Unpacking the Elevator Pitch: Women's Narratives in Engineering

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When you ask women how they became interested in engineering as a career path, they typically launch into an origin story, perhaps detailing their childhood hobbies, educational achievements, or mentors who encouraged them. The narrative often seems well-practiced, as if it has been honed to include only the most important information and sharpened through repeated tellings. In my ethnographic fieldwork with women engineers, I began to associate these stories with the "elevator pitch" genre, in which the narrative is condensed to provide the maximum impact in the shortest amount of time. Faulkner (2009) observed in her fieldwork that women's origin stories are well-rehearsed in ways that men's are not, indicating women's obligation to justify their existence in the male-dominated world of engineering. These narratives are opportunities for women to define their own identities as engineers, and to simultaneously reshape the listener's perception of what makes a "good" engineer. This paper draws upon narratives collected during 15 months of field work in the Northeastern US (2018–2019), including 50+ life history interviews. The "elevator pitch" was a frequent occurrence, unprompted, usually at the beginning of the interview, and the participant and I would develop the life history in more detail throughout the rest of the interview. I use narrative analysis to identify core components and strategic variations of these origin stories, highlighting what these components and variations do in terms of defining women's engineering identities. Using the more detailed life history content, I note the components of participants' experiences that have been trimmed out of the "elevator pitch". I also compare the narratives of women born in the US with women who were born in India and China. I find that engineers who immigrated to the U.S. are not always familiar with this particular story-telling style, which can limit their persuasiveness in the workplace. In addition, Asian women struggle to explain their histories to an American audience, placing them at a disadvantage in shaping how they are perceived by their colleagues. Small sample sizes and regional specificity limit the generalizability of these findings; however, these narrative accounts provide important context related to how women perceive their position in the male-dominated field of engineering and their efforts to situate themselves as full members within it.

"How did you become interested in engineering as a career path?"

This was my most frequent opening question in my interviews with women engineers. As a former engineer myself, now a PhD student studying gender in engineering, I was very familiar with this question and presumed my research participants would be as well. It was supposed to be an easy question, a way for me to get participants talking about something familiar, and to build rapport between us. I realize now this question was also an implicit invitation to tell a story, to give me a sense of who they are, and to provide me a roadmap of what kind of questions might be useful to ask later in the interview.

For most participants, it accomplished all of these goals. I was surprised by how naturally these narratives rolled off their tongues, how rehearsed women's stories were about how they came to be involved in engineering. As my research project went on, this became a narrative that I would

patiently wait for them to finish – eager to get past the story they wished to present to the world and into the complicated histories that have been buried along the way. It got me thinking about my own narrative of how I came to be an engineer, and how tortured I felt to deliver a quick, understandable explanation for why I belonged in engineering. I remember trimming parts of the story that did not go well in my conversations with others, eliminating the parts that didn't fit well, were confusing, or left doubts about my qualifications. I was curious to what extent I might recognize these efforts in the narratives of other women.

I was also surprised when my opening question did not work as planned, when participants did not seem to understand it as an invitation to tell a story, and the answers were more perfunctory and functional. In particular, this tended to happen with Chinese women from rural areas, although my Indian participants also had some difficulty explaining parts of their histories. Therefore, I decided to investigate why this question cued particularly well with American women and what distinguishing features could be found amongst transnational engineers. My findings illuminate the difficulties women face in translating their experiences across borders, which I argue places them at a disadvantage in their ability to shape how they are perceived through these origin stories.

Literature Review

This study builds upon the previous work of scholars examining the boundaries of gender, identity and belonging in engineering culture. The inequality of women in engineering has been attributed to persistent male-dominated cultures and women's difficulty establishing themselves as legitimate engineers. In 1993, McIlwee [1] found that men's identities in engineering centered around "tinkering" hobbies and passion for technology. Women's interest in engineering, in contrast, was typically more academic and less "hands on". In her ethnographic work with engineering students, Tonso [2] argued that despite a wide range of normative engineering identities, none of them were associated with women. Ten years later, McLoughlin [3] argued that while some women were drawn to engineering through the "traditional" pathway of passion for technology, there is an underrecognized strategy for successful women engineers that is more generalist in nature and thrives due to exceptional organizational skills. While these women successfully complete the qualifications to become engineers, they are less likely to strongly identify as engineers, preferring instead to develop interdisciplinary skills and keep their options open.

These findings of women's struggle to develop an engineering identity are juxtaposed with a parallel set of literature that finds that engineering identity is crucial to success in engineering. In their study of persistence in engineering, Buse et al. [4] find that women who persist experience about the same level of bias and/or hostility at work as women who leave, but the ones who stay are more likely to have a strong sense of identity as an engineer. Similarly, Ayre et al. [5] find that engineers who begin their careers with a strong engineering identity are more likely to persist.

Women's origin stories in engineering are an opportunity to establish their identities by highlighting aspects that align most closely with engineering identity. Carter & Kirkup [6] observe that women in engineering are acutely aware of their position as outsiders in engineering

and understand the importance of presenting a professional image and identity. Having a prepared explanation for how they arrived in a male-dominated career is one way in which this identity is established. Faulkner observes:

"Many of the men provided little or no account of their choice, whereas virtually all of the women I interviewed 'have a story to tell' about why they made the choice. It became apparent that they had been asked the question so often they have a readily elaborated answer. Like not having children, choosing to be an engineer demands an explanation, if you are a woman." [7, p. 173]

Faulkner argues that this is because there is nothing remarkable about being a man in engineering; in contrast, being a woman in engineering is unusual. Other scholars have also noted these stories indirectly in their work. McIlwee [1] noted that women tended to emphasize their academic excellence in math and science, rather than highlighting tinkering hobbies as men did. Buse's [4] study finds that women who persist in engineering tend to describe themselves as actively choosing engineering, rather than being "pushed" into the discipline. Women's origin stories are therefore an opportunity for women to explain and justify their presence in the discipline.

However, my discovery that the question "why did you choose engineering?" is not interpreted in the same way by all women begs the addition of an intersectional lens. Intersectionality, first introduced by Kimberly Crenshaw [8], is the theory that analysis using a single lens of gender, race, class or any other inequality is incomplete without understanding the ways it intersects with other inequalities. Sometimes referred to as the "matrix of oppression" [9], intersectionality theories argue that in order to understand structural inequalities, we must move beyond dualisms, additive concepts of race and gender, and attempts to "rank" inequalities. For example, Jordan-Zachary [10] argues that as a black woman, she is contained neither within normative definitions of "woman", which assumes whiteness as the default, nor "black", which assumes maleness as the default. She asserts that rather than an "additive" approach, in which her gender and racial inequalities are compounded on top of each other, her identity as a black woman must be seen as integrated, resulting in a position within the matrix that relates differently to structures of power than either white women or black men.

Efforts to study intersections of gender and race in science have been underway since Malcolm et al.'s report on "The Double Bind" in 1976 [11], describing the challenges of being a woman of color in science. A body of intersectional literature has been built upon this foundation [12]–[17]. However, these intersectional studies struggle to gain traction, and most studies of women in engineering presume white women as the default position. In a 2011 follow-up study, Malcom and her daughter [18] emphasize the importance of recognizing the multiple pathways into scientific professions in order to be more inclusive of minority scientists. They also call for greater attention to Asian minorities, since these groups are currently understudied, even as they make up a growing proportion of the scientific workforce.

Accordingly, in this study, I join a burgeoning literature on Asian experiences in engineering [19]–[25]. I present Indian and Chinese women's narratives alongside American women's to illustrate the expected structure of engineering women's origin stories and their variations. I

argue that transnational histories are difficult to translate across borders, placing Asian women at a disadvantage in shaping how they are perceived by others in their field.

Methods

This paper draws upon narratives collected during 15 months of field work in the Northeastern United States (2018–2019), including 50+ life history interviews. For brevity, I have selected five (5) interviews that best exemplify the genre. Each interview was analyzed using Labovian narrative analysis [26] which calls attention to the purpose of each phrase in the narrative structure. In any narrative, Labov argues, there may be found the following basic components: (1) an Abstract, summarizing the story that is about to be told, (2) Orientation, explaining important background information, (3) Evaluation, in which the teller informs us how they felt about the events in the story, or how we should feel about them, (4) Complicating Factors, which derail and/or drive the story forward, (5) a Resolution, in which the complicating factors are overcome, and (6) a Coda, summarizing what was just told. Storytellers have a variety of ways to construct stories – components can show up in any order, any number of times. This type of analysis helps to call attention to the purpose of each phrase, and what it *does* in terms of framing the story that teller is trying to produce.

I also assessed how rehearsed each narrative seemed. One marker of unrehearsed stories includes having to pause the story to include more Orientation, or background information that had been left out. Additional markers of off-the-cuff stories include frequent "ums" and pauses, which the teller uses to buy time to organize her thoughts. In contrast, rehearsed stories tend to be cohesive all the way through, with few stumbles or missed information.

Finally, I conducted a qualitative content analysis to pull out five (5) important factors that appear frequently in these narratives and analyzed why these factors are important to include. I also compared women's narratives, which appeared early in the interview, with the more comprehensive accounts of women's experiences in engineering that unfolded over the course of the rest of the interview.

I came to view these narratives as belonging to the "elevator pitch" genre, in which only the most important information is conveyed in a relatively short amount of time. To define what constitutes an elevator pitch, I turned to a popular website that advises those wishing to hone their own elevator pitches. This website advises to keep the pitch short and to the point, using 75 words or less [27]. In the time it takes to ride the elevator from the bottom floor to the top, speakers should explain who they are, what they do, and what they want. Speakers are advised to select only the most pertinent information in their career histories, to highlight their strengths, and to remove everything that is not absolutely critical. "Once you've got it down to just a few points," the website advises, "organize them in a way that makes sense in your story." It further urges speakers to practice and polish the speech to avoid extraneous details and project confidence.

The narratives collected in this study were a bit longer than 75 words. However, they followed the basic principles: to avoid extraneous details wherever possible, to project confidence and

present oneself in the best possible light, and to remove any trace of doubt that one belongs in engineering.

American Engineers' Elevator Pitches

I will begin my analysis with the most basic version of the "elevator pitch" I encountered. This interviewee, Christine (pseudonym), has managed to condense her story to include only the most important elements.

> Me: How did you get interested in engineering?
>
> Christine: Okay. So. When I was in high school, I really liked chemistry. I learned about engineering through the First Robotics Program. So if it wasn't for First Robotics, I wouldn't even know what engineering was. Before that I thought scientists worked in labs. I had no idea. Because I liked chemistry the most out of all the sciences, I ended up going into chemical engineering. That's how that happened.

For clarity, in this first example, I will also demonstrate the Labovian breakdown of the narrative components.

> Abstract: Okay. So.
>
> Orientation: When I was in high school, I really liked chemistry.
>
> Orientation: I learned about engineering through the First Robotics Program.
>
> Complicating Factor: So if it wasn't for First Robotics, I wouldn't even know what engineering was. Before that I thought scientists worked in labs. I had no idea.
>
> Resolution: Because I liked chemistry the most out of all the sciences, I ended up going into chemical engineering.
>
> Coda: That's how that happened.

This pitch is only sixty-nine words in length. There are no "ums", indicating a more practiced delivery. Furthermore, the opening phrase ("Okay. So."), indicates that the interviewee is preparing to deliver a prepared speech.

The organization of the pitch is logically constructed. Christine's narrative indicates she had an initial interest in chemistry, learned about engineering careers in high school, and then selected chemical engineering as her major. There is little Evaluation in this pitch, which I have come to view as a marker of engineers' speech: in the interest of objectivity, engineers omit their own opinions and feelings from the narrative, or state them in such a way that they appear to be mere logic. So in this case, Christine's evaluation that she "likes chemistry" is stated as a factor that

contributed to her rational decision to choose engineering, rather than decision based on a feeling or emotion.

From this very basic version of women's elevator pitches, I observe that there are a few important factors that must be included in order to establish oneself as a legitimate female engineer: (1) indications of an early interest in science; (2) when the interest in science began; (3) how the speaker learned about engineering careers; (4) an evolution of interests toward engineering; and (5) a final decision to choose engineering. I tested a number of other interviews to ascertain whether these basic factors are present, and whether other factors might also be important. With the caveat that nothing can be generalized from this limited data set, this framework appears to hold amongst the interviews I collected.

> The two factors I find most interesting are Factor 2, the inclusion of the time period when interest in science began and Factor 3, which articulates how the speaker heard about engineering as a career. In Factor 2, there appears to be an implicit preference that interest in science should begin early in one's life, and the earlier the better. In this way, women position themselves as "naturally" inclined toward science. Factor 3 appears to be a response to an unspoken demand that women demonstrate that they know what engineering is. For most American women, this may be done through exposure to outreach programs, such as First Robotics, or through family members or acquaintances that are engineers. What makes this remarkable is, as Faulkner [7] observed, men are rarely required to make such accountings of their choices, nor demonstrate how they became familiar with the engineering field.

Christine's narrative is informative, but quite a bit shorter than other interviewees. To illustrate a more typical, longer form of the elevator pitch, consider this narrative from Teresa:

> Me: So let's start with why you chose to pursue engineering.
>
> Teresa: So I initially started off, I always loved science and I always loved art, and I never really knew where I wanted to take it. When I was in high school, I ended up doing an internship with NASA, so I got to fly down to California. I worked at [company] space communication and some of the NASA scientists and stuff. ((Wow!)) It was amazing! ((Yeah!)) I really loved it. ((How old were you?)) Fifteen. I was in a, um, the person who was my mentor was very absentee and I had a very bad mentorship experience, but while I was there, I ended up working in the high bay for a while, which is where they built the satellites. I remember seeing the scientists playing ping pong, like discussing ideas over it and like, I just loved the way that they came up with ideas and just implemented them and changed something that was impactful to so many people. So for me, that was something I held onto. And when I went to college, the University of Washington, I had never really done a lot of art stuff, so I decided to take some art classes. That was the first time I had ever taken like, any…I'd also had a painting, I'd had some success with art on my own. Where I had a painting that was displayed at the capitol building in D.C. ((Wow!)) It was awesome. Also as a young person. But I also wasn't really sure which way I wanted to take it. So I decided to take my first art classes in college and did that for a while. And then, I didn't really like the

> way the art classes felt? Some of the stuff that was going on. It was a lot about selling yourself, less about your work. And I realized that I just wanted to keep that for myself. So I went and started talking to some different professors about…what kind of engineering opportunities there were. And then, the materials program offered me a scholarship to go. So I decided to do materials engineering (laughs) oh boy. And that's how I ended up getting into engineering.

Teresa's narrative is a little less polished than Christine's, and there are a few interjections by me, which briefly disrupt the main narrative. However, you can find each of the basic components of the elevator pitch in this speech: (1) she loved science, (2) "always", (3) she describes an early exposure to NASA scientists, (4) her interests evolve from a dual interest in art and science to a strong science focus, leading to (5) a decision to pursue a career in materials engineering.

Teresa's narrative is especially interesting because she feels the need to resolve her prior interests in art with her final decision to choose engineering. The way she explains it here, being an artist required her to "sell herself", which she was not comfortable with. She found it comforting that in engineering she would be judged on the merits of her work. As pointed out by Cech [28], [29], meritocracy is one of the core tenants of engineering identity; in this way, Teresa is demonstrating that she belongs as an engineer. In addition, she describes the scientists she met at NASA as creative and fun, solving problems over ping pong. In this way, she is able to merge two parts of her identity, an artist and a scientist, which might otherwise be perceived as competing, into a single coherent identity.

Equally interesting in both Teresa and Christine's narratives are what is omitted from the pitch. Christine was not singularly focused on chemistry or engineering, as her narrative suggests. In fact, she also enjoyed writing – so much so that she actually dual majored in Technical Writing. She tells me that the reason she didn't pursue writing as a career is because she couldn't see any viable career options, whereas in engineering, there were plenty of job opportunities. Whereas Teresa felt the need to resolve her competing interests in the elevator pitch itself, Christine omits them entirely, perhaps feeling that her writing interests confuse the narrative too much or are irrelevant because they are not practical.

One factor Teresa omitted was an admission later in the interview that receiving a good scholarship was a big factor in her decision to switch to materials engineering. For Teresa, it was more important to use her narrative to establish an identity for herself as a scientist. The practical influence of a scholarship perhaps casts a shadow on this identity if she is not perceived as "authentically" interested in science.

Asian Women's Elevator Pitches

As I progressed in my research project, I noticed that my interviews with Asian engineers were a more exploratory process than my interviews with American engineers. American engineers were intensely familiar with diversity programs in engineering. They would know almost instinctively what I was asking and deliver exactly the responses I was asking about. In contrast,

amongst women born overseas, more explanation was needed, both on their part and mine. This was reflected in their opening narratives as well.

Here is Kalpana, a young engineer who was educated in India and came to the United States for graduate school:

> Me: How did you become interested in engineering as a career?
>
> Kalpana: So I think the main reason goes back to my family, and what my parents, even my grandfather, what they did, how they thought about things. That's what got me into physics or math or engineering in general. My grandfather was a schoolteacher and eventually the principal of the school. He never got to study more than a bachelor's level. In spite of that, the amount of curiosity he had, he used to understand engineering even better than me, when I was actually pursuing it. So he had this curiosity to keep reading about things and keep finding out how things worked. So I always saw him tinker with objects at home. You know that's what got me inspired, in that way? If he can do it at the age of 83, I can definitely try to find out how the world works. My dad, he was by profession, he did his PhD in microbiology. So he didn't have anything to do with the technical side, but he was also I would say an engineer at heart. Because he also would, whatever appliances would break down, he would just open things up and he loved to take apart stuff. Sometimes even if it was working, like halfway, he would just make it not work at all, but he still enjoyed the process. Mom used to be sometimes not very happy about it. ((laughs)) Me and my brother, would be like, no no, don't touch it please! It's working fine! My brother and I we used to see him do all this when we were growing up. My brother is also an engineer. He is four years older than me. And that's kind of what got us interested in this engineering field. To me, physics is more dear than engineering. I would say physics is the reason I got into engineering. Because in India the way it worked after your high school was you either go into engineering, which is the applied sciences, or engineering field in terms of not just doing research, basic physics research, but how things get applied. It is more a job-oriented thing. Versus the physics pure science field which is more academic than engineering. So for me I loved physics to begin with, in school always. But after high school I used to get from my teachers, I used to get counseling which told me I should go for something more job-oriented. Because eventually I wanted to work, I wanted to be financially independent, so to speak. So I thought maybe that's the better option for me. I would still get…like engineering is all about physics and math, so I would still get to learn what I love, but it would be a more practical application. ((Is your degree in physics or engineering?)) In engineering. So this was right after high school, at the point where we decide whether you do a bachelor's of science or bachelor of technology. That's how they do the fields in India. So at that point I decided to go to the technology side of it.

Kalpana's narrative includes the same elements that American engineers include. She (1) has a strong interest in physics, which began (2) "in school, always". (3) She learned about engineering from her father and grandfather. (4) Her interests gradually evolved to a preference for engineering because it is more "job-oriented", leading to (5) a final choice of a technology

career path over pure science. However, there are a few key differences I'd like to point out that makes this narrative unique.

First, it is not as succinct as we see in other elevator pitches. She includes a lot more orientation to explain basic background information about the Indian education system. This indicates the additional work that international women must do to make their stories understandable to American audiences.

In addition, the first part of Kalpana's narrative is primarily about her family, not herself. She tells how her father and grandfather had "tinkering" engineering identities, which they passed along to her and her brother. Family was central to several interviews with Indian women; their families were mentioned early and often throughout the course of the interview. In contrast, American engineers frequently did not mention their families until I specifically asked. In her excellent ethnography, Radhakrishnan [30] argues that the "global Indian" identity, while flexible on other cultural traditions, such as diet and religious practice, is fixed to family values as a core component of "Indianness" abroad. In this way, Kalpana establishes herself as not only a "natural" engineer, but as an extension of her family.

Furthermore, Kalpana positions her decision to choose engineering not as a decision between the arts and sciences, as Teresa does, but between applied and pure science. Kalpana does have artistic and athletic interests – she plays ping pong and is an accomplished dancer. However, her career decision does not reference these talents. Instead, she is choosing between the pure science of physics, which she loves, and the more practical applied science of engineering. This is an important indicator, since in India, women are more likely to choose pure sciences. Men, who are under more pressure to provide for their families, tend to choose engineering. Therefore, Kalpana, in her narrative, feels she must justify her choice to go into a practical career path rather than pursue pure sciences like many of her female classmates.

Kalpana's interview shows the importance of national origin in understanding women's positioning in engineering. In her narrative, she demonstrates the centrality of her family to her identity. In addition, she has a different orientation toward what are perceived as "women's careers" and "men's careers". It is not altogether unusual for women to pursue science in India. It is a little more unusual to choose to pursue a career. Many Indian women who receive degrees in science and engineering do not enter the workforce at all, choosing to get married and stay at home instead. Therefore, Kalpana is not as concerned with being perceived as "good at science", but rather wishes to establish that for her, choosing engineering was choosing a career.

For a couple of interviewees, my opening question fell flat. Here is my interview with Yu Yan:

> Me: How did you get interested in engineering as a career?
>
> Yu Yan: Oh, okay, I think that I was affected by the family. Yeah. It's also first you choose the university and after that, you follow the track.

This was followed by a beat of silence as I tried to figure out whether she had anything more to add. She was indeed finished with her story. I thought it was a fluke, until in another interview, the same thing happened:

> Me: When did you decide to be an engineer?
>
> Wangshu: Um…roughly when I graduated from senior high school. We need to choose whether we learn some science related or technology related. Or how can I say…article…
>
> Me: [suggesting words] Artistic? Humanities related?
>
> Wangshu: Yeah. Something like that. At that point, I chose the technology, science related major.

This again was the end of the story. It was clear that these two women had not understood my question as an invitation to tell a story, but rather as an invitation to provide a factual answer. I think there are a number of factors that may have contributed to this misunderstanding.

First, both women are native Mandarin speakers. While they have a focal fluency in workplace settings, everyday conversations about their lives was more difficult. In this light, telling a long narrative would have been difficult. When translating from one language to another, brevity is often easier, even if it is not as detailed.

Second, in addition to language translation, there is quite a bit of cultural translation that would be hard for them to bridge in speaking with an American interviewer. Most Americans are unfamiliar with Chinese history and culture and it would have taken my participants perhaps an entire interview to fill me in on the details. China has undergone rapid economic growth and political change in the past fifty years alone, which has dramatically shifted the structures of education and work life. Although I had done some background research on Chinese education and engineering culture, my interviewees' initial presumption was that I did not know very much on these topics. It would have been hard for them to fill me in, and so I suspect that short answers were an attempt to answer truthfully but not have to get into a lot of detail.

Finally, at least in part, the decision to choose engineering was a little more straightforward for these women. I found it significant that both women were Chinese women in their mid-40s whose parents had not received a high school education. During the course of their interviews, they clarified that they had relied heavily on career recommendations made by their teachers and had simply selected the most challenging program that they qualified for after the college entrance exams. As Yu Yan put it, "after that, you follow the track." There wasn't much waffling over career choice, which made the story of how they chose engineering very simple.

I also want to point out that generational differences are very important in China, since there has been such rapid growth and development. Younger generations of Chinese women have more flexibility in their careers, particularly for those from cities and amidst the upper-middle class. My younger Chinese participants' narratives sound much more like Kalpana's. I would like to

include an example, but for brevity, I will simply point out the importance of these generational distinctions.

Conclusion

In this paper, I have argued that women's narratives about how they became interested in engineering are opportunities for them to establish their legitimacy as engineers and position themselves within normative boundaries of engineering identity. Amongst my American interviewees, women demonstrated a familiarity with this question and their responses often fit a particular pattern. Within this pattern, women highlight their strengths, reconcile any divergent components of their identities, and omit parts of their story that might confuse the narrative.

I have also highlighted some of the differences I discovered between American engineers and engineers from India and China. In particular, contextual factors from their countries of origin are important for understanding how they position themselves within engineering identities. In the case of Kalpana, she defines herself as a passionate scientist, but also as a woman who has chosen a career, in contrast to many of her classmates who got their degrees but chose not to enter the workforce. Similarly, for two of my Chinese participants, language and cultural barriers made telling their stories to an American interlocutor more complicated. I argue here that these considerations are important to note, since not having a clear elevator pitch may put them at a disadvantage. While American women use these tools to position themselves favorably amongst their colleagues, Asian women's narratives frequently require additional orientation in order to make their stories understandable to their American coworkers.

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