

AC 2010-846: “THE IMAGE OF A WOMAN ENGINEER:” WOMEN’S IDENTITIES AS ENGINEERS AS PORTRAYED BY HISTORICAL NEWSPAPERS AND MAGAZINES, 1930-1970

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“The image of a woman engineer:” Women’s identities as engineers as portrayed by historical newspapers and magazines, 1930-1970

Abstract

The Society of Women Engineers’ National Collection is an archive with rich potential for investigating the historical story of women’s identities as engineers. Filled with newspaper and magazine clippings, oral histories of pioneer women engineers, and SWE’s own institutional history, these archives allow us to see how women engineers were skillfully positioned as acceptably feminine, despite their peculiar profession. Noting women’s body measurements, hair color, dressing habits, and even home address, in addition to their usual marker of age, such newspaper reports pointed out the unusualness of individual women’s participation in engineering against a backdrop of national discussions on white women’s suitability for the paid workforce and their cultural roles as wives and mothers. Embedded in these historical data are additional threads of race – of note to the newspapers are the white women who choose to work until marriage, rather than women of color colleagues, even sparser to find, and who have never questioned their need to work in the paid workforce.

In this paper we describe the content analysis method by which we processed these historical data, and some of the conclusions we have drawn about women’s identities as engineers as portrayed through historical public sources drawn from 1900-1980 with a focus on the 1950s and 1960s.

Introduction

A recent surge in interest in engineering philosophy¹⁻⁵ and identity⁶⁻⁷ has revitalized a discussion on understanding the gendered nature of engineering⁸⁻⁹ and engineering education¹⁰⁻¹². Here, we use a sociocultural notion of identity that involves how persons are given meaning or made sense of in context, that is how individuals come to be considered engineers, or not, when positioned against a sociocultural notion about engineers taken for granted in society.¹³ This paper is part of a larger project, that of understanding how historical representations of engineering continue to have power in contemporary representations. Using historical sources, including newspaper clippings, oral histories of women engineers, and organizational documentation from the Society of Women Engineers National Archives, we have characterized three themes of interest to an engineering education audience: representations of women engineers as strange, representations of women engineers as normal when put into hegemonically feminine contexts, and significant absences from these media representations, including men’s voices and explicit discussions of race.

Methods

Unlike the quantitative data collection and analysis many engineering educators may know, archival research is significantly different, beginning with a “research question,” progressing through a contingent “research design” matched to the nature of the data, and following findings and conclusions that emerge from archival research. This section endeavors to describe our data collection and analysis processes, but must be read with the caveat that these findings are early in this project, and will benefit from additional revisits to the data and seasoning over time (and with the help of the ASEE audience).

While we approached this project with a particular area of interest in mind, archival researchers must always structure their inquiry based on what information or data are available in an archive itself. Metaphorically, while we might like to have a cheese sandwich for lunch, we must open the fridge first to see whether cheese, bread, butter and chutney resides within, before we can actually make the sandwich and eat it for lunch; in the same way, we might open the fridge with the intention to prepare a cheese sandwich, but we may be stuck with chutney alone, if there is no cheese (itself a good sandwich, but not what we were hoping for). In the same way, researchers must explore archival finder guides and talk with a collection's archivist to ascertain to what extent a particular collection might help a researcher explore a particular topic, and then must actually study the archival materials themselves to determine if the archive is sufficiently rich to investigate their topic of interest. Thus, one's results may differ from one's original plans.

For this project, the authors met in person at a meeting organized by the Society of Women Engineers (SWE) 60th Anniversary Project committee. The archivist of the SWE National Collection, Troy Eller, talked meeting participants through the collection's finding guide, describing particular strengths and challenges of the collection. We also talked with Tanya Zainish-Belcher, archivist of the Women in Science and Engineering archives collected at Iowa State University. Around and through these conversations, and in concert with other researchers participating in the SWE 60th Anniversary Project, we discussed particular "big questions" in the field of gender and engineering that remain or are increasingly important to investigate. Each of the authors of this larger project have an intense interest in applying feminist research methods to the investigation of women's persistent underrepresentation in engineering education and their struggles in the profession, and we decided to collaborate on a project to investigate how women's identities as engineers were portrayed by others as well as by themselves.

The authors focused primarily on Accession # 1539, Series XI, Subseries A and B. In subseries A, described in the finding aid as "Clippings, articles and speeches, publications, statistics and surveys, non-SWE conferences, and library materials that fall into the general category, 'women in engineering'" between 1885-2004, we looked at Box 183, which contained newspaper and magazine clippings collected from both a clippings service that SWE subscribed to (Press Intelligence, Inc. of Washington DC in 1955) as well as those articles that members sent in of their own volition. We supplemented these clippings files with items from Boxes 100 (membership and section reports and committee information, particularly of the Committee on Minority Concerns) and Subseries B Boxes 187, 191 and 192 (biographical materials collected on particular SWE members and leaders — we looked for files on members mentioned in the clippings files).

These files were intriguing both in the material itself, and in consideration of why they resided in the archives. Little information remains on the instructions given to the clipping service, including what topics it was asked to clip on behalf of SWE. Articles that come from members often include some marginalia such as the first name of the person who sent it in, and occasionally a year date, but often came to the archives without a publication name, location, or date printed. Because of these challenges in the data, this archival research cannot make claims about the generalizability of images of women engineers across time or publications in the way

some readers might expect. Instead, data show us a partial and incomplete window onto a particular historical time, framed by the interests of SWE members and SWE itself.

Most of the articles in Box 183 were published in the 1930s-1960s, and these files formed the main material upon which we derive our themes. For each article stored here, we considered the following guiding questions:

- How are the women explicitly or implicitly described in the article – its headline, body text and images? In particular, we looked at how women were described as individuals, how they described themselves in the article, and how they were described in relation to men.
- How was the relationship between women, men, and engineering work described? In particular, how did women describe their work as engineers, and how did men describe women's engineering work?
- How did the article's author frame the import of the article? In other words, what is "of note" in this situation that the article was deemed worthy of writing and publication?

For this project, data constituted both quotations from articles (including headlines, captions, and body text of articles) and from images published alongside such articles. We collected text and images of articles that helped us think through how women engineers were represented — by themselves and by others. Preliminary themes emerged from frequent revisiting of the original articles and images themselves, through repetition by later articles in the file, through revisiting the focused data the authors captured from these files, and through conversations between the authors. We report these preliminary themes here; more thorough and systematic analysis will constitute the remaining portion of our research and will be reported elsewhere.

Theme 1: Women engineers as strange

As these articles on women in engineering were included in printed works (newspapers and magazines), we might imply that women's participation in engineering was de facto newsworthy. However, through a discourse grounded in social expectations about womanhood, women were deemed strange in engineering — a fact made normal through these media accounts.

Scholars such as Subramaniam¹⁴ and Bix¹⁵ have noted how the language of invasion, of war and by aliens, is regularly employed in metaphorical ways to make strange and alarming particular populations changes. While Subramaniam talks about invasion in the context of "invasive species" and the language's relationship to people's immigration patterns, Bix has discussed the language of invasion in the explicit context of women "invading" campus and engineering. In this archival source, too, we see this habit: one headline from 1907¹⁶ exclaims in capital letters how "PITTSBURGH WOMEN SUCCESSFULLY INVADE ALL THE PROFESSIONS" while another from 1930¹⁷ screams (capital letters again) "WOMEN STORM FIELD OF ENGINEERING." Indeed, this language of women as invaders persists today — the first issue of the *Economist* in 2010 has Rosie the Riveter on the cover to celebrate "the rich world's quiet revolution: women are gradually taking over the workplace." And further on into the article, again we see that women's employment is called an invasion of the workplace."¹⁸

Women's peculiarity is heightened by their contrast opposite men. Countless articles refer to women engineers as "girls," — as in, "Helen Foell, Girl Draftsman,"¹⁹ or "Girl Turnpike Engineer Finds Men 'Part of Job'"²⁰ — and others describe how alone these women are in a sea of men. An example is Lucille Pieti, whose story is published in *Parade* for Valentine's Day in 1954.²¹ Pieti's photograph "all decked out for a dance," accompanies her story, with the headline: "'There I was — all alone — with 300 men... : A girl engineer tells how to succeed in a man's job.'" While the juxtaposition of the image with the headline may raise in modern minds the alarming image of sexual assault rather than an opportunity to snag a husband, it is without a doubt that *Parade* intends to portray this woman as being very much alone amongst men. Another article²⁰ quips that "the leading role in 'One Hundred Men and a Girl' might find a new counterpart in Miss Madalyn Mays, the only girl engineer on the new Pennsylvania Turnpike project." However, readers, fear not for Miss Mays, who is "feminine to the point of wearing her hair long with fetching top curls." The author assures us that "[t]all, slender Miss Mays remains unabashed when working exclusively with men. At the University of Pittsburgh she was the only feminine member in most of her classes." Or yet, in another article, titled "There Aren't Many Cute Girl Engineers,"²² the author winks, "Nida Balsys doesn't need her slide rule to figure out what a lucky coed she is. Being surrounded by 612 males is not something that happens to just every college girl." Here again is the image of the woman alone amongst men. We learn in the next paragraph that Balsys is "an 18-year-old honey blonde" and, even later, that "the blue-eyed junior will also be the youngest graduate in the department's history."

Taken together, text and photographic imagery highlighted women's intrusion and particular women's aloneness, while signaling women's strangeness in the male-identified realm of engineering. By repeatedly making the case that men comprised engineering and women intruded there, women were made strange as engineers. Such repetition built a case that considered women tenuously identified with engineering, or otherwise miscast among engineers.

Theme 2: Women engineers as normal when doing hegemonically feminine things

After this work of making women engineers strange, many articles soothe the reader by assuring that the women have retained innate feminine natures. Women's physical appearance is routinely mentioned, in particular drawing attention to a particular woman's femininity. Descriptions of a "slim," "pert," "vivacious," "petite," "feminine" brunette or blonde (as appropriate) pervade the texts, as are women's positioning along more conventional markers of femininity — with images of women posing in stylish dresses (evening as well as those more appropriate for work), where their fashion sense or hairstyle is commented upon. The most obvious example we found in this archive is the case of Marlene Schmidt. An engineer in Germany who immigrated to the US, Schmidt's newsworthy accomplishment was winning the Miss Universe pageant held in Miami Beach, Florida on July 17, 1961. While the winners of such pageants often garner the attention of reporters, it is Schmidt's employment as an electrical "engineeress"²³ that captivated many reporters' imaginations. Perhaps, in this beauty contest context, it seemed appropriate that we learn she "is 24, 5 feet 8 inches tall [and] engineeringwise is 36 1/2, 23, 36."²³ Also, similar, though less dramatic, examples exist. In 1959: Francoise Pioline, an aeronautical engineer working at Cal Tech, is introduced in the Fashion, Beauty and Homemaking section of the Los Angeles *Mirror News* with headline "'SECRET WEAPON' IS A BIT OF FLUFF" and is described as a "fluffy bit of French femininity who flies gliders, whips up a mean omelet and pulls down A's and B's against almost all-male competition."²⁴ And a

photo caption²⁵ from 1960: “An electrical maze in a complicated electronic machine doesn’t frighten Judy. Her nimble fingers make short work of putting each wire in place. Sometimes she likes to wear her hair long, like this.” These women with extensive intellectual accomplishments were continually made the model of acceptable (raced and classed) femininity, with attendant fine-motor or cooking skills, and conventionally attractive looks.

A startling example of placing women engineers into the acceptable female role for white, middle-classed women is provided from an unlabeled clipping hand-dated 1960. The article²⁶ describes “Geraldyn M. (Jerrie) Cobb, twenty-nine-year-old vivacious blonde from Ponca City, Okla.,” who is “the first woman to undergo and pass space flight tests.” However, in the all-important first paragraph of the article, the action being reported was that Cobb “said here yesterday that she has no fear of the limitless outer regions, she is afraid only of grasshoppers.” So while the article might have been prompted by Cobb’s notable accomplishment of passing space flight tests, this feat was immediately diminished with the ridiculous image of a woman who could face “limitless outer regions” actually being more afraid of the quotidian grasshopper. The article later describes Cobb as “5 feet 7 inches, weighing 121 pounds with a figure measuring 36-26-34.” Marriageable material indeed — at least, in this article, the newspaper does not publish Cobb’s home street address. This is in contrast with the 1954 story in the *Detroit News*²⁷ of Pieti (whom we met above) who had become “the first woman automotive engineer officially to represent Chrysler Corp.” and who “lives with 10 other career girls in the chocolate brown and powder blue house at 825 Chicago, known by the girls’ dates as Mantrap Manor.” Here, women engineers were clearly positioned as the sexual objects of men.

Not surprisingly perhaps, there was scant profiling of married women as engineers, or of lesbian engineers. One married engineer was described²⁸ in 1958 as a “30-year-old green eyed blond” who is described exotically with her husband (administrator for Lockheed) as having “their own ketch, the ‘Love Affair,’ and spend most summer weekends in Southern California waters. They also are sports car enthusiasts, have a swimming pool at their home high in Beverly Hills, and divide the housework because they have no servants. ‘We eat out a lot,’ she confesses, ‘but we seem to have a busy schedule and there isn’t too much time for cooking.’” While she is married, she doesn’t cook, she clearly has the sort of glamorous and expensive lifestyle more akin to an Audrey Hepburn movie, than that of a typical 1950s middle-classed woman.

While it was newsworthy to discuss women’s gender and femininity in the context of their work as engineers, describing the even rarer species of a lesbian engineer who was public about her sexuality was perhaps more than the 1930s-1970s audience could stomach. This paucity of profiles about out lesbian or queer engineers persists today.²⁹

In addition to women’s physical appearance restoring them to hegemonically feminine spaces, archive data feminized women’s engineering work. For instance, domestic housework associated with white middle-class women also framed the kinds of engineering tasks deemed “natural” for women in engineering. In an undated article titled “Housewives Have the Touch For Careers in Engineering,”³⁰ author Guin Hall describes Florence Beebe Anderson, “chief design engineer for the Deepfreeze Appliance Co. of North Chicago, and the only woman, to our knowledge, who designs freezers and refrigerators.” Anderson “declares,” “Women have a natural talent for engineering, whether or not they realize it. They like to hunt for bargains,

know instinctively how to cut corners without harming quality, and, having to do the same housework day in and day out, they are masters at saving time, energy and money.” The article goes on to position Anderson’s technical knowledge as an engineer with her “feminine” knowledge of the domestic sphere — “Words like hypocycloid, cam, compressor, baffle, thermo couples and condensers are just everyday vocabulary with Mrs. Anderson who has been an engineer for fourteen years. However, she is equally familiar with a variety of standard feminine activities as well. Needlepoint is one of her favorite indoor pastimes when she isn’t doing handpainted textiles, or making Christmas cards (she makes all of the cards she sends out and most of her gifts).” She also “maintains a fully equipped workshop in the basement” where she “does all of her home repairs and has taught the use of power tools to all the children in the neighborhood.” So while Anderson may spend her time working with technical equipment, she retains her femininity through the production of domestic crafts and through the teaching of children.

Other examples also positioned women engineers as “acceptable” women. A caption of a photo appearing in 1943,³¹ noted that “Marie Giloth (left) and Eunice L. McClurkin, Grumman aircraft plant workers, prepare at breakfast time the lunch which they will take to their place of work. The scene is in their home near the Grumman plant on Long Island.” Although putatively about women being hired at the Grumman plant, the article’s large photograph emphasized women’s work of preparing food at home. And, from 1957, the *Christian Science Monitor*³² profiled the work of engineer Beulah Loomis:

She can help a customer decide what is best for his requirements [with Sturgis Equipment company, sales engineer for hydraulic and pneumatic tools], figure out the type of valve he needs, or how many cubic feet of air he should get with certain equipment, and, when necessary, trip daintily on her high heels out into the shop to repair a tool. “Many people think women engineers are mannish looking,” Mrs. Loomis explained, “but a woman defeats her own purpose if she tries to make herself into a masculine type engineer.” The feminine qualities and talents a woman brings to engineering earn for her the acceptance in every type of engineering, according to Mrs. Loomis. These include “a woman’s special talent for detail and thoroughness in research, her loyalty and sense of obligation to her employer, and her creative ability, whether it is in designing or in a time study to do a job more efficiently.”

Taken together, SWE archive data deliver a clear message: Women may do the prototypically masculine work of engineering, but only if they retain their normative femininity. Ultimately, so long as women continued to embody activities and skills that highlighted their association with acceptable ways to be women – that is societal notions of femininity, women *as engineers* were tolerated as a charming anomaly in the workplace, in contrast to the invasion of women discussed in the previous section.

Theme 3: Absences from the published story of women engineers

Two notable absences remained after our sifting through these archive files. The first concerns a discussion about race. The vast majority of women were introduced without reference to any particular ethnic group, with the inferred exceptions of an author’s describing many women’s blond hair or blue eyes. Kolko³³ (and others) might suggest this functions to “whiten” the women being discussed in these articles — a tendency reinforced by including black and white

photographs of the women being profiled, images consistent with whiteness in the U.S. Here, we hear (and see) stories of white women whose economic situation permits them the expectation of working until marriage, anticipating that they will resign from their jobs to raise a family full time.

However, in a few exceptions, race or ethnicity was mentioned, although descriptions of international women engineers occurred more often than those of women of color born in the US. In one article³⁴, the reader is introduced to Mme. Jyoti Desai, an Indian engineer, who was in fact the first person named in an article describing how American engineers were hoping to learn from foreign ones. Mme. Desai, attired in her sari, provides readers with a sense of exoticism — these foreign engineers who even have a woman working for them! — while simultaneously being marginalized in a photograph, where the caption reads “Mme. Jyoti’s sari blends with the decor of Kuljian’s U.S. headquarters.” In another article³⁵, entitled “The Lady Is a Rust-Buster,” the reader is introduced to “attractive Kunda Barhat Mehta, from Bombay, India” where along with Mehta’s technical talk about rusting auto parts in her research, she also is shown with hair upswept, shoulders bare, and slide rule in hand.

Exceptions occur. Yvonne Clark, an African-American engineer and one of the first African Americans to join SWE, is profiled in a publication in 1971 entitled “They Forgot to Tell Me I Couldn’t Do It.”³⁶ Written when she worked at Tennessee State University (a historically black institution), this article stands out for how it addressed Clark’s race, including such quotes from Clark as: “Fifteen years ago race was my main stumbling block to becoming an engineer. I’m now working on an internship in industry for my engineering management master’s degree. This time being a woman has been the main problem. There’s an economic squeeze in Nashville and when companies hire, white men come first, then white women, then black men and then me.” Note that 15 years before this article was published puts us in 1956, shortly after the Brown vs. Board of Education Supreme Court decision that ruled public schools segregated on the basis of race were unconstitutional, and at the beginning of the Civil Rights Movement in the US.

However, articles routinely gloss over the racism women of color experienced on top of the sexism. For example, in another article profiling Clark, this one published in the Nashville Tennessean³⁷, the author quoted Clark on her choice of Howard as the place to get her undergraduate degree: “I chose Howard because I wanted dormitory life and was able to get into a dorm there.” Implicit in this statement was the perpetuation of racial segregation in tertiary educational institutions. Later on, the author described how Clark was “a member of (though not active in) the NAACP,” carefully positioning Clark as not a black revolutionary or otherwise a threat to white readers.

The second absence relates to of the lack men’s voices in these articles. Even though the women being profiled were surrounded by men — even 300 of them!²¹ — few article authors or editors interviewed men about women’s employment, or about women as colleagues or classmates. However, a rare disparaging comment was incorporated into an article, such as one “annoyed” co-worker who said³⁸ about his colleague “‘Mr.’ Ruth Wilson,” “I thought they had scraped the bottom of the barrel when they hired two agricultural engineers. But, when they hired a woman around here, they dug a hole underneath the barrel.”

In the main, the archive highlights white, middle-class women's experiences, with white women's voices and those of article authors given prominence. The notable absence of women from African American and Hispanic backgrounds deepens their strangeness as engineers, even as it reinforces the presumptive whiteness of engineering. In addition, the lack of commentary from men who comprised the overwhelming majority of engineers well into the current era, leaves the assumed masculinity of engineering unexamined, in particular leaving a void about how forms of masculinity mapped onto engineering and how men engaged women's presence there. Instead, something of a prototypically masculine engineer seemed to ground archival content, which contributed to producing an impression of engineering as uniformly or monolithically masculine, instead of providing information about nuanced ways to be men engineers.

Conclusions and Implications

This paper describes some preliminary themes that we see threaded through newspaper and magazine articles from the 1930s through the early 1970s. Why should engineering educators learn about the history of how women engineers were portrayed in media, and why might a discussion of historical themes from this time be useful?

To a new generation of engineers and engineering educators, the people of the 1930s-1960s may not feel like "us" anymore, but instead feel like other people. However, people from engineering's past made today's world. Article authors told stories about women engineers and these contributed to framing stories told about women engineers — indeed, they created genres of stories or prototypes of identity about women engineers — that reports such as *Changing the Conversation*³⁹ are trying to replace.

Finally, analysis of these historical data helped us articulate some extremes: it would be unusual today to see women engineers defined through their measurements. However, the themes that we have identified through these historical extremes bolster an analysis of parallel images today. In particular, our investigation of historical media images of women uncovered a mass-produced, fictional persona for women in engineering that persists, even today. As an example, in an article entitled "Revenge of the Nerdette,"⁴⁰ Newsweek authors Bennett and Yabroff asserted that "[t]he Nerd Girls may not look like your stereotypical pocket-protector-loving misfits," and then fell further into a deep and insidious groove, claiming as counter to conventional wisdom that these women were "smart, they're techie and they're hot." Here, Newsweek may have talked about the intelligence and capability of women engineers at Tufts, but the imagery continued to reproduce conventional images of femininity and of women as sexual objects of men. Thus, this 21st-century storyline again adopted a fictional case that enshrined women's misfit with engineering, since young women must engage both a masculine Nerd image and a not-masculine feminine imagery, a thoroughly antithetical conjoining. We remain considerably less sanguine about the potential of this tack to improve women's being thought of as fitting into engineering. In fact, we interpret the Newsweek article as a reinscription of the myth about women's lack of fit in engineering, and begin to implicate the unexamined masculinity of engineering — not the attributes or other skills of women. Through examining the historical sources collected in SWE's archive, we fail to find a time or source that identified women with an imagery wherein being women seemed consistent with being engineers. What we do see is a persistently produced mythology of "women of today" (whenever the "today" was) being not so hideous or misfittish

as “women in the past” (whenever the past was). The archive documents the steady production and reinscription of this myth about women’s *not* fitting into engineering. We cannot help but wonder, confronted with this mirror to our engineer selves, how might engineering educators create images of *engineers* that counter persistent themes from the archive: of engineers being masculine (and white), of (white) women being ill-fitting in engineering, and of women of color begin doubly ill-fated as engineers?

Acknowledgements

We would like to thank the Society of Women Engineers for their support of this research and for the 60th Anniversary research project. We are most grateful for the support of Troy Eller, SWE Archivist at Wayne State University for all her considerable patience and assistance. We also appreciate the reviewers of this article for their good guidance and encouragement, and whose comments will be most useful when we work to submit additional articles from this research to peer-reviewed archival journals, if we have not already incorporated them here.

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