Misogyny in Software

Louise Scheer

In the male-dominated world of the technology industry, there is a massive gender gap. According to the Department of Labor, women make up just 20 percent of software developers and 21 percent of programmers in America. All in all, the average percentage of women working in the tech industry is around 30.[1]

Taken into account that more and more women are interested in and enrolling in STEM-related academics (academic disciplines of science, technology, engineering, and mathematics)[2], the number of women actually *working* in the tech industry remains significantly low.

But what is it that discourages women from pursuing a technical career? Research points towards many different possible factors. The most prominent ones include the lack of female role models in these male-dominated fields, strong gender stereotyping, and less family-friendly flexibility in the STEM workplace.

This underrepresentation indicates that what women in software have been saying for years is true: the STEM workplace is misogynistic.

To understand how the STEM workplace has come to be so sexist (according to the women who work there) we must look back over seventy years, during the time when women began to join the workforce. This might also answer the question as to why some feminist movements have begun to dig into the software itself to cast light upon some misogynistic and sexist issues – and why they are there to begin with.

History of women in software

Although women today make up a small part of the technology industry, especially in software development, the history of software is heavily influenced by women. When the ENIAC computer (Electronic Numerical Integrator And Computer, the first electronic digital computer) was first developed in 1943, young women were employed to perform the important computer work. They had male analysts as supervisors who were higher up in the hierarchy and would speak commands that the women had to translate into input for the ENIAC.[3] The input basically consisted of flipping switches and connecting cables on a board.

ENIAC, dubbed by the media "The Giant Brain" and "the machine that changed the world"[4], was used to solve significant problems at the time of its origin and use – and the women who learned to use it and were appointed to using it were in this era called "computers". The job of a computer was critical, especially during war times as the men were deployed overseas. Women took the noncombat positions in the military in the stead of men, and the computer positions were also a part of the war effort. They were also a part of the development of the bombing and firing tables needed during the war.

Women were regarded as capable of doing the work more accurately and rapidly than men, and by the middle of World War 2, almost all computers were women and so were their direct supervisors.[5] At one point there were about one hundred women working in the Computing Unit.[6]

These women were essentially seen as software and less as humans as they were a part of the chain link to make the ENIAC computer work. Not only did they operate the machine, they helped shape it and make it functional; and some of the decisions the female programmers made back then continue as a part of the programming process to some extent even today.[7] For these reasons, the women of ENIAC were (and still are) celebrated as the first computer programmers.

However, there is reason to believe that this could be a misconception. Seeing as the women worked at the base of a male-dominated hierarchy and their commands came from a superior (usually male), which they executed without actually understanding, the power didn't necessarily lie with the computers – they were only setting switches and connecting cables. Alan Turing called them for this reason "slaves".[8]

It is around this time that the term "black-box" began to surface. A black box is in this instance a system that can be viewed in terms of its inputs and outputs – without any knowledge of how it actually works. The computers did repetitive tasks, executing the commands they didn't understand, and out came a response, a reaction. They did not understand logically *how* the system worked; they only knew what to do in order to make the command, or the output, happen.

However, the so-called ENIAC girls *did* understand the underlying programming of the machine and were not just computers who executed orders. As said by the youngest of the original six ENIAC girls, Betty Jennings:

"Occasionally, the six of us programmers all got together to discuss how we thought the machine worked. If this sounds haphazard, it was. The biggest advantage of learning the ENIAC from the diagrams was that we began to understand what it could and what it could not do. As a result we could diagnose troubles almost down to the individual vacuum tube. Since we knew both the application and the machine, we learned to diagnose troubles as well as, if not better than, the engineer."[9]

Since the ENIAC girls understood the computer so well, they are being viewed and celebrated as the first computer programmers. As mentioned earlier in this paper some of their work continues to be a part of the programming process even to this day, and a few of the ENIAC girls even went on to be a part of inventions of new programming languages. Betty Snyder, for example, another one of the original six ENIAC girls, contributed and played a significant role in the development of the Fortran language.[10]

Sadie Plant, British author and philosopher, argues that women always have been a part of technology even though they mostly worked in the background and never received recognition for their work. In her book, *Zeroes and Ones,* Plant tries to correct what she believed to be a great misconception at the time of the publishing of the book (1997) about the relationship between women and computers in particular and technology in general.

She explains how some of the oldest technologies in the world have a foundation in the work that women did: weaving and spinning yarns, which later lead to textiles. In her words, "*Textiles themselves are very literally the software's linings of all technology."* [11] Textile was later used for canvases, paper to write on, and cloths were used as currency. String, too, has been described as *"the unseen weapon that allowed the human race to conquer the earth."* [12] All of these ancient inventions and discoveries were based on the work of women, and according to Plant, it is also the case in programming and software:

"Hardware, software, wetware — before their beginnings and beyond their ends, women have been the simulators, assemblers, and programmers of the digital machines."[13]

But despite all this there is still an on-going discussion about whether or not programming can be said to be heavily influenced by women during these years, because only the ENIAC girls primarily understood the underlying results of their tasks. The other computers merely followed orders from their supervisors and treated the system like a black box.

Wendy Chun claims that many others had an influence on the programming in the 1940s and that the ENIAC girls should not get all the credit for being some of the first computer programmers, as they were part of a chain link – one that cannot work without all the other links:

"Also, reclaiming these women as the first programmers and as feminist figures glosses over the hierarchies within programming among operators, coders, and analysts that defined the emergence of programming as a profession and as an academic discipline." [14]

The power hierarchy in the programming tasks did, of course, exist – but it is possible that even though men were higher up in the business than women does not necessarily mean that the role women played in programming was insignificant.

Yet it is important to remember them as being the foundation of the mid-century programming hierarchy. Ultimately, after the war, their labour was automated, with the 1940s direct programmer integrated into the machine. After that, their work was mostly forgotten.

Women in tech today

As previously mentioned in this paper, women in the technology industry are hard to come by. As in 2015, only 30% of people working in STEM jobs are women. [15] In comparison, women make up 46% of the labour force in America[16]. Which is a little surprising, seeing as the women earn 33 percent more than their non-STEM peers and the gender wage gap is considerably smaller, if not non-existent in STEM careers.[17]

Women are discouraged from working in tech for several reasons and scholars and policy makers have discussed the low representation of women in STEM careers.

Some point towards biological factors as being one of the reasons that so few women are working in the technology industry. In areas such as spatial skills[18], which are considered as critical component to success in some branches of engineering and science, men are found to outscore women in tests. However, spatial skills can be quickly developed through training, and women are very well represented in chemistry workplaces, where spatial skills are essential to understand the work.

Another reason women might not necessarily want to work in STEM-related careers is the lack of female role models. There is a hierarchical segregation in the STEM workplace, as there is a decrease in the number of women in the higher positions. There tends to be a lack of gender diversity the higher up the corporal ladder one climbs, where men typically hold the highest positions.

In college, the majority of women tend to choose majors such as education, natural sciences, humanities, psychology, English and nursing rather than technological sciences. One reason that women choose those majors despite the fact that many young girls in high school are interested in STEM careers[19] is because of the underrepresentation of women in the actual workplace.

The underrepresentation goes against what some studies show about how women are twice as likely to be hired as their male counterpart, if both candidates are equally qualified.[20] But this study does not seem to be relevant to real-life hiring, as women are actually not hired as often as men, even though the applications are exactly the same.[21]

In a research from Corinne Moss-Racusin, a social psychologist at Skidmore College, it was proven that STEM institutions are more likely to hire men than women.[22] Two versions of the same resume was sent out to over one hundred biologists, physicists, and chemists, with only one difference: the name. On

half the applications, the name of the applicant was John, and on the other, Jennifer. Studies showed that gender stereotypes did taint the judgment of these scientists, as Jennifer was perceived as significantly less competent than her male counterpart and they were less willing to hire her – not only that, but she was also offered around 13 percent less pay than John.

So even though women are being chosen as the best candidate in some studies, they are not the ones being hired in the real world, where gender stereotyping is still very real.

Another, rather obvious point, is the tradition and gender stereotyping. The technology field is exclusive, and many females in the department or even studying in STEM fields feel like they "do not belong".[23] Some even struggle with something called "imposter syndrome", a psychological phenomenon in which they feel a sense of inadequacy despite being perfectly competent.

This might stem from decades of being taught what women *should* want – being mothers, nursing, teaching, etc., whilst video games, building blocks, science and technology is geared more to the boys – meaning that ever since childhood, we are taught what to like and strive towards. There is generally a negative stereotype about girls' technical abilities. This might be one of the reasons women feel uncomfortable about their place in STEM educations.

There are many initiatives to get women more interested in technology – especially since women do well in that field. Tech companies with women in leadership positions have a 34 percent higher return on investment than their male counterparts.

Major tech companies like Microsoft, Google, and Apple have publicly announced that they will attempt to hire more women in their technology departments, and both Google and Facebook are prepared to go as far as to pay for their female employee's egg-freezing treatments to keep them in the workforce for as long as possible.[24] This is a new step towards making the STEM workplace more family-friendly, and Google is already notorious for their extravagant offices with nurseries, kindergartens, and washing facilities.[25]

Girl Develop It, a non-profit organization, provides opportunities for women to learn about technology, web development and software[26], and university campuses and hosting networking events to get women interested in STEM careers.[27]

Despite all the efforts, the rate at which women are hired in STEM jobs is slow. As of today, only 17 percent of Google's tech workforce are women. Twitter's numbers go as low as 10 percent.

Since the tech culture is obviously exclusive, consciously or not, this keeps women from pursuing jobs in the technological workforce.

One of the most important things to begin with, according to women who are working in STEM, is to simply acknowledge the problem. As quoted by a female STEM student: "*They need to know that they* [professors] *can bring it up and it's okay. Instead, it's just this silent thing where the minorities steadily drop out of the course.*" [28] The more an issue is being discussed and the more attention it garners, the easier it is to solve its problems. Another important factor that might help young women pursue technical jobs is the support and

encouragement, either from a professor or mentor. The STEM work field is highly competitive, especially for a woman, and there may be many obstacles for them to face early on in their careers, which is why a support system could be very useful to help keep the women in the IT workforce.

But even though STEM fields acknowledge the problem and outwardly agree with the importance of increasing the representation of women in their career paths, they may – consciously or not – still be biased.

If we look at the gender stereotyping and tradition, encouragement from a young age might be the key to get more girls/women interested in technology and/or science. It is imperative that gender stereotypes get taken out of the equation and that all children are encouraged to pursue their interests in STEM departments. This might help close the gender gap in technology jobs, as well as showing young girls that women *can* work and work *well* in IT.

Code examples

Technology is becoming a bigger part of humanity as time wears on. As humans become more and more in touch with technology, so do we become more and more in touch with ourselves. We have new forms of representation of gender and sexualities, the queer representation in the media is growing and self-expression is at its peak on social media. In the words of Zach Blas, an artist theorist based in London: "*First, we must assess the technological process, the system or machine itself, as well as its larger cultural representations to even begin to understand how we are being marked/signified/erased.*"[29]

Misogyny and sexism does not only exist in the STEM workplace, but also in the software itself. Feminists are trying to end the sexism and oppression and have therefore also gone into depth with computer coding. Computer coding or programming languages are, as all languages, designed by humans. And as humans have a tendency to be biased (racist, misogynistic, homophobic, etc.), it may also be translated into the coding language.

Some might question why it is important to go into coding, as there are many other concerns that could demand the attention of feminism. But when one codes, one changes the world we live in – and therein lies a responsibility.

If code is inherently sexist and/or misogynistic, the designers of said code are part of a bigger problem than the world has been facing for years: the oppression of women. This is why casting light upon queer coding might uncover a relatively hidden issue.

To combine computer science with social consciousness several feminists have tried to work with computer languages and queer coding to raise awareness of the problem with sexism in software.[30] One of the most notable works is actually a satire – but that does not mean that one cannot see the obvious complications in contemporary programming language through that.

The satire programming language that I will use as an example is called C+ Equality (or C+=)[31], and is designed by the Feminist Software Foundation. The coding language is written by feminists and identifies itself as a feminist programming language. It primarily focuses on the equality of the sexes, self-identification, patriarchy, chauvinism and misogyny. To list a few of the most prominent examples from C+ Equality:

- The ”y” variable is strictly prohibited. Only “x” is allowed.

  The “y” variable clearly points towards the direction of the male chromosome. Although feminism is about the equality of the sexes, C+ Equality chooses to eradicate all that is masculine from their programming language. This is as mentioned *not* a feminist idea, so whether or not C+ Equality is a feminist programming language can be taken up for discussion.

- ”<” and ”>” or ”lesser or greater than” are considered sexist and affirm unequal states between objects and numbers.

  They believe in the abolishment of class hierarchy and therefore have no classes or object-orientation. Equality plays a role here, as all numbers are equal. Here is an example from C+ Equality’s website:

```
1. OPENDIALOGUE
2. check (c = 1. c <= space. c++)
3. yell(" ").
4.
5. space++.
6.
7. checkc = 1 . c <= 2*(n-k)-1. c++)
8. yell("*").
9.
10. yell("\n").
11. ENDMISOGYNY.
```

  OPENDIALOGUE and ENDMISOGYNY are being used instead of setup, and the “greater than” or “lesser than” are followed by an equality sign, to validate that all numbers are essentially equal. The “yell” function is to replace “text”, to give a voice to the oppressed. [32]

- 1s are inherently phallic and thus misogynistic. Also, the 1s & 0s are hetero-oriented, which is problematic.

  This points out the male 1s and their binary opposites, the female 0s. On the subject of 1s and 0s, The Feminist Software Foundation suggest to use 0s and Os as fundamental binary logic gates instead. They symbolize the “varying, natural, and beautiful differences of the female vaginal opening”. Furthermore, whether 0 or O is used is determined depending on how the underlying logic “feels” at the moment of the running of the programme.

The discussion about software and hetero-normativity (which C+ Equality tries to cover) has also been discussed by Zach Blas, who engages technology, queerness, and politics: *"Most importantly, does technology bind all bodies to a heterosexist ideology of control or can technology offer empowering, subversive structures and processes to give all bodies a freedom?…"*[33] On the subject of whether or not programming language should widen and embrace queerness, he too attempts to cast light upon the issue of the heterosexism in software.

He believes that queer technology is necessary, so as to include queer people in the hi-tech culture, which is as of now ruled by heteronormativity. Software is powerful and can give the queer community tools for "activism, resistance, and empowerment". [34]

- Men often focus on the exterior appearances of women. To combat that, C+ Equality is to tackle only audio and text, and never graphics.

Society is generally focused on exterior appearances, and according to The Feminist Software Foundation, this renders relationships to be shallow and chauvinistic, and also debases our standards of beauty. To avoid all visual pleasure, they wish to eradicate all graphics and only allow the user to hear/read sketches made with the programming language. As seen in the code example above, no graphics are being portrayed – only text.

Although The Feminist Software Foundation do have a point, some of the examples from their website do seem to promote sexism towards men. For example it is stated that the programming language C+ Equality should be English-based, as "women are better than men with natural language", and that "women are more social than men". [35] This is obviously an unfair misconception and thus further promotes the fact that C+ Equality could never be an actual feminist programming language, as it goes against what feminism actually stands for.

Altogether C+ Equality cast light on some of the issues with misogyny in programming language, but at the same time shows a wrong portrayal of feminism. It fortifies the misconception that feminism is about the overruling of men, that feminists are radicals whose sole intention is to put women at the top of the hierarchy. It promotes women as the strongest sex by diminishing the worth of men, which is not the right way to achieve equality.

The Feminist Software Foundation – either a real foundation or a satirical one – still manage to open up a discussion about an issue that has been relatively hidden until now.

Conclusion

Why the technological jobs have a reputation for being misogynistic and sexist apparently stems from over seventy years back, when women were first introduced to the workplace and began taking over work for the men who were overseas during the second World War. As far as history can tell us sexism has always been a part of the STEM workplace.

This might stem from the misconception that women are not very good at technology – that their fields should be teaching, nursing, languages, etc. Although there have been made huge steps in the twenty first century, there is still a long way to go for women, especially in the workplace. Both the wage and gender gap are under scrutiny at the moment and although companies are now trying to encourage more women to pursue technological educations and jobs, there is still a significant gap between the genders.

The absence of women in history is man-made. If we stay in the path of computing and technology, the first computer programmer was, in fact, a woman.[36] The ENIAC girls share some of the credit many decades later. If women's history in technology was more common knowledge, then women interested in STEM careers would be able to find their role models in the field, the lack of which is one of the reasons women hesitate in pursuing technological careers.

Another key that might help push more women into the technology fields might lie with the parents. Encouraging children regardless of gender in their interest within IT might begin to close the gender gap that starts already in college years in STEM related academics.

Information about IT workplaces and STEM careers could also help even out the gender gap – many major tech companies are already taking steps towards getting more women interested in their fields.

If we look at the software and programming language, coding can appear sexist to some degree – the satire programming language C+ Equality might take "feminism" to a new level, but some of their points bring together the main idea that programming language is something to look into when talking about misogyny in technology.

Some of the very first programming languages were created and blossomed in a time where sexism and misogyny was not even remarked as being a problem. So the sexist undertones we see in software today come from a time where society was sexist and it has not evolved a lot since then – even though technology in itself has, even greatly.

There is of today no final reason why the gender differences in STEM fields exist, but findings provide evidence of a need to encourage more women to pursue careers in STEM. History can give us pointers as to *how* the misogyny in technology came to be, but not *why* it is still there in the twenty first century.

The STEM workplace and careers do have great potential, seeing as the technology industry is ever-growing and the pay is higher there than in non-STEM jobs. Hopefully, ten years from now, women will no longer be intimated to pursue jobs in IT.

End notes

[1] Cheng, Roger, *"Women in Tech: The numbers don't add up",* CNET, May 6 2015 (Date
[2] Cheng, Roger "Women in Tech" 2015
[3] Chun, Wendy, "*On Sourcery and Source Codes",* in Programmed Visions: Software and Memory, MIT Press, 2008
[4] Wikipedia, "ENIAC", Wikimedia Foundation (Date accessed: May 26, 2015)
Link: http://en.wikipedia.org/wiki/ENIAC
[5] Fritz, Barkley W., *"The Women of ENIAC",* in IEEEAnnals of the History of Computing, Vol. 18, No. 3, 1996
Link: http://courses.cs.washington.edu/courses/csep590/06au/readings/00511940-frist.pdf
[6] Fritz, Barkley "Women of ENIAC", p. 17
[7] Fritz, Barkley "Women of ENIAC", p. 14
[8] Chun, Wendy, *Sourcery*
[9] Fritz, Barkley, "Women of ENIAC", p. 20
[10] Fritz, Barkley "Women of ENIAC", p. 17
[11] Plant, Sadie, " *Zeroes and Ones: Digital Women and the New Technoculture",* Fourth Estate, 1998, p. 61
[12] Plant, Sadie, " *Zeroes and Ones",* p. 61
[13] Plant, Sadie, *"Zeroes and Ones",* 1998
[14] Chun, Wendy, "On Sourcery and Source Codes", 2008
[15] Cheng, Roger, *"Women in Tech"* 2015 (Date accessed: June 4 2015)
[16] The World Bank, "Labor Force, Female" 2013
[17] U.S. Department of Commerce, "Women in STEM: A Gender Gap to Innovation", August 2011 (Date accessed: June 5 2015)
Link:
http://www.esa.doc.gov/sites/default/files/womeninstemagaptoinnovation8311.pdf
[18] Wikipedia, "Spacial Visualization Ability", Wikimedia Foundation, (Date accessed: June 7 2015)
Link: http://en.wikipedia.org/wiki/Spatial_visualization_ability
[19] Wikipedia, Women in STEM Fields, Wikimedia Foundation (Date accessed: June 5 2015)
[20] Bernstein, Rachel, "Women Best Men in STEM Faculty Hiring Study", 2015
Link: http://news.sciencemag.org/education/2015/04/women-best-men-stem-faculty-hiring-study
[21] Moss-Racusin, Dovidio, Brescoll, Graham, Handelsman, "*Science faculty's subtle gender biases favor male students",* Proceedings of the National Academy of Sciences of the United States of America, 2012
Link: http://www.pnas.org/content/109/41/16474.full
[22] Watts, Alexander, "Why Does John get STEM Job Rather than Jennifer", 2015
Link: http://gender.stanford.edu/news/2014/why-does-john-get-stem-job-rather-jennifer
[23] Weismann, Elena, "Female STEM Students cite Isolation, Lack of Role models", The Brown Daily Herald, 2015
Link: http://www.browndailyherald.com/2015/04/23/female-stem-students-cite-isolation-lack-of-role-models/
[24] Bessette, Chanellle, *"Apple, Facebook To Women Employees: Keep Working, We'll Pay To Freeze Your Eggs",* Forbes Magazine, 2014 (Date accessed: June 5, 2015)
Link: http://www.forbes.com/sites/chanellebessette/2014/10/14/apple-facebook-to-female-employees-keep-working-well-pay-to-freeze-your-eggs/

[25] CBS NEWS, "Inside Google Workplaces", 2012 (Date accessed: June 9 2015)
Link: http://www.cbsnews.com/news/inside-google-workplaces-from-perks-to-nap-pods/
[26] Girl Develop It (Date accessed: June 5, 2015)
Link: https://www.girldevelopit.com/
[27] University of Vermont, "Closing the Gender Gap for Women in Technology", May 6 2015 (Date accessed: June 5 2015)
Link: http://learn.uvm.edu/business/women-in-technology
[28] Weismann, Elena, "Female STEM Students", 2015
[29] Blas, Zach, *"What is Queer Technology?",* under Archives, 2006
Link:
http://www.zachblas.info/publications_materials/whatisqueertechnology_zachblas_2006.pdf
[30] See Mez Breeze, Micha Cárdenas, Arielle Schlesinger
[31] Feminist Software Foundation, *C+=: The World's First Feminist Programming Language (Satire),* 2014
Link: http://www.blazingcatfur.ca/2015/01/18/c-the-worlds-first-feminist-programming-language-satire/
[32] The Feminist Software Foundation, C+=, 2014
[33] Blas, Zach, *"What is Queer Technology?"* 2006
[34] Blas, Zach, *"What is Queer Technology?"* 2006

[36] Wikipedia, Ada Lovelace, Wikimedia Foundation, (Date accessed: June 9 2015)