Against Women

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The Technology Enterprise: Systemic Bias Against Women

Lori Andrews*

Who Designs Technology?.....	1037
Who Funds Technology?.....	1045
Who Patents Technology?.....	1048
How Is Technology Marketed?.....	1050
What Is the Impact of Technology—and on Whom?.....	1055
Conclusion.....	1061

Eleanor Ireland and hundreds of other women worked as codebreakers at Bletchley Park during World War II.¹ After the war, women were the mainstay of computer programming in England. But their knowledge and skills were lost when a decision was made in the 1970s to give computer programming jobs to men.² The British computer industry fell behind as a result.³

“Skills are not enough to undo gendered labor discrimination,” observes Marie Hicks in *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing*, “because historically such discrimination has not been about finding the people with the most skills. Indeed, technocratic control is far less about technical skills than about power.”⁴

Technology could provide a livelihood for women and enhance their lives, but all too often technology is designed by men, evaluated by men, marketed by men, and mandated by men—all in ways that disadvantage and even harm women.

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1. MARIE HICKS, *PROGRAMMED INEQUALITY: HOW BRITAIN DISCARDED WOMEN TECHNOLOGISTS AND LOST ITS EDGE IN COMPUTING* 28 (2018).

2. *Id.* at 146–48.

3. HICKS, *supra* note 1.

4. *Id.* at 237.

Technology too often reflects and perpetuates the overall societal power structure, rather than disrupting it and creating new opportunities.

The technology realm is rife with lost chances. The development of baby formula and breast milk pumps could have profoundly changed the roles of men and women in the workforce, since women did not need to stay at home to breastfeed babies. Men and women could have shared childcare. However, due to social norms and constraints, a technology that could have transformed gender roles did not.⁵

How technology is designed and deployed has a profound effect on women's lives. Women and their needs are excluded, ignored, or ridiculed on the path to the development of technology. The articles in this symposium issue help us understand the ways in which technology can be assessed through the lens of women's lives. In this Article, I will explore the questions that should be asked in the course of the development and deployment of technologies—and analyze the harms to women when those questions are ignored.

My own career has focused on technologies—reproductive technologies, genetic technologies, nanotechnologies, and digital technologies. If I had entered a traditional legal field—Estates and Trusts, Commercial Law, or even Litigation—there would have been generations of male lawyers ahead of me. But because my legal analyses about the technologies emerged at the same time as the scientific developments emerged, I was able to help set policies in these fields. I testified in Congress soon after law school and advised government agencies around the world, basing policies on studies I undertook on the impact of technologies on individuals, relationships, communities, social institutions, and legal concepts.

An early encounter when I was a young lawyer is illustrative of how my unusual knowledge helped me gain entry into the technology arena. The national organization of fertility doctors, then known as the American Fertility Society (AFS), called me about its annual meeting. By that time, I had advised legislatures on reproductive technologies, appeared on the *Today Show* and elsewhere to discuss them, and published a book on the subject. The physician who headed the AFS program committee, who was male and only slightly older than I was, asked me if I could recommend a male lawyer to speak at their meeting.

I responded with a letter, recommending three male lawyers, but added the caveat that he should make sure the person he chose could answer the following twenty questions, including “Can the child of a sperm donor sue him for child support?” and “What should happen to a frozen embryo if the couple dies, divorces, or loses interest in the embryo?”

5. Mothers spend close to 49.8 hours per week with their children compared to fathers who spend around 31.4 hours per week with their children. Sara Raley, Suzanne M. Bianchi & Wendy Wang, *When Do Fathers Care? Mothers' Economic Contribution and Fathers' Involvement in Child Care*, 117 AM. J. SOC. 1422, 1437 (2012). A study of parenting roles found that fathers undertake physical care of children only half as much as mothers (38% of fathers contribute to physical care compared to 71% of mothers). *Id.*

I ultimately received a call asking me to speak, but the doctor added, “Could you Golda Meir yourself up a little?” (meaning look older and less attractive). He never would have asked that of a man.

I was able to find a place in the world of technology, but it has taken me a long time to understand the systematic misogyny in that world. Studies show that women and people of color perceive greater risks from technology than white men do.⁶ Initially, it was suggested that those fears were due to inadequate scientific understanding, but even well-informed women and people of color share those perceptions.⁷ Fear of technological hazards is not just the product of short-term reactions to the news of some technological disaster⁸ but is due to systematic differences in the lives of white men versus others.

“Perhaps white males see less risk in the world because they create, manage, control, and benefit from so much of it,” notes one group of researchers.⁹ White women and people of color may be concerned about risk because they are more likely to bear those risks than white men, they have less power and control, and they tend to benefit less from technology.¹⁰

Addressing the sexism and racism that flow through the veins of technology requires answering the following questions about the enterprise of technology:

Who designs the technology?

Who funds the technology?

Who patents the technology?

How is the technology marketed?

What’s the impact of the technology—and on whom?

WHO DESIGNS TECHNOLOGY?

The technologies used by people in their daily lives—from health care technologies to transportation—have been developed with male users in mind, creating vast safety risks for women. With technologies outside the personal sphere, technological sexism can make it hard for women to enter the workforce and engage safely in certain professions.

6. Theresa M. Marteau et al., *Long-Term Cognitive and Emotional Impact of Genetic Testing for Carriers of Cystic Fibrosis: The Effects of Test Results and Gender*, 16 HEALTH PSYCHOL. 51, 52 (1997) (citing, *inter alia*, Marc Pillisuk & Curt Acredolo, *Fear of Technological Hazards: One Concern or Many?*, 3 SOC. BEHAV. 17 (1988); Paul Slovic, *Perceptions of Risk: Reflections on the Psychometric Paradigm*, in SOCIAL THEORIES OF RISK 117 (Dominic Goldring & Sheldon Krinsky eds., 1992)).

7. Ian Savage, *Demographic Influences on Risk Perceptions*, 13 RISK ANALYSIS 413, 413–20 (1993).

8. Pillisuk & Acredolo, *supra* note 6, at 23.

9. James Flynn, Paul Slovic & C.K. Mertz, *Gender, Race, and Perceptions of Environmental Health Risks*, 14 RISK ANALYSIS 1101, 1107 (1994).

10. *Id.*

For countless years, research involving health care technologies was designed to focus on men's disorders and men's needs.¹¹ When MD/PhD Florence Haseltine arrived at the National Institutes of Health (NIH) in 1985, she realized that she was the only gynecologist there. There were more veterinarians than doctors concerned with women's health, and virtually all the existing medical knowledge was based on research on men. The dangers to women were profound. For example, a coronary stent designed based on studies of male heart patients proved fatal for some women because it was too large for their arteries.

It now seems absurd to think that anyone would design a study of the relationship between obesity and breast and uterine cancer, as was done at one institution, that included only men,¹² or that a study of heart disease—the leading cause of death among women—would enroll 22,000 men and no women.¹³ It seems equally incomprehensible that a federal study on health and aging would proceed for twenty years with only male subjects.¹⁴ There is even evidence that, in basic research, researchers excluded female rats.¹⁵ It is like that children's story where someone finally points out that the emperor is wearing no clothes. It is now impossible to look at the older studies in the same way.

By 1990, Haseltine had mobilized the female members of the House of Representatives and a Government Accounting Office investigation revealed that women had been systematically excluded from clinical research studies.¹⁶ In 1993, Congress mandated that research sponsored by the NIH include male and female participants.¹⁷ Prior to this mandate, “clinical research studies excluded women, resulting in a lack of information about gender differences in disease prevalence, progression, and response to treatment.”¹⁸ Yet many currently-used therapies and technologies were developed using data compiled before the 1993 mandate.¹⁹

11. See WOMEN AND HEALTH RESEARCH: ETHICAL AND LEGAL ISSUES OF INCLUDING WOMEN IN CLINICAL STUDIES 1-2 (Anna C. Mastroianni, Ruth Faden & Daniel Federman eds., 1994).

12. Rebecca Dresser, *Wanted: Single, White Male for Medical Research*, 22 HASTINGS CTR. REP. 24, 24 (Jan.-Feb. 1992); Karen H. Rothenberg, *Gender Matters: Implications for Research and Women's Health Care*, 32 HOUS. L. REV. 1201, 1207 (1996).

13. This is particularly problematic because two and one-half million women are hospitalized annually for heart disease. Five hundred thousand die annually from heart disease. We have not come that far from the time in 1964 when women showed up at an American Heart Association Conference on Women and Heart Disease—only to learn that it was about how women could care for their husbands' hearts. Natalie Davis Spingarn, *Women's Ill Treatment by Doctors: Authors Indict Male-Controlled Medicine for Blindness, Bias, and Boorishness*, WASH. POST, Jan. 31, 1995, at Z13.

14. Dresser, *supra* note 12.

15. *Id.* at 24.

16. Ruth Macklin, *Women's Health: An Ethical Perspective*, 21 J.L. MED. & ETHICS 23, 24 (1993).

17. Diane E. Hoffmann & Anita J. Tarzian, *The Girl Who Cried Pain: A Bias Against Women in the Treatment of Pain*, 29 J.L. MED. & ETHICS 13, 13 (2001) (citing National Institutes of Health Revitalization Act of 1993, Pub. L. No. 103-43, 107 Stat. 22 (1993)).

18. *Id.* (citing S.J. Blumenthal & S.F. Wood, *Women's Health Care: Federal Initiatives, Policies, and Directions*, in HEALTH CARE FOR WOMEN: PSYCHOLOGICAL, SOCIAL & BEHAVIORAL INFLUENCES 57 (Sheryle J. Gallant, Gwendolyn Puryear Keita & Renee Royak-Shaler eds., 1997)).

19. Kenneth Miller, *How Health Care Fails Women*, PREVENTION 46, 51 (June 2018).

Even today, note Harvard Medical School Professor of Medicine Paula Johnson and her colleagues at Brigham and Women's Hospital in Boston, "[t]he science that informs medicine—including the prevention, diagnosis, and treatment of disease—routinely fails to consider the crucial impact of sex and gender Once clinical trials begin, researchers frequently do not enroll adequate numbers of women or, when they do, fail to analyze or report data separately by sex. This hampers our ability to identify important differences that could benefit the health of all."²⁰

Health researchers and clinicians often harbor sexist notions when assessing the symptoms of a disease and the side effects of a potential treatment,²¹ failing to give credence to women's complaints when designing research. In the medical literature, women's pain level has been discounted and women have been portrayed

20. PAULA A. JOHNSON ET AL., MARY HARRIGAN CONNORS CTR. FOR WOMEN'S HEALTH & GENDER BIOLOGY AT BRIGHAM AND WOMEN'S HOSP., *SEX-SPECIFIC MEDICAL RESEARCH: WHY WOMEN'S HEALTH CAN'T WAIT* 5 (2014).

21. Because of stereotypes about pain, doctors fail to properly treat women and people of color or undertake proper research regarding their treatment. Numerous studies have shown that, after surgery, men are more likely to receive pain medication than women. Hoffmann & Tarzian, *supra* note 17, at 17. Women are more likely to be given a sedative because they are perceived as anxious instead of in pain. *Id.* (citing K.L. Calderone, *The Influence of Gender on the Frequency of Pain and Sedative Medication Administered to Postoperative Patients*, 23 *SEX ROLES* 713 (1990)). This extends to children, with boys receiving significantly more codeine than girls; girls typically are given acetaminophen instead. *Id.* (citing J.E. Beyer et al., *Patterns of Postoperative Analgesic Use with Adults and Children Following Cardiac Surgery*, 17 *PAIN* 71 (1983)). Women with similar abdominal pain scores as men are up to 25% less likely to receive an opioid pain medication than men. Esther H. Chen et al., *Gender Disparity in Analgesic Treatment of Emergency Department Patients with Acute Abdominal Pain*, 15 *AM. EMERGENCY MED.* 414, 416 (2008). On average, women wait sixteen minutes longer than men to receive pain medications in an emergency room, with men waiting forty-nine minutes and women waiting sixty-five minutes. *Id.* The disparity in receiving pain medication seems to disappear after the age of fifty, which could indicate that doctors attribute women's pain to gynecologic issues common for younger women. *Id.* at 417.

Similarly, a 2016 study found that 11.5% of medical students and residents believe that there are biological differences between whites and blacks, such as black people having thicker skin, stronger bones, and a stronger immune system than white people. Kelly M. Hoffman, Sophie Trawalter, Jordan R. Axt & M. Norman Oliver, *Racial Bias in Pain Assessment and Treatment Recommendations, and False Beliefs About Biological Differences Between Blacks and Whites*, 113 *PROC. NAT'L ACAD. SCI. U.S.A.* 4296, 4298 (2016). This study also found that medical students and residents exhibiting these false beliefs are more likely to provide inaccurate treatment to black patients compared to white patients because they think black patients feel less pain than white patients. *Id.* at 4300. The history of doctors harboring racist ideas around the experience and treatment of pain is long. Slave owners, scientists, and doctors promoted the idea that there were significant biological differences between black and white people to justify inhumane treatment. *Id.* at 4297. Doctors in the 19th century claimed black people had "thicker skulls, less sensitive nervous systems, and diseases inherent in dark skin." *Id.* At least one doctor claimed that black people came with a disease exclusive to them that prevented them from feeling pain when punished. *Id.* Doctors believed that slaves were capable of feeling little, if any, pain during surgical operations. *Id.* The belief that "the black body was more resistant to pain and injury" prevailed well into the 20th century, with researchers, including the military, experimenting on black individuals. *Id.*

as hysterical or emotional.²² As a result, doctors are more likely to think women's symptoms are caused by emotional factors even when clinical tests show a physical health issue.²³ For decades, the painful bladder disease of interstitial cystitis was dismissed as a "hysterical female condition."²⁴ Only through extensive efforts of a patient advocacy group did the primarily male field of urology begin to pay attention to the disease.²⁵

Side effects reported by men are taken more seriously than side effects reported by women. Male birth control has not been brought to market because of the side effects experienced by men, namely weight gain and mood swings.²⁶ Yet those same side effects are ignored in research and approval of birth control for women. Female birth control can cause weight gain, mood swings, change in sex drive, spotting or bleeding between periods, sore breasts, nausea, and headaches.²⁷ An FDA-approved Intra-Uterine Device, Liletta, is known to cause mood swings and depression.²⁸ As noted by Julie Beck in *The Different Stakes of Male and Female Birth Control*, women routinely experience side effects that were deemed too risky for men: "The standards are different."²⁹

Treatments that have been tested primarily on men might actually harm women. For example, the diet conventionally recommended for heart disease "could actually exacerbate the risk of heart disease for women."³⁰ When drugs are marketed based on studies done solely or primarily on men, the results can be fatal for women. A wide range of medications, including some antihistamines, gastrointestinal drugs, antibiotics, and antipsychotics, trigger potentially fatal heart

22. Hoffmann & Tarzian, *supra* note 17, at 20. Young boys are also perceived as experiencing more pain from the same intervention—a finger prick—than young girls. Brian D. Earp et al., *Gender Bias in Pediatric Pain Assessment*, 44 J. PEDIATRIC PSYCHOL. (2019) (pre-print manuscript at 3).

23. Hoffman & Tarzian, *supra* note 17, at 17 (citing V. Elderkin-Thompson & H. Waitzkin, *Differences in Clinical Communication by Gender*, 14 J. GEN. INTERNAL MED. 112 (1999)).

24. Macklin, *supra* note 16, at 26.

25. *Id.* (citing Vicki Ratner, Debra Slade & Kristene E. Whitmore, *Interstitial Cystitis: A Bladder Disease Finds Legitimacy*, 1 J. WOMEN'S HEALTH 63 (1992)).

26. Hermann M. Behre et al., *Efficacy and Safety of an Injectable Combination Hormonal Contraceptive for Men*, 101 J. CLINICAL ENDOCRINOLOGY METABOLISM 4779 (2016); *Male Birth Control Study Killed After Men Report Side Effects*, NPR (Nov. 3, 2016), <https://www.npr.org/sections/health-shots/2016/11/03/500549503/male-birth-control-study-killed-after-men-complain-about-side-effects> [<https://perma.cc/MZ76-ZPKL>].

27. *What Are the Disadvantages of the Pill?*, PLANNED PARENTHOOD, <https://www.plannedparenthood.org/learn/birth-control/birth-control-pill/what-are-the-disadvantages-of-the-pill> [<https://perma.cc/4VP6-VGV4>] (last visited Apr. 6, 2019).

28. Julie Beck, *The Different Stakes of Male and Female Birth Control*, ATLANTIC (Nov. 1, 2016), <https://www.theatlantic.com/health/archive/2016/11/the-different-stakes-of-male-and-female-birth-control/506120/> [<https://perma.cc/QT9X-PZMX>].

29. *Id.*

30. Dresser, *supra* note 12, at 27.

arrhythmia more often in women than men.³¹ Similarly, medications administered after a heart attack to diminish blood clots, “while beneficial to many men, may cause significant bleeding problems in women.”³²

Women’s hormones are different than men’s, leading some drugs to have enhanced effects in women³³ and some to have diminished effects. Even though women are prescribed 80% of medications, drug research has been predominantly conducted on men³⁴ and has not investigated the effects on women or analyzed how drugs act over the course of a woman’s menstrual cycle.³⁵ Consequently, “[t]he administration of drugs to women at dosages designed for men can place women at risk for overdose.”³⁶ For example, women metabolize Ambien more slowly than men, causing them to be drowsy longer and impaired in driving the morning after.³⁷ In 2013, the FDA reduced the dosage recommendation of Ambien for women.³⁸

On the other hand, some treatments may be beneficial to women, but never brought to market if the testing is done primarily on men.³⁹ As one set of researchers notes, “Ignoring possible sex differences in form and function is simply no longer acceptable, given the potential adverse consequences of doing so.”⁴⁰

31. Roni Caryn Rabin, *The Drug-Dose Gender Gap*, N.Y. TIMES (Jan. 28, 2013), <https://well.blogs.nytimes.com/2013/01/28/the-drug-dose-gender-gap/> [<https://perma.cc/RRG6-TRXW>].

32. Londa Schiebinger, *Women’s Health and Clinical Trials*, 112 J. CLINIC INV. 973, 974 (2003).

33. Simona Pace et al., *Androgen-Mediated Sex Bias Impairs Efficiency of Leukotriene Biosynthesis Inhibitors in Males*, 127 J. CLINIC INV. 3167 (2017); see also Amy Westervelt, *The Medical Research Gender Gap: How Excluding Women from Clinical Trials Is Hurting Our Health*, GUARDIAN (Apr. 30, 2015), <https://www.theguardian.com/lifeandstyle/2015/apr/30/fda-clinical-trials-gender-gap-epa-nih-institute-of-medicine-cardiovascular-disease> [<https://perma.cc/2FHF-LL9Y>] (“The inclusion of more women in clinical trials has resulted in evidence that some lung cancer treatments work better for women than men.”).

34. “Until 1988, clinical trials of new drugs by the US Food and Drug Administration (FDA) were routinely conducted predominately on men” Schiebinger, *supra* note 32, at 974.

35. “Antiseizure and antidepressant drugs may require different doses over the menstrual cycle to achieve the desired effect, and the failure to calibrate asthma medication to this cycle may contribute to the existing premenstrual rise in asthma deaths.” Dresser, *supra* note 12, at 27.

36. Schiebinger, *supra* note 32, at 974.

37. Joris C. Verster & Thomas Roth, *Gender Differences in Highway Driving Performance After Administration of Sleep Medication: A Review of the Literature*, 13 TRAFFIC INJ. PREVENTION 286 (2012).

38. U.S. DRUG ADMIN., QUESTIONS AND ANSWERS: RISK OF NEXT MORNING IMPAIRMENT AFTER USE OF INSOMNIA DRUGS; FDA REQUIRES LOWER RECOMMENDED DOSES FOR CERTAIN DRUGS CONTAINING ZOLPIDEM (AMBIEN, AMBIEN CR, EDLUAR, AND ZOLPIMIST), <https://www.fda.gov/drugs/drugsafety/ucm334041.htm> [<https://perma.cc/S3CZ-52Z6>] (last updated Feb. 13, 2018). The proper women’s dosage is half that of men’s. Rabin, *supra* note 31.

39. “[D]rugs developed for men and untested on women may be dangerous for women, drugs that are potentially beneficial to women may be eliminated in early phases of clinical testing when the test group does not include women and no benefits are manifest in male subjects.” Schiebinger, *supra* note 32, at 974.

40. Karyn M. Frick et al., *Estrogenic Regulation of Memory Consolidation: A Look Beyond the Hippocampus, Ovaries, and Females*, 187 PHYSIOLOGY & BEHAV. 57, 57 (2018).

Disease itself is often defined in male terms. The original definition of AIDS did not recognize the way the disease progressed in women.⁴¹ Without proper research, women did not receive adequate treatment. And because the disease's definition was based on male symptoms, women were unable to receive Medicaid funding for AIDS-related treatment and services.⁴²

It is only in the area of reproduction that women have consistently been researched upon. Women have been subject to risky, surreptitious, and involuntary interventions—not for their own benefit, but for the purported benefit of their offspring. There are numerous examples of women being tricked into participating in reproductive research. In one birth control study, women seeking contraceptives were not told they were part of a research protocol in which some women were given a placebo.⁴³ Ten of the seventy-six women receiving the placebo became pregnant.⁴⁴

In the course of developing reproductive technologies, physicians surreptitiously removed eggs and embryos from women who were undergoing pelvic surgery for other reasons.⁴⁵ *In vitro* fertilization (IVF) was undertaken in women before it was done in chimps, leading IVF researcher Don Wolf to say, “Women were the model for non-human primates.”⁴⁶ And apparently Lesley Brown, the first woman to give birth to a child conceived through IVF, was not initially told how experimental the procedure actually was.⁴⁷ She was led to believe that many women before her had successfully used the technology. Similar deceptions have occurred with each new reproductive technology—such as embryo freezing, egg donation, and egg freezing.

41. Mary Anne Bobinski, *Women and HIV: A Gender-Based Analysis of a Disease and Its Legal Regulation*, 3 TEX. J. WOMEN & L. 7, 16 (1994).

42. When the AIDS outbreak occurred, the Centers for Disease Control in the U.S. Department of Health and Human Services created a definition of AIDS. PRINCETON, THE CDC AIDS DEFINITION: IMPLICATIONS OF THE CD4 LYMPHOCYTE COUNT, §§ II.1-II.2 (1992), <https://www.princeton.edu/~ota/disk1/1992/9206/920604.PDF> [<https://perma.cc/N5DL-VNPF>]. It included conditions that are almost exclusive to men infected with AIDS, including “pneumocystis carinii pneumonia, Kaposi’s sarcoma, esophageal candidiasis, toxoplasmosis of the brain, and HIV wasting syndrome.” *Id.* It did not include cervical cancer, vaginal candidiasis, and other symptoms commonly experienced by infected women. Susan Blumenthal & Negar Avaregan, *A World Without AIDS for American Women*, AMFAR (June 20, 2014, 11:37 AM), <https://www.amfar.org/world-without-aids-for-american-women> [<https://perma.cc/PQ7N-EGF8>]. Unless a person suffered from one of the “male” conditions, he or she was not considered to have AIDS under the definition. PRINCETON, *supra*. The definition had been criticized because the majority of the conditions necessary to qualify only occur in white, homosexual men. *Id.* The definition failed to include symptoms most commonly associated with women and injected drug users, and thus disqualified them from receiving Medicaid funding. *Id.* This meant that the needs of women with AIDS were not addressed, and they could not access treatment. *Id.* There were racial disparities as well, as the majority of infected women and injected drug users were African American or Hispanic. *Id.*

43. ROBERT J. LEVINE, ETHICS AND REGULATIONS OF CLINICAL RESEARCH 71–72 (1986).

44. *Id.*

45. GENA COREA, THE MOTHER MACHINE 101–13, 135 n.2 (1985).

46. Don Wolf, Speech at Chicago-Kent College of Law (Apr. 7, 1997).

47. COREA, *supra* note 45, at 167.

And it is not just medical technologies that follow a male model. Think of one of the most costly technologies most of us own—our car. There are about as many female drivers as male drivers in the United States.⁴⁸ But until 2003, female crash dummies were not used in federal compliance crash tests,⁴⁹ and it was only in 2011 that female dummies were used in vehicle safety ratings tests.⁵⁰ As a result, seat-belted female drivers were 47% more likely to suffer a serious injury than belted male drivers and 71% more likely to suffer moderate injuries.⁵¹

In the professional sphere, technological sexism can lead to women being harmed on the job. As was the case with Florence Haseltine's arrival at NIH and her advocacy for medical research involving women, it required the inclusion of women such as Pamela Savage-Knepshield in the military research labs to shed light on the risks to female soldiers' safety and efficiency when women are overlooked in the design of military systems.⁵² Savage-Knepshield and her colleagues point out, "It is also critical that females are fully considered during the design of new systems to help prevent adverse health effects as a result of operating the equipment, and to ensure that the equipment itself does not prevent them from performing efficiently."⁵³ The military research regarding women is helping spur the development of changes that could help both male and female soldiers (such as the development of exoskeletons and lighter materials to increase strength and endurance). The military research has also helped dispel some stereotypes about women, such as that they have lesser spatial abilities.⁵⁴ And, in contrast to stereotypical presumptions that female soldiers and sailors are more prone to motion sickness, when researchers measured physiological responses they found

48. *Licensed Drivers by Age and Sex (In Thousands)*, U.S. DEPT. OF TRANSP. FED. HIGHWAY ADMIN. (Mar. 29, 2018), <https://www.fhwa.dot.gov/ohim/onh00/bar7.htm> [<https://perma.cc/E2EB-PBCL>]. As of March 29, 2018, there were 95,796 male licensed drivers and 94,829 female licensed drivers in the United States. *Id.*

49. See Katherine Shaver, *Female Dummy Makes Her Mark on Male-Dominated Crash Tests*, WASH. POST (Mar. 25, 2012), https://www.washingtonpost.com/local/trafficandcommuting/female-dummy-makes-her-mark-on-male-dominated-crash-tests/2012/03/07/gIQANBLjaS_story.html?https://perma.cc/E6BQ-WDJR; U.S. Dep't of Transp.: Nat'l Highway Traffic Safety Admin., *Milestones for NHTSA's Crash Test Dummies*, SAFETY IN NUMBERS 1 (Sept. 2015).

50. Shaver, *supra* note 49.

51. See Dipan Bose, Maria Segul-Gomez & Jeff R. Crandall, *Vulnerability of Female Drivers Involved in Motor Vehicle Crashes: An Analysis of US Population at Risk*, 101 AM. J. PUB. HEALTH 2368, 2371 (2011); Kat Ely, *The World is Designed for Men: How Bias is Built into Our Daily Lives*, MEDIUM (Sept. 8, 2015), <https://medium.com/hh-design/the-world-is-designed-for-men-d06640654491> [<https://perma.cc/6GM8-PBT9>]. In 2011, many car safety ratings including for Toyotas and Hondas took a hit. For instance, the 2011 Toyota Sienna received a score of only a two out of five stars on the safety of its front passenger in a frontal crash, down from a five-star rating for the safety of that seat in the 2010 model of the same vehicle. Shaver, *supra* note 49.

52. Pamela A. Savage-Knepshield et al., *Designing Military Systems for Women in Combat*, 181 WOMEN IN MED. 44 (2016); see also Rachel N. Weber, *Manufacturing Gender in Commercial and Military Cockpit Design*, 22 SCI. TECH. & HUM. VALUES 235 (1997).

53. Savage-Knepshield et al., *supra* note 52, at 44.

54. *Id.* at 46–48.

that women were not more likely than men to experience motion sickness (but women were more likely to admit it, while men lied about it).⁵⁵

Women's participation in the design team can help focus technology on real problems and actual needs. In contrast to a male-designed app marketed to men that tells them what to do in extremely rare situations, such as being confronted by a poisonous snake,⁵⁶ the app Companion, created by five students at the University of Michigan, two of whom are women, addressed actual risks. The app allows the user to send her location and destination to selected "companions," who track her route home to ensure she arrives safely. "If you start running, your phone falls to the ground, or you don't make it to your destination on time, you'll get a message asking if everything is OK — if you don't respond in 15 seconds, the app alerts your companions. It also includes features to call police or give a heads up about unsafe conditions."⁵⁷

In order for women to participate fully in the design of technologies, first they need to be provided with opportunities to use their skills. Although the number of women receiving science degrees has significantly increased, the number of women being hired in junior positions remains low.⁵⁸ A study conducted by professors from Yale University of 127 science faculty (biology, chemistry, and physics professors) from research-intensive universities (three private and three public)⁵⁹ concluded that inherent gender biases exist that result in faculty members showing preferential treatment toward male students.⁶⁰ Each faculty member was randomly assigned the application materials of a student, who had either a male or female name, applying for a laboratory manager position.⁶¹ However, each packet of materials, whether submitted using the female name or the male name, was the same.⁶² Faculty members were under the impression that they were assessing a real student who would have access to their mentoring.⁶³

The study found that the female applicant was viewed as less competent, less suitable for hiring, and less worthy of career mentoring than her identical male counterpart.⁶⁴ The average salary offered to the female applicant was \$26,507.94,

55. *Id.*

56. The app, SAS Survival Guide, was designed by a British special forces trainer. Dennis Green, *14 Apps Every Modern Gentleman Should Have on His Phone*, BUS. INSIDER (Mar. 17, 2016), <http://www.businessinsider.com/apps-every-every-man-should-have-on-his-phone-2016-3> [<https://perma.cc/CD6E-YA44>].

57. Nile Cappello, *16 Free Apps Every Woman Should Download*, POPSUGAR (June 20, 2018), https://www.popsugar.com/tech/Best-Apps-Women-38348398?stream_view=1#photo-38348413 [<https://perma.cc/TP6U-EZDN>].

58. Corinne A. Moss-Racusin et al., *Science Faculty's Subtle Gender Biases Favor Male Students*, 109 PROC. OF THE NAT'L ACAD. OF SCI. OF THE U.S. 16474, 16474 (2012).

59. *Id.* at 16478.

60. *Id.* at 16474.

61. *Id.* at 16475.

62. *Id.*

63. *Id.* at 16478.

64. *Id.* at 16475.

while the average salary offered to the male applicant was \$30,238.10.⁶⁵ The gender of the faculty member did not have an effect on his or her decision.⁶⁶ Both male and female professors demonstrated implicit biases against female students.⁶⁷

WHO FUNDS TECHNOLOGY?

Innovative technologies often develop outside the normal corporate research and development structure. When financing new businesses during the early stages, innovators sometimes self-fund through bank loans and assistance from family and friends,⁶⁸ but at other times start-ups are funded by raising venture capital. Nearly 5000 start-ups were founded in 2017;⁶⁹ 2425 of them received venture capital.⁷⁰

Male innovators and female innovators are treated differently in the venture capital sphere. Women are doubted, seen as less serious about business, and asked about their plans for motherhood. They are sexually harassed. Above all, they are underfunded. In 2016, venture capitalists invested about \$58 billion in companies with all-male founders.⁷¹ Meanwhile, female-led companies received just about \$1 billion.⁷² As of 2013, businesses with only men on their executive teams were four times more likely to receive funding from venture capital investors than those with even one woman on their team.⁷³ Only 2.7% of the companies receiving venture capital funding had a female CEO.⁷⁴ Moreover, female founders are provided with less equity in their companies. Women hold 6% of founder equity even though they make up 13% of founders.⁷⁵ And the amount these women own in equity is thirty-nine cents of every dollar male founders own.⁷⁶

65. *Id.*

66. *Id.*

67. *Id.*

68. CANDIDA G. BRUSH ET AL., DIANA REPORT WOMEN ENTREPRENEURS 2014: BRIDGING THE GENDER GAP IN VENTURE CAPITAL 3 (2014).

69. According to Crunchbase, 4955 start-ups were founded in 2017. *Startups Founded in 2017*, CRUNCHBASE, <https://www.crunchbase.com/hub/startups-founded-in-2017#section-overview> [<https://perma.cc/S494-S7QR>] (last visited Apr. 6, 2019).

70. NAT'L VENTURE CAPITAL ASS'N, NVCA 2018 YEARBOOK 5 (2018).

71. Valentina Zarya, *Venture Capital's Funding Gender Gap Is Actually Getting Worse*, FORTUNE (Mar. 13, 2017), <http://fortune.com/2017/03/13/female-founders-venture-capital/> [<https://perma.cc/5RPD-YC24>].

72. *Id.*

73. Candida Brush et al., *The Gender Gap in Venture Capital- Progress, Problems, and Perspectives*, 20 VENTURE CAPITAL 115, 128 (2018).

74. Brush et al., *supra* note 68, at 7.

75. *The Gap Table: Analyzing the Gender Gap in Equity*, CARTA (Sept. 17, 2018), <https://blog.carta.com/gap-table> [<https://perma.cc/84ES-CL2X>].

76. *Id.*

Even though women are not raising as much money, they are generating more.⁷⁷ In a study of 266 startups, companies with at least one female founder performed 63% better than companies with all-male founders.⁷⁸ According to a study by Boston Consulting Group, “[f]or every dollar of funding, . . . startups [founded by women] generated 78 cents, while male-founded startups generated less than half that—just 31 cents.”⁷⁹ Assessing that study, the business magazine *Inc.* noted, “By that measure, if investors had put the same amount of capital into women-run companies as they did into the ones run by guys, they would have helped generate an additional \$85 million in revenue.”⁸⁰

This disparity in venture capital funding is attributable to the small percentage of female venture capitalists, the stereotypes venture capitalists hold of women as mothers and sex objects, and the fact that men are expected to succeed and women are expected to fail.

Venture capital firms with female partners are twice as likely to invest in businesses with women on the executive team (34% vs. 13%) and three times more likely to invest when there is a female CEO (58% vs. 15%).⁸¹ Yet, as of March 2018, there were 1015 decision makers across 232 venture capital firms and only 9% of them were women.⁸²

Companies led by men received significantly greater amounts of funding than those run by women, even when both requested the same amount of money.⁸³ Contrary to the idea that the gender gap in funding comes from women asking for less money because they have lower capital needs,⁸⁴ it is due to venture capitalists treating men and women differently. A study by Dana Kanze and her colleagues covering pitch sessions of 623 startups evaluated 1857 questions that were asked by potential investors and 1718 responses from entrepreneurs to determine if the

77. Kimberly Weisul, *When It Comes to Revenue, Women Entrepreneurs Are Pummeling the Guys*, *INC.* (June 6, 2018), <https://www.inc.com/kimberly-weisul/boston-consulting-group-female-founders-higher-revenues.html> [<https://perma.cc/5K3W-84Q7>].

78. See *Female Founders Outperform Their Male Peers*, FIRST ROUND CAPITAL, <http://10years.firstround.com> [<https://perma.cc/A43J-FD95>] (last visited May 31, 2019); Weisul, *supra* note 77.

79. Katie Abouzahr et al., *Why Women Owned Startups Are a Better Bet*, BOS. CONSULTING GRP. (June 6, 2018), <https://www.bcg.com/en-us/publications/2018/why-women-owned-startups-are-better-bet.aspx> [<https://perma.cc/V6V9-BUL3>].

80. Weisul, *supra* note 77.

81. Brush et al., *supra* note 68, at 11.

82. Dan Primack, *Venture Capital Is Still a Boys Club*, AXIOS (Mar. 7, 2018), <https://www.axios.com/women-make-very-small-gains-1520437286-dc72c256-768a-463f-b14f-99694bf7fd94.html> [<https://perma.cc/Y5TH-VHXG>]. In total, there are 970 venture capital firms in the U.S. See NAT'L VENTURE CAPITAL ASS'N, *supra* note 70, at 5. The Axios study of female representation was undertaken using a subset of the 970—232 firms with at least one fund of at least \$100 million between 2013 and 2017. Primack, *supra*.

83. Dana Kanze et al., *We Ask Men to Win and Women Not to Lose: Closing the Gender Gap in Startup Funding*, 61 *ACAD. MGMT. J.* 586, 597 (2018).

84. *Id.* at 594.

gender of the entrepreneurs affected the questions asked.⁸⁵ The study, published with the title *We Ask Men to Win and Women Not to Lose*, found that both male and female venture capitalists⁸⁶ asked men questions that related to growing their investment but asked women questions related to preventing loss.⁸⁷

Men were asked promotion-based or growth questions such as: “How do you want to acquire customers,” “How do you plan to monetize this,” “What is your aspiration,” “What major milestones are you targeting for this year,” and “What does success look like.”⁸⁸ Women were asked prevention-based questions including, “What safeguards do you have against that,” “How long will it take you to break even,” “Are people coming back,” and “What are the opportunities for leakage.”⁸⁹ Startup entrepreneurs who were asked promotion-based questions received on average \$16.8 million from investors, which is seven times higher than the \$2.3 million received by startup entrepreneurs who were asked prevention-based questions.⁹⁰

Venture capitalists also commonly express concerns that family commitments would interfere with a woman’s role in her venture.⁹¹ Teresa Nelson and her colleagues found that potential investors asked women whether they had children, how much time they planned to spend with their children, and whether they would meet their deadlines.⁹²

The value of female entrepreneurs is also minimized through sexual harassment. After Jennifer Hyman graduated from Harvard Business School, she and a female classmate started Rent the Runway, an internet service that rents out designer dresses and accessories at affordable prices.⁹³ Within the first week of operation, Rent the Runway signed up 20,000 women for its service.⁹⁴ That same week, the company was featured on the front page of *The New York Times* business section.⁹⁵

When Hyman sought to raise money in Silicon Valley, one investor used a business meeting to proposition her for sex, both in person and via text message.⁹⁶

85. *Id.* at 591.

86. *Id.* at 603.

87. *Id.* at 602.

88. *Id.* at 611.

89. *Id.* at 612.

90. *Id.* at 598.

91. Teresa Nelson, Sylvia Maxfield & Deborah Kolb, *Women Entrepreneurs and Venture Capital: Managing the Shadow Negotiation*, 1 INT’L J. GENDER & ENTREPRENEURSHIP 57, 72 (2009).

92. *Id.*

93. Emily Peck, *How the Co-Founder of ‘Rent The Runway’ Beat Sexism on Her Way to the Top*, HUFFINGTON POST (Nov. 17, 2017), https://www.huffingtonpost.com/entry/jennifer-hyman-rent-the-runway-business-sexism_us_59e13603e4b0a52aca181ab9 [https://perma.cc/WXS6-6X3A]. The rental service allows women to rent dresses for “roughly one-tenth of what it would cost to buy in retail stores.” Jenna Wortham, *A Netflix Model for Haute Couture*, N.Y. TIMES (Nov. 8, 2009), <https://www.nytimes.com/2009/11/09/technology/09runway.html>.

94. Wortham, *supra* note 93.

95. *Id.*

96. Peck, *supra* note 93.

She had already generated tens of millions of dollars in funding for her company and should have been taken seriously as an entrepreneur.⁹⁷ Rent the Runway is now a nearly \$1 billion company with over eight million customers and more than 1200 employees.⁹⁸

In technology companies where women have played a role, some have had their contributions minimized or ignored. When Whitney Wolfe Herd sued Tinder on sexual harassment grounds, she also claimed that the dating app company had deprived her of her title as co-founder.⁹⁹ She was harassed mercilessly on the web as a result of her lawsuit, with men saying that she should be raped or killed.¹⁰⁰

But with her million dollar settlement and an investment from the head of an international dating app, she started Bumble, an alternative dating app which puts power in the hands of women.¹⁰¹ Only women can initiate contact and there are no selfies of men stripped to the waist à la Anthony Weiner. Bumble is now a billion dollar company,¹⁰² leading *Forbes* to feature twenty-eight-year-old Herd on the cover of its “30 Under 30” cover.¹⁰³

WHO PATENTS TECHNOLOGY?

Even the system of obtaining a patent—a potential key to funding an innovation—is tainted with gender inequalities. Although “women earn half of the doctoral degrees in science and engineering,” only 10% of patent holders are women.¹⁰⁴ Based on patenting progress since 2000, studies conducted by Jessica Milli and her colleagues at the Institute for Women’s Policy Research found that gender parity will not be reached until the year 2092.¹⁰⁵ However, the study defines “parity” as “half of all patents having at least one woman inventor listed.”¹⁰⁶ This does not mean that women will make up half of the inventors overall.¹⁰⁷

97. *Id.*

98. Natalie Daher, *3 Success Tips from Rent the Runway CEO – Who Built a Nearly \$1 Billion Company*, CNBC (Sept. 28, 2017), <https://www.cnbc.com/2017/09/26/3-success-tips-from-rent-the-runway-ceo-jennifer-hyman.html> [<https://perma.cc/2ZR5-LVRX>].

99. Clare O’Connor, *Billion-Dollar Bumble: How Whitney Wolfe Herd Built America’s Fastest-Growing Dating App*, FORBES (Nov. 14, 2017), <https://www.forbes.com/sites/clareoconnor/2017/11/14/billion-dollar-bumble-how-whitney-wolfe-herd-built-americas-fastest-growing-dating-app/#ed2672b248b3> [<https://perma.cc/KN3L-8NXD>].

100. *Id.*

101. *Id.*

102. *Id.*

103. *Id.*

104. Jyoti Madhusoodanan, *Why Do Women Inventors Win Fewer Patents?*, YALE INSIGHTS (Apr. 9, 2018), <https://insights.som.yale.edu/insights/why-do-women-inventors-win-fewer-patents> [<https://perma.cc/RP2U-N1MX>].

105. JESSICA MILLI ET AL., EQUITY IN INNOVATION: WOMEN INVESTORS AND PATENTS 7 (Inst. Women’s Pol’y Res. ed., Nov. 9, 2016), <https://iwpr.org/publications/equity-in-innovation-women-inventors-and-patents/> [<https://perma.cc/S9TZ-76KZ>].

106. *Id.*

107. *Id.*

Some argue that the source of this disparity lies in the lack of women in the science, technology, engineering, and math (STEM) fields.¹⁰⁸ A direct correlation does exist between STEM field graduates and patenting activity;¹⁰⁹ however, this still does not explain the fact that women earn about 42% of the doctoral degrees in STEM fields, yet more than 81% of patents do not list a woman as an inventor.¹¹⁰

A person's gender affects that person's chance of obtaining a patent. Kyle Jensen and his colleagues at the Yale School of Management conducted a study of 2.7 million patents from 2001-2014 and found that individuals with female names seeking a patent had a 21% lower chance of having that patent approved.¹¹¹ However, there was less of a gender gap for women with rare names, "where it would be tougher for an examiner to guess the applicant's gender."¹¹²

Patents usually go through numerous stages of revision before a decision is made to approve or reject them.¹¹³ When women seek patents, they are subject to more roadblocks by the patent office than are men. Their applications often have a higher number of office actions¹¹⁴ where patent examiners reduce the scope of their patents, making the patents weaker.¹¹⁵ This is particularly problematic because strong patents affect a person's ability to obtain venture capital.¹¹⁶

Even when a woman's patent is approved, she is still discriminated against in her field.¹¹⁷ The number of citations to a patent signals the patent's "impact and quality."¹¹⁸ Patents of inventors with common female names were cited 30% less frequently by future patent applicants than inventors with common male names.¹¹⁹ When women inventors had rare names (not easily seen as female), their patents

108. *Id.* at 8 (citing John Winters, INST. LAB. ECON., *Foreign and Native-Born STEM Graduates and Innovation Intensity in the United States*, DISCUSSION PAPER SERIES (Oct. 2014), <http://anon-ftp.iza.org/dp8575.pdf> [<https://perma.cc/U5NU-CPTA>]).

109. *Id.*

110. Adrienne LaFrance, *Why Do Women Inventors Hold So Few Patents?*, ATLANTIC (July 21, 2016), <https://www.theatlantic.com/technology/archive/2016/07/the-patent-gap/492065/> [<https://perma.cc/DUK2-RKKA>]; NAT'L SCI. FOUND., TABLE 54 – NCSES SURVEY OF EARNED DOCTORATES: FY 2016, <https://www.nsf.gov/statistics/2018/nsf18304/data/tab54.pdf> [<https://perma.cc/2A6T-ULJT>] (last visited Apr. 6, 2019) [hereinafter NCSES SURVEY OF EARNED DOCTORATES].

111. Kyle Jensen, Balazs Kovacs & Olav Sorenson, *Gender Differences in Obtaining and Maintaining Patent Rights*, 36 NATURE BIOTECHNOLOGY 307, 309 (Apr. 6, 2018). Some of the gender difference had to do with the fact that women applied for patents for technologies in fields with lower patent rates. *Id.* Controlling for technology category, women still were 7% less likely to be granted a patent.

112. *Id.*

113. See Michael Carley, Deepak Hegde & Alan Marco, *What is the Probability of Receiving a U.S. Patent?*, 17 YALE J.L. & TECH. 204, 207 (2015).

114. MILLI ET AL., *supra* note 105, at 14.

115. Jensen, Kovacs & Sorenson, *supra* note 111; Madhusoodanan, *supra* note 104.

116. See ARTI RAI, U.S. DEP'T COM., PATENT REFORM: UNLEASHING INNOVATION, PROMOTING ECONOMIC GROWTH & PRODUCING HIGH-PAYING JOBS 1 (2010); LaFrance, *supra* note 110.

117. MILLI ET AL., *supra* note 105, at 14–15.

118. *Id.*

119. See Jensen, *supra* note 111; Madhusoodanan, *supra* note 104.

were 20% more likely to be cited than those of men with rare names, indicating that, if citations relate to quality, “the average patent granted to a woman inventor is of higher quality than the average patent granted to a man.”¹²⁰

Women’s patents are less likely to be commercialized—with their inventions brought to market—than men’s. Women hold only 5.5% of commercialized patents.¹²¹ This is related to the difficulty women have in obtaining venture capital¹²² and to problems in “mentorship, corporate culture, and academic culture.”¹²³

HOW IS TECHNOLOGY MARKETED?

The marketing of technologies can reinforce stereotypes about women. Considering that we each see as many as 5000 ad messages per day (up from 500 in the 1970s),¹²⁴ ads play a profound role in conditioning.¹²⁵ In the 1940s and 1950s, ads showed women who were overjoyed—practically orgasmic—to receive technologies such as vacuum cleaners or stoves to be used in their roles as homemakers.¹²⁶ In ads of that era, a woman’s role was to care for the home and please her husband. A study conducted by Professors Ahmed Belkaoui and Janice Belkaoui found that ads in the 1950s depicted women as “housewives in decorative roles and idle situations or as low-income earners with limited purchasing power.”¹²⁷ An ad from that decade for a food processor called “Chef” depicts a wife embracing her husband with the caption: “The Chef does everything but cook—that’s what the wives are for!”¹²⁸ These ads reiterated the common stereotypes associated with

120. Jensen, *supra* note 111, at 309.

121. Holly Fechner & Matthew S. Shapanka, *Closing Diversity Gaps in Innovation: Gender, Race, and Income Disparities in Patenting and Commercialization of Inventions*, 19 TECH. & INNOVATION 727, 729 (2018).

122. See Zarya, *supra* note 71.

123. Fechner & Shapanka, *supra* note 121, at 729.

124. Caitlin Johnson, *Cutting Through Advertising Clutter*, CBS (Sept. 17, 2006), <https://www.cbsnews.com/news/cutting-through-advertising-clutter/> [<https://perma.cc/F2JG-S8R9>].

125. Katharina Lindner, *Images of Women in General Interest and Fashion Magazine Advertisements from 1955 to 2002*, 51 SEX ROLES 409, 410 (2004).

126. One 1940 ad shows a smiling woman receiving a Hamilton Beach Food Mixer, with text that reads: “It’s just what I wanted.” Sally Edelstein, *Guaranteed Gal Pleasing Xmas Presents*, ENVISIONING AM. DREAM (Dec. 26, 2014), <https://envisioningtheamericandream.com/2014/12/26/guaranteed-gal-pleasing-xmas-presents/> [<https://perma.cc/3KJX-AKGX>]. A 1947 ad for Proctor toasters, irons, and roaster grillers shows a woman smiling and winking at the viewer, with text that says: “Ways to please a lady.” *Id.* In an ad from 1969, a woman in high heels looks down lovingly at her new Hoover vacuum cleaner. *New Slim-Silhouette Hoover Convertible*, PINTEREST (Nov. 19, 2018), <https://www.pinterest.com/pin/237635317808304065> [<https://perma.cc/5VZP-6CNZ>].

127. Lindner, *supra* note 125, at 410.

128. Julian Crowley, *10 Most Sexist Print Ads from the 1950s*, BUSINESS PUNDIT (Dec. 10, 2012), <http://www.businesspundit.com/10-most-sexist-print-ads-from-the-1950s/> [<https://perma.cc/6ZEM-GP2A>].

women, and even went so far as to guilt and place additional burdens on them.¹²⁹ An ad for Mornidine, a morning sickness drug, depicts a woman standing over the stove with the caption: “Now she can cook breakfast again.”¹³⁰ In the 1950s, ads ridiculed women outside the home. An ad for Drummond sweaters portrayed two men hiking while a woman is dangling from the mountain hanging on a rope.¹³¹ The ad states, “Men are better than women! Indoors, women are useful—even pleasant. On a mountain they are something of a drag.”¹³²

In the late 1970s, in the era of consciousness-raising and more women entering the workplace (even in traditionally male jobs such as law enforcement and the building trades), the focus of ads did not change dramatically.¹³³ Women were rarely portrayed working out of the home and were often depicted as sex objects dependent on men.¹³⁴ Women were shown in stereotypical roles and were expected to live up to these portrayed expectations.¹³⁵ In fact, some ads just added women’s work outside the home to their duties of cooking, cleaning, and making their husbands happy. A case in point: a 1979 Enjoli perfume ad showed a woman in a bathrobe, in a suit, and in a slinky dress, with lyrics about feeding the kids, cooking, and passing out kisses. The song’s refrain was, “I can bring home the bacon, fry it up in a pan and never, never, never let you forget you’re a man.”¹³⁶

Professors Gary Sullivan and P.J. O’Connor, comparing ads from the 1950s and 1970s to those from 1983, noted that “[a]ds in 1983 were more than twice as

129. In an attempt to highlight the sexism displayed in these ads, artist Eli Rezkallah recreated a series of ads from the 1940s, 50s, and 60s where he switched the roles of men and women. India Stoughton, *Seven Photographs by Lebanese Artist Eli Rezkallah That Reveal How Sexist Advertising Can Be*, NATIONAL (Feb. 19, 2018), <https://www.thenational.ae/arts-culture/art/seven-photographs-by-lebanese-artist-eli-rezkallah-that-reveal-how-sexist-advertising-can-be-1.706132> [<https://perma.cc/2E9E-2F64>]. Entitled *In a Parallel Universe*, Rezkallah describes his work as “a series of fictional images, recreated from real ads in the mad men era, that question modern day sexism: showing it through a humorous light to spark a conversation through role play.” *In a Parallel Universe*, ELI REZKALLAH, <http://www.elirezkallah.com/inaparalleluniverse> [<https://web.archive.org/web/20181112120632/http://www.elirezkallah.com/inaparalleluniverse>] (last visited Nov. 15, 2018). For example, one of the original ads depicts a man spanking his wife with the caption, “If your husband ever finds out you’re not ‘store-testing’ for fresher coffee...” Rezkallah recreated the ad to depict a woman spanking her husband and replaced “husband” with “wife” in the caption. Another ad for men’s slacks depicts a man standing on a woman’s head stating, “It’s nice to have a girl around the house.” Others in which he switched genders originally portrayed women happily receiving vacuums, toasters, and irons as gifts, endorsing their “place”—in the kitchen. Though it may seem extreme or exaggerated, the role reversals in each ad reveal sexual stereotypes that continue to be prevalent in ads today.

130. Crowley, *supra* note 128.

131. *Id.*

132. *Id.*

133. Lindner, *supra* note 125, at 410.

134. *Id.*

135. *Id.* at 409.

136. Bionic Disco, *Enjoli Perfume ‘I’m A Woman’ Commercial (1979)*, YOUTUBE (Nov. 15, 2017), [https://www.youtube.com/watch?v=N_kz\]-f5C9U](https://www.youtube.com/watch?v=N_kz]-f5C9U) [<https://perma.cc/7XCV-UGQ5>].

likely to portray women as employed as ads in 1970.”¹³⁷ But while the manner by which they are depicted may have changed from decade to decade, women continued to be portrayed as inferior to men. Professor Mee-Eun Kang found that the stereotypical portrayal of women continued into the 1990s, but the *type* of stereotyping changed.¹³⁸ In a comparative study of magazine ads from 1979 and 1991, Kang found that the women in the 1991 ads were “more often depicted in ‘sexy’ dress or nude than in 1979.”¹³⁹ She further noted that “only superficial cultural alterations are transferred to advertisements, while the underlying ideological foundation remains untouched.”¹⁴⁰ Though women were no longer depicted as primarily caregivers and housewives, in 1991 they were still being sexualized as much as they were in the 1970s.¹⁴¹

Stereotypical advertising continues even today. Professors Ercan Sirakaya and Sevil Sonmez analyzed state tourism brochures in the United States and found that women continue to be portrayed in traditional roles as “overly subordinate, submissive, [and] dependent on men.”¹⁴² A study by Martin Eisend analyzing gender stereotyping in ads found that it still exists—particularly for women and the occupational roles they portray.¹⁴³

Psychologist Rosalind Gill compared ads from the 1950s to those of today. She noted that “if, in the 1950s, it was the home that was the ideal focus for women’s labour and attention and from which their ‘worth’ was judged, in the new millennium it is the body.”¹⁴⁴ Today, ads minimize women by sexualizing them. Katharina Lindner noted how the move toward gender equality was “counteracted [in ads] by an increase in women portrayed in purely decorative and sexualized roles.”¹⁴⁵ Though women may no longer be depicted as primarily caregivers and housewives, they are now being sexualized in ads, which “reestablished the power imbalance” created by the portrayal of women as equal to men.¹⁴⁶

137. Gary L. Sullivan & P.J. O’Connor, *Women’s Role Portrayal in Magazine Advertising: 1958-1983*, 18 *SEX ROLES* 181, 187 (1988).

138. See generally Mee-Eun Kang, *The Portrayal of Women’s Images in Magazine Advertisements: Goffman’s Gender Analysis Revisited*, 37 *SEX ROLES* 979 (1997).

139. *Id.* at 993.

140. *Id.* at 994 (quoting Jean Umiker-Sebeok, *The Seven Ages of Women: A View from American Magazine Advertisements*, in *GENDER AND NONVERBAL BEHAVIOR* (Clara Mayo & Nancy M. Henley eds., 1981)).

141. *Id.* at 979.

142. Ercan Sirakaya & Sevil Sonmez, *Gender Images in State Tourism Brochures: An Overlooked Area in Socially Responsible Tourism Marketing*, 38 *J. TRAVEL RES.* 353, 361 (2000).

143. Stacy Landreth Graua & Yorgos C. Zotos, *Gender Stereotypes in Advertising: A Review of Current Research*, 35 *INT’L J. ADVERT.* 761, 763 (2016) (citing Martin Eisend, *A Meta-Analysis of Gender Roles in Advertising*, 38 *J. ACAD. MARKETING SCI.* 418 (2010)).

144. Rosalind Gill, *Empowerment/Sexism: Figuring Female Sexual Agency in Contemporary Advertising*, 18 *FEMINISM & PSYCHOL.* 36, 42 (2008).

145. Lindner, *supra* note 125, at 410.

146. *Id.*

Even though women make 85% of all purchasing decisions,¹⁴⁷ only 11% of advertising executive directors are women.¹⁴⁸ Is it any wonder, then, that advertising has a history of stereotyping women and presenting them as “objects for male consumption and pleasure?”¹⁴⁹

Exposure to advertising influences the way we understand our gender roles and conform our behavior to these roles. One study found that people “showed significantly more negative attitudes toward women, especially concerning their managerial skills” after seeing women in stereotypical roles in ads as opposed to professional roles.¹⁵⁰ Moreover, the sexualization of women in ads has been linked to attitudes supportive of sexual aggression and violence against women.¹⁵¹ A study conducted by Professors Kyra Lanis and Katherine Covell used thirty ads from general interest magazines (including *Cosmopolitan*, *Vogue*, *Sports Illustrated*, and *Time*).¹⁵² The ads were categorized into three image conditions (sex object, non-traditional role, and product-oriented (devoid of people)), and the participants were randomly assigned to one.¹⁵³ After being shown the ads, participants were asked to respond on a seven-point scale from “strongly disagree” to “strongly agree”¹⁵⁴ to statements including: “there is something wrong with a woman who does not want to marry and raise a family”; “most women are sly and manipulating when they are out to attract a man”; or “sometimes the only way to turn a cold woman on is by using force.”¹⁵⁵

The study concluded that a correlation exists between exposure to sexualized women in ads and attitudes regarding sexual aggression toward women.¹⁵⁶ The data from the study indicate that “males who see print media advertisements in which women are presented as sex objects are more likely to evidence increased sex role stereotypic and rape-myth beliefs, and are likely to be more accepting of interpersonal violence (primarily against women), than are males exposed to other types of advertisements.”¹⁵⁷

A more recent study reached the same conclusion. This study, conducted by Professors Arleigh Reichl, Jordan Ali, and Kristina Uyeda, analyzed whether latent

147. Ali Hanan, *Five Facts That Show How the Advertising Industry Fails Women*, GUARDIAN (Feb. 3, 2016), <https://www.theguardian.com/women-in-leadership/2016/feb/03/how-advertising-industry-fails-women> [<https://perma.cc/H3JY-Y74V>].

148. *Id.*

149. Gill, *supra* note 144, at 38.

150. Lindner, *supra* note 125, at 409; see generally William E. Kilbourne, *Female Stereotyping in Advertising: An Experiment on Male-Female Perceptions of Leadership*, 67 JOURNALISM Q. 25 (1990).

151. See generally Kyra Lanis & Katherine Covell, *Images of Women in Advertisements: Effects on Attitudes Related to Sexual Aggression*, 32 SEX ROLES 639 (1995).

152. *Id.* at 641.

153. *Id.* at 642.

154. *Id.*

155. *Id.*

156. *Id.* at 645.

157. *Id.* at 642.

sexism in ads promoted acceptance of sexual assault.¹⁵⁸ Latent sexism was defined as “content considered sexist by experts but not identified as sexist by laypersons.”¹⁵⁹

Ads considered to be overtly sexist included “women portrayed as sex objects, inferior to men, unintelligent, or trivialized.”¹⁶⁰ Ads without sexism included “depictions of women as active and competent (e.g., as athletes or in business), or performing the same activity as a man.”¹⁶¹ Ads that demonstrated latent sexism included “images of dismembered legs, makeup that could resemble a bruise, women in potentially dangerous locations, women’s bodies decorated with product logos, women presented alongside violent ad copy (e.g., “pow,” “bang”), and women held by men in vulnerable positions.”¹⁶²

The study concluded that the participants who were exposed to overtly sexist and latently sexist ads displayed a “greater acceptance of sexual assault” when compared to participants who were exposed to nonsexist ads.¹⁶³ Further, the participants exposed to latently sexist ads showed an even *greater* “acceptance of sexual assault” in comparison to those that were exposed to overtly sexist ads.¹⁶⁴ This is problematic because latent sexism is not considered to be “sexist” by the average person. These ideals have been ingrained into our society such that nonobvious sexism is acceptable in the media and in all forms of advertisement people are exposed to daily.

The types of technologies that are marketed to women versus men also provide a glimpse into society’s assumptions about women’s lives, suggesting that women are focused on themselves while men are focused on the larger world. For the law school course that I teach on social networks, I asked students to do a simple in-class experiment. Everyone went to a neutral-seeming website, www.tvguide.com, and compared the ads that popped up on the home page. Even though the students were roughly the same age, pursuing the same profession, and vying for the same jobs, there was a great variation in the ads. Men received ads for expensive cars and higher-limit credit cards. Women received ads for rental cars or ads about starting a family. As with advertising overall, the marketing of apps and the ads shown to women on the internet can influence gender roles and can limit the range of experiences to which women are exposed.

Racial biases are present in advertising as well. A recent study found discriminatory ads based on Google searches of names associated with a certain race.¹⁶⁵ For example, when searching names that are more likely to be assigned to a

158. A.J. Reichl, J.I. Ali & K. Uyeda, *Latent Sexism in Print Ads Increases Acceptance of Sexual Assault*, 8 SAGE OPEN 1, 1 (2018).

159. *Id.*

160. *Id.* at 4

161. *Id.*

162. *Id.*

163. *Id.* at 7.

164. *Id.*

165. Latanya Sweeney, *Discrimination in Online Ad Delivery*, 11 QUEUE 1, 15 (2013).

black person, such as DeShawn, Darnell, and Jermaine,¹⁶⁶ ads appear that suggest the person has an arrest record, even when they do not.¹⁶⁷ On the other hand, names associated with white people, such as Geoffrey, Jill, and Emma,¹⁶⁸ generate a much lower percentage of ads that are suggestive of a criminal record.¹⁶⁹

The information collected about people on the web for marketing purposes can entrench discrimination and deny them benefits. The collection of potential customers' personal information for behavioral advertising gives companies greater ability to deny opportunities to people based on that personal information or their location.¹⁷⁰ Data aggregators have access to all types of information about consumers to "create an almost perfect proxy for race."¹⁷¹ For example, Wells Fargo used ZIP codes to strategically direct home buyers to neighborhoods that predominantly consist of their same race.¹⁷² Companies have also used this technology to direct low income, black, and Latino consumers toward more expensive subprime mortgages where they were charged higher fees than those offered to white people with similar credit scores.¹⁷³

Though consumer data can be beneficially used to identify and target consumer interests, companies have also used this information for exploitative purposes.¹⁷⁴ For example, websites for major companies, including Staples, Home Depot, and Rosetta Stone, use data about the user's location to display different prices for different consumers.¹⁷⁵ Rather than using this technology to the benefit of low-income consumers, companies actually charge higher prices to consumers in poor neighborhoods because they have fewer brick and mortar stores to compete with the online market.¹⁷⁶ Marketing on the web can also limit opportunities to women by, for example, showing ads offering less desirable opportunities than men are offered.¹⁷⁷

WHAT IS THE IMPACT OF TECHNOLOGY—AND ON WHOM?

New technologies are often presented as providing people with additional choices, but technologies soon become entrenched. Often, the decision of whether to use a technology is not up to the woman at all, but her doctor, her employer, or another social institution. There is substantial evidence that birth technologies serve

166. *Id.* at 8.

167. *Id.* at 13.

168. *Id.* at 8.

169. *Id.* at 13.

170. Gary A. Hernandez, Katherine J. Eddy & Joel Muchmore, *Insurance Weblining and Unfair Discrimination in Cyberspace*, 54 SMU L. REV. 1953, 1965 (2001).

171. Nathan Newman, *How Big Data Enables Economic Harm to Consumers, Especially to Low-Income and Other Vulnerable Sectors of the Population*, 18 J. INTERNET L. 1, 5–6 (2014).

172. *Id.* at 6.

173. *Id.* at 8.

174. *Id.* at 12.

175. *Id.*

176. *Id.*

177. *See* discussion *infra* p. 1058.

the physician's needs and convenience over the woman's. For example, most Cesarean sections are done during daylight hours and on Fridays¹⁷⁸ so doctors don't need to come in at night or on the weekends.

Genetic testing during pregnancy—presented initially as an “option” for women—has become virtually mandatory.¹⁷⁹ Today, the extensive use of prenatal testing (with some obstetricians refusing to treat pregnant women unless they agree to undergo such testing) sends the message that it is women (rather than both parents) who are expected to be guarantors of their children's health. When pregnant women do not undergo available prenatal testing, health care professionals blame them for the resulting genetic conditions of their children.¹⁸⁰ Women may also be criticized for continuing a pregnancy if the fetus is found to have a genetic abnormality.¹⁸¹

Such an approach has a negative social impact on women by underscoring the long-standing culture of motherhood that has seen women as solely responsible for their offspring's well-being. Court cases from the turn of the last century suggested that women should be forbidden to do certain types of work—including being lawyers—on the grounds that it might make them less fit to reproduce.¹⁸² And when courts upheld sexist employment laws that kept women out of the employment that men were allowed to take, they used as a rationale “that her physical structure and a proper discharge of her maternal functions—having in view not merely her health, but the well-being of the race—justify legislation to protect her from the greed as well as the passion of man.”¹⁸³

The premium put on healthy babies has been seen in cases in which courts have been willing to order Cesarean sections over a woman's refusal on a doctor's advice that the operation is necessary for the fetus.¹⁸⁴ Psychiatrists have been willing to institutionalize pregnant women who are behaving in a manner considered

178. In addition, physicians also take into consideration the size of their practice when deciding whether to schedule C-sections as “busy physicians with higher obstetric patient volume may be more likely to perform C-sections to manage their time.” Lawton R. Burns, Stacie E. Geller & Douglas R. Wholey, *The Effect of Physician Factors on the Cesarean Section Decision*, 33 MED. CARE 365, 369–70 (1995). Furthermore, the organizational structure of the hospital also has an impact on C-section rates. The highest rates of C-sections were performed in investor-owned hospitals as compared to government-owned. *Id.* at 368.

179. Physicians genetically test women without their knowledge or consent, such as by testing pregnant African-American women to see if they are carriers of the sickle cell anemia gene. Peter T. Rowley et al., *Do Pregnant Women Benefit from Hemoglobinopathy Carrier Testing?*, 565 ANNALS N.Y. ACAD. SCI. 152 (1989). Physicians do this surreptitious testing on blood collected from the women for other purposes.

180. Theresa M. Marteau & Harriet Drake, *Attribution for Disability: The Influence of Genetic Screening*, 40 SOC. SCI. & MED. 1127 (1995).

181. Mary B. Mahowald, Dana Levinson & Christine Cassel, *The New Genetics and Women*, 74 MILBANK Q. 239 (1996).

182. *Bradwell v. Illinois*, 83 U.S. 130 (1872).

183. *Muller v. Oregon*, 208 U.S. 412, 422 (1908).

184. *See, e.g., Jefferson v. Griffin Spalding City Hosp. Auth.*, 274 S.E.2d 457 (Ga. 1987).

harmful to the fetus. Pregnant women have also been prosecuted for acting in ways that are seen as contrary to their fetus's well-being.¹⁸⁵

In some instances, not using technology is penalized. Theresa Marteau's work found that physicians sometimes blame women for the birth of children with genetic conditions if the women refuse prenatal genetic testing.¹⁸⁶ This is particularly troubling since physicians may be less likely to help women who decline testing because "the outcome, giving birth to a child with a condition for which prenatal screening is available, is seen as preventable."¹⁸⁷ Other research shows that physicians try not to spend time with patients when they believe that the patients have contributed to the illness.¹⁸⁸

Situations in which genetic testing is undertaken without the individual's knowledge or consent (as happens during pregnancy when women's blood is tested) are particularly appalling because women, more than men, feel that doctors should keep out of reproductive decisions. When you ask couples "who should decide about prenatal diagnosis, the couple itself or somebody else?" 82% of women indicated the couple should make the decision compared to only 20% of the male partners.¹⁸⁹

Moreover, men's decisions to reject medical technologies are more often honored than are women's decisions. Steven Miles and Allison August found that courts in right-to-die cases have been less willing to honor women's choice to refuse treatment than men's choices.¹⁹⁰ While the (primarily male) judges respected a man's preference in 75% of the cases on withdrawal of treatment, this was true in only 14% of women's cases. Despite the fact that men and women gave similar reasons for refusing treatment, courts characterized men's refusal as "rational" and women's as "emotional" and not sufficiently thought through. In one case, a judge ordered a female Jehovah's Witness to undergo a blood transfusion because she had young

185. Michele Goodwin, *Fetal Protection Laws: Moral Panic and the New Constitutional Battlefield*, 102 CAL. L. REV. 781 (2014); Michele Goodwin, *Prosecuting the Womb*, 76 GEO. WASH. L. REV. 1657 (2008). Women of color are particularly likely to be prosecuted. For example, white women are more likely to use drugs while pregnant than black women, but black women are more likely to be prosecuted. *Id.* at 1672–73.

186. Marteau & Drake, *supra* note 180, at 1130.

187. *Id.*

188. PETER E.S. FREUND & MEREDITH B. MCGUIRE, HEALTH, ILLNESS, AND THE SOCIAL BODY: A CRITICAL SOCIOLOGY 243–44 (1991).

189. No women indicated that the couple should not be the ultimate decision maker and 18% were uncertain. Berit Sjögren, *Future Use and Development of Prenatal Diagnosis, Consumers' Attitudes*, 12 PRENATAL DIAGNOSIS 1, 4 (1992). Forty percent of male partners believed the couple should not be the decision maker in the use of prenatal diagnosis and 40% were uncertain who the decision maker should be. *Id.* The question proposed medical specialists or public authorities as alternative decision makers to the couple. *Id.*

190. Steven H. Miles & Allison August, *Courts, Gender and the Right to Die*, 18 L. MED. & HEALTH CARE 85, 87–88 (1990).

children to care for.¹⁹¹ When a man in that same situation wanted to refuse a transfusion, *his* wish was granted.¹⁹²

Digital technologies, too, disproportionately disadvantage women. On the internet, female job seekers are shown lower paying jobs than male job seekers.¹⁹³ Researchers from Carnegie Mellon created hundreds of fake male and female internet job seekers.¹⁹⁴ The fake job applicants from both groups visited employment webpages. The study found male job seekers received overwhelmingly more ads for high-paying jobs than the female job seekers.¹⁹⁵ Ads for job offers over \$200,000 were displayed almost six times more often for men than for women.¹⁹⁶

In the hiring process, too, women are disadvantaged by digital technologies and are held to different standards regarding behavior in their social media profiles. Over a third of employers, according to a CareerBuilder study, say that they will not hire someone whose Facebook page includes information about the person's drinking or photos that are provocative.¹⁹⁷ But who is considered to be wearing something provocative? Women.

At work, some employers use digital monitoring to track productivity, which can disproportionately affect the people who take low-level administrative jobs (generally women). Workplace tracking is becoming more invasive as employers introduce medical apps and wearables like Fitbit¹⁹⁸ that monitor an employee's activities and health.¹⁹⁹ Employees are sometimes pressured into participating in a workplace wellness program. For example, Houston city employees were required to pay an extra three hundred dollars a year for medical coverage if they declined to

191. *In re the President and Directors of Georgetown College, Inc.*, 331 F.2d 1000, 1008 (D.C. Cir. 1964), *cert. denied*, 377 U.S. 978 (1964).

192. *In re Osborne*, 294 A.2d 372 (D.C. Cir. 1972).

193. Amit Datta et al., *Automated Experiments on Ad Privacy Settings*, 2015 PROC. ON PRIVACY ENHANCING TECH. 92, 92 (2015).

194. *Id.* at 102.

195. *Id.* at 110.

196. *Id.* at 102.

197. *Number of Employers Using Social Media to Screen Candidates at All-Time High, Finds Latest CareerBuilder Study*, CAREERBUILDER (Jun. 15, 2017), <http://press.careerbuilder.com/2017-06-15-Number-of-Employers-Using-Social-Media-to-Screen-Candidates-at-All-Time-High-Finds-Latest-CareerBuilder-Study>.

198. Lee Bell & Chris Hall, *Fitbit Ionic Review: Bridging the Gap Between Fitness Tracker and Smartwatch*, POCKET-LINT (Jun. 21, 2018), <https://www.pocket-lint.com/fitness-trackers/reviews/fitbit/142566-fitbit-ionic-review-fitness-tracker-smartwatch> [<https://perma.cc/CN4J-A2QT>].

199. See generally Gordon Hull & Frank Pasquale, *Toward a Critical Theory of Corporate Wellness*, 13 BIOSOCIETIES 190 (2018); Kelli B. Grant, *Your New Office Workout: Financial Fitness*, CNBC (Apr. 23, 2016), <http://www.cnbc.com/2016/04/23/workplace-financial-wellness-programs-get-more-popular.html> [<https://perma.cc/JA3J-RVYN>]. For example, GetHealth and CoreHealth offer apps designed for workplace wellness programs. See Jeremy Bornstein, *5 Tools for Tracking & Motivating Employee Wellness*, 2020 (Jul. 14, 2017), <https://www.2020onsite.com/blog/5-tools-for-tracking-motivating-employee-wellness> [<https://perma.cc/3KSY-XV8Y>].

participate in the workplace wellness program.²⁰⁰ Maintaining a certain level of fitness—as measured by steps on Fitbit—can lead to gifts and discounts on insurance, but these benefits are based on how many steps the employee takes. Women who are stuck in low level administrative office jobs may not be able to wander around like male managers and may not be able to meet the criteria. At the same time, the monitoring of women in the workplace through apps and devices may be more privacy-invading for them than for men. When apps and devices indicate the user’s location, the monitoring of the amount of time that a woman spends in the bathroom can reveal private information such as whether she is in the early stages of pregnancy.²⁰¹

Women’s use of digital technologies can also be harmful to them in custody cases and rape cases. Women who express their sexuality on social networks run the risk of losing their children in custody cases. Judges seem to have a stereotypical notion that women cannot be good mothers if they think about or engage in sex.²⁰² For example, a woman who posted sexually explicit comments on her boyfriend’s Myspace page lost custody of her child as a result.²⁰³ When another woman created Myspace pages for her seven- and ten-year-old daughters and friended them, they could then view her Myspace page, which contained photos that the judge said showed her posing “provocatively” in lingerie.²⁰⁴ The judge awarded custody to their father.

In another case, when a pregnant woman posted a romantic photo of herself with a man who was not her husband, the male judge told her, “I don’t know where your mom and dad went wrong, and I don’t think they did, and I guess this is a nightmare every parent faces when you have got a child that acts like a slut, quite frankly, a slut.”²⁰⁵ The judge granted the husband a divorce and awarded him custody of the child, even though he’d not seen or cared for the child except for a

200. See *Wellness Campaign FAQ’s*, CITY OF HOUSTON, http://www.houstonx.gov/hr/benefits/wellness_campaign_faqs.html [https://perma.cc/3NQE-A4FQ] (last visited May 31, 2019); *2018-2019 Health & Wellness Program: Win for Life*, CITY HOUS., http://www.houstonx.gov/hr/benefits/wellness_campaign.html [https://perma.cc/G3CL-YBJM] (last visited May 31, 2019).

201. Robin Elise Weiss, *Knowing the Early Signs and Symptoms of Pregnancy*, VERY WELL FAMILY (Nov. 25, 2018), <https://www.verywellfamily.com/early-pregnancy-signs-2759952> [https://perma.cc/7GAT-RPQ3].

202. The problem is compounded because social networks reveal aspects of a parent’s life that judges have not had access to before. In theory, that might sound like a good thing. But there is a huge class divide between the (mostly white, mostly older, mostly well-off) judges who oversee custody cases and the parents who come before them. Judges can now glimpse into the lifestyles of people quite different from themselves, and they may be repelled by aspects that have nothing to do with whether the person whose Facebook or Myspace page they are viewing would be a good parent or not. People are revealing their most intimate selves in their postings and some of what they reveal may be more prejudicial than probative if admitted in the case.

203. Vesna Jaksic, *Litigation Clues Are Found on Facebook*, NAT’L L.J. 1 (2007), <https://www.law.com/almID/1192179801788/> [https://perma.cc/5P36-AAHL].

204. *Smith v. Smith*, No. CA 08-577, 2009 WL 195939 (Ark. Ct. App. Jan. 28, 2009).

205. *Lipps v. Lipps*, No. CA 09-1108, 2010 WL 1379803, at *1 (Ark. Ct. App. Apr. 7, 2010).

brief leave from the military.²⁰⁶ Now the ex-husband has moved the child to another state.²⁰⁷

Can you imagine that ever happening to a man? Arnold Schwarzenegger impregnated the family maid while his wife was pregnant.²⁰⁸ Is there any chance that a male judge would call him a slut and take his children away from him? In fact, a father's sexually explicit social media presence rarely is seen as relevant to his ability to "parent." The only exception is if he is involved with an underage girl. In one case, a father was denied custody because his ex-wife found social media website conversations with another woman (who appeared to be underage) on his computer.²⁰⁹ In another divorce case, the court considered the fact that a child's parents met in an online chat room when the father was fifty and his future wife was fifteen and denied him custody.²¹⁰ There is a double standard where *any* social media sexiness can cause a woman to lose custody, while only *illegal* sexual interactions with minors implicate a man's ability to father.

As with custody cases, where evidence from social networks about a woman's sexuality has improperly been used against her, postings and photos that show a female victim's sexuality have been used to undercut her testimony in rape cases. Even though evidence of prior sexual activities or the clothes a woman wears is generally not admissible, accused rapists are now getting around that rule by introducing sexy statements and photos of victims from Facebook and Myspace. They argue that the postings are being used not to show past sexual exploits but rather to question the victim's credibility.

For young girls who are victims of sexual abuse by a male relative or their mother's boyfriend, a social media post of a sexy photo can do damage to the jury's opinion of her, suggesting that she asked for it. But should such a photo even be admitted into evidence? When a thirteen-year-old girl finally got up the courage to tell a teacher that she had been repeatedly raped by her father, a physical exam showed that she had been beaten and forcibly sexually abused.²¹¹ When the father was convicted, he appealed, claiming that the trial court made a mistake by not allowing him to introduce evidence from the girl's Myspace page. He wanted a new trial so that he could introduce suggestive photos of the girl from her page. He also wanted to introduce the results of a survey where she answered in the affirmative to the question, "Had sex?" The girl said that the survey had been filled out by one of her friends.

206. *Id.* at *2.

207. *Id.* at *4.

208. A.L. Bardach, *Is Arnold Schwarzenegger Still Lying?*, DAILY BEAST (Sept. 30, 2012), <https://www.thedailybeast.com/is-arnold-schwarzenegger-still-lying> [https://perma.cc/HQ6C-FFGF].

209. *Rommers v. Rommers*, 858 N.W.2d 607 (Neb. Ct. App. 2014).

210. *Delgado v. Delgado*, 389 S.W.3d 52 (Ark. Ct. App. 2012).

211. *In re K.W.*, 666 S.E.2d 490, 494 (N.C. Ct. App. 2008).

The appellate court held that despite the rule that prior sexual activities should not be admitted in rape cases, the Myspace page should have been admitted as evidence to address the girl's credibility. The court did not grant a new trial, though, since there was ample other evidence of the father's sexual abuse. But its pronouncement that someone's sexy photos and survey answers from a social network should be admitted in sexual abuse cases sets a troubling precedent for women's ability to get justice when they are raped.

CONCLUSION

I have spent my career analyzing emerging technologies. With each new generation of technologies, the problems were overwhelmingly visited upon women. This will not change until the ideas and needs of women are considered in the design and implementation of technology.

Initially, it appeared that the solution would be to recruit more female students into scientific fields. However, that alone is not enough. Women earn 42% of the doctoral degrees in STEM fields,²¹² yet they receive only 2% of venture capital investments²¹³ and only 10% of patents.²¹⁴

Even in brand new areas of technology—such as the design of social media—which arguably should have been open equally to men and women, women are underrepresented.²¹⁵ Women use social media at a greater rate than men.²¹⁶ And yet, women are underrepresented in tech positions in social media companies: 19% at Facebook, 17% at Twitter, 20% at Google, and 19% at Microsoft.²¹⁷ There are also very few women in leadership positions: 28% at Facebook, 33% at Twitter, 25% at Google, and 19% at Microsoft.²¹⁸

The problem of women and technology is not that women do not have the training or creativity to develop and deploy technology. Women invented the dishwasher, the lifeboat, jet fuel, Kevlar, windshield wipers, the first universal computer programming language, wireless technology, the glass aquarium, and something that has probably touched as many lives as any of those—the chocolate chip cookie.²¹⁹

212. NCSES SURVEY OF EARNED DOCTORATES, *supra* note 110.

213. Zarya, *supra* note 71.

214. Madhusoodanan, *supra* note 104.

215. They make up only 35% of the employees at Facebook, 31% at Google, 26% at Microsoft, and 38% at Twitter. Rani Molla, *How Facebook Compares to Other Tech Companies in Diversity*, RECODE (Apr. 11, 2018), <https://www.recode.net/2018/4/11/17225574/facebook-tech-diversity-women> [<https://perma.cc/DZ36-ZV93>].

216. See *Social Media Fact Sheet*, PEW RES. CTR. (Feb. 5, 2018), <http://www.pewinternet.org/fact-sheet/social-media/> [<https://perma.cc/QT5W-D52J>].

217. Molla, *supra* note 215.

218. *Id.*

219. Katherine Handcock, *Sisters in Innovation: 20 Women Inventors You Should Know*, MIGHTY GIRL (Sept. 19, 2018), <https://www.amightygirl.com/blog?p=12223> [<https://perma.cc/56SG-L3M4>]; MILLI ET AL., *supra* note 105, at 14.

Encouraging more women to study STEM subjects is not enough. As Hicks points out in her book *Programmed Inequality*, initiatives to train women in technology-related fields “mean little if the participants being targeted for empowerment in a field are still disempowered in the wider world.”²²⁰ The problem is the social context in which female technologists operate—one of sexual stereotyping and sexual harassment. As a result, we need to be concerned not only about stopping sexual harassment and finding leadership roles for women in technology, but also about assuring their representation as major decision makers in finance, advertising, politics and the world at large.

220. HICKS, *supra* note 1, at 237.