

WOMEN in the ENGINEERING INDUSTRY

by Kaitlin Duck Sherwood

THIS ARTICLE DESCENDS FROM A TALK I GAVE TO THE SOCIETY OF WOMEN ENGINEERS AT UIUC. I HAVE TRIED TO TRANSLATE FROM THE SPOKEN WORD TO THE WRITTEN WORD, BUT SOME THINGS MAY NOT HAVE MADE IT OVER PROPERLY.

Being a woman in engineering industry is different from being a man in engineering industry. Not better, not worse, but different. I'm going to try to talk about the things that are going to annoy you and help you when you get out to The Real World.

Please note that not everything I am going to say will apply to everyone here. (Many of them don't even apply to me, as a relatively tall woman with very masculine speech patterns.) These are rampant generalizations, but I can't talk about anything interesting if I don't generalize.

Physiology

Men and women have physiological differences, as you may have noticed. You would think that this shouldn't make any difference in the workplace, but it does.

Temperature

Women, prepare now for being cold at work for the rest of your life.

Those of you who have taken thermodynamics know that heat production is a function of volume (radius cubed), while heat dissipation is a function of surface area (radius squared). So the generation to dissipation ratio goes as the radius, and so the smaller you are, the colder you will be. Furthermore, because women menstruate, they are more prone to anemia, which can also make you cold. I've also read that women have much tighter tolerances on their core temperature regulation, to provide for a better growing environment for potential fetuses. So when a woman's core temperature drops by a little bit, all the blood gets sucked back from the extremities to the core. When men's core temperature drops by a little bit, and it just sits there, no problem.

- Toss in that the ultimate control over building thermostats usually lies with large, well-fed men in three-piece suits in south-facing window offices, and you're going to be cold a lot. When I was working, I would always bring a coat to work with me, even in the height of summer.

Now, before you run and slap the next guy you see for being so insensitive, note that men are frequently hot - especially in a tie and a nice wool suit! Furthermore, I've seen some things that lead me to believe that part of why women live on the average eight years longer

than men is their superior temperature regulation system. I don't know if this is true or not, but believing it gives me great comfort. On bad days I can sit there and think evil thoughts about the men in charge of the thermostats: 'I may be freezing, but you're going to die!'

Carpal Tunnel

In addition to being colder, women in my experience seem to be more prone to carpal tunnel syndrome. I have a friend whose theory is that because men's shoulders are wider and their handspan greater, they don't have such a big excursion when hopping from keyboard to mouse or reach for funky keys. My anecdotal evidence is that the Sun keyboards with two keys between semicolon and return are the worst by the way.

It may also be that tables and chairs are the wrong size for people who are substantially bigger or smaller than the average. This can lead to neck strain, back strain, eye strain, brain strain, whatever. If you start getting any of these problems, deal with it right away. Repetitive stress injuries don't go away with time, they get worse. Ask for a monitor stand, a different chair, put your computer on a box, the floor, get a new desk, whatever. And don't feel bad about asking for this: a new desk and chair is cheaper for the company than two years of physical therapy.

(See also Computer Related Repetitive Strain Injury.)

Language

You do need to be careful about how you ask for a more suitable workspace, and this brings me to the other major difference between men and women: language.

Phrase Everything As A Win-Win

Do not walk into your boss' office, throw a hissy fit, and say that you need new furniture NOW! Negative style points. Whenever possible, explain your ideas in terms of how they would benefit the other person, not how they would benefit you. Women tend to be more sympathetic, so tend to expect sympathy more readily. Forget it. You have to make them understand why they want to do what you want them to do.

Learn To Say 'No' Well

You also need to be able to say 'no' well. If the boss says, 'We'd like you to write a statistical process control package for our line in one month', the appropriate response is not 'you're out of your mind', nor is it 'that can't be done'. The appropriate response is, 'Well, we could do that, but only if we hire about five contractors and rent six computers for development.' It may be that the project is important enough that they are willing to do just that.

If your boss really pushes you and basically tells you that you have

to do it all by yourself in a month, you need to tell your boss, 'I will do the best I can to get this done in a month, but let me go on record as stating that I feel that this is a schedule aggressive enough that it is not possible for anyone to do.' If you can back that up with examples of time-to-completion for similar projects, even better. Put it in writing and keep one for your files, even better.

This is very important. The saddest case I ever saw of a woman not fitting into the culture was one of the sweetest women you'd ever want to know. She was universally highly-regarded technically. And she had a reputation for being very difficult to work with.

She is so sweet that when they ask her to do impossible things, she'd end up capitulating relatively easily because she wanted to be nice. She'd work her brains out, day-in, day-out, evenings, weekends, all the time, get all frazzled. Then when it got close to deadline and it wasn't ready, they'd start to come down on her, and she would just explode. She'd go totally non-linear. And nobody would understand what set her off. So she'd get nailed for being hard to work with.

This obviously was extremely frustrating for her, so it would be even worse next time. It was very sad. Here was a human being who spent a lot of time being very unhappy and a company that lost a great resource. Moral of the story: learn to say no! And if you can't say no, you'd better be dam-shootin' sure to keep your boss well apprised of your progress.

Speak Up!

In general, you should not wait for people to poll you for your opinion, for your status, for your needs and desires. You have to speak up and tell them yourself. There is a scholarship in General Engineering - the Elizabeth Ruff scholarship - whose description basically says that it is for sweet, unpretentious, unassuming girls. (Yes, it really does say, 'girls'.) I read the criteria and said, 'Whoever wins this has my deepest sympathy. This is practically a recipe for failure in the engineering workplace.' Especially in meetings, you can't wait for them to say, 'Now, Marilyn, how do you feel about this?' You'll have a long wait.

Expressing Certainty

Also on the subject of pretentiousness, I have a friend who observes that if a man thinks the answer is three, he'll say, 'The answer is three.' If a woman knows the answer is three, she will say, 'I think the answer is three.' Women tend to be more tentative. This is not necessarily bad - you may end up with higher credibility than the man who keeps insisting that the answer is three when it is really is seventeen... but you might look wishy-washy.

Don't Take It Personally

Men also take things a lot less personally. They will yell and scream and call each other bloody idiots over a technical point, then go have a beer together. The fact that someone doesn't like a particular idea of yours does not necessarily mean that they don't like or respect you. They just may lack diplomacy. If someone is in your face, it's probably because he or she feels responsible for but not in control of something. This is a deadly combination.

If some guy gets nasty with you, do what I do: assume he had a fight with his wife, got into a fender-bender, has to come up with \$3000 to fix his roof, and left his wallet at home. Then feel sorry for him and see if you can make his day better.

This can have some very nice outcomes. This guy who was famous for being abusive barged into my office, just livid, and started beating on my desk with his fist. 'Your goddamn group can't do shit right @\$*(R*@\$S# (*#S&! I let him rant and rave until he wound down, then said, 'Yeah, well, we very well might have screwed up, let's take a look at it.'

That stopped him dead in his tracks! He was so braced for a fight that he didn't quite know what to do when I wouldn't fight back. We looked at the code, and it turned out that he had screwed up. I showed him what he had done wrong, explained what he needed to do to fix it, and told him that if he would go fix it right away, I'd stay late to personally oversee my group's part of it so that it would be ready to move on first thing in the morning.

It was priceless! He just sort of slunk away and never gave me any trouble after that. My friend Anne reports a nearly identical occurrence with Customer From Hell, so it wasn't just me.

Accept Blame Properly

Accepting guilt can be really useful. Not just for defusing cases like that jerk, but also for establishing credibility. If you say, 'Yeah, I screwed up' when you do screw up, then when you say, 'No, that was not my fault', people will believe you.

Now, when you do accept blame, DO NOT GROVEL. DO NOT MAKE EXCUSES. I worked with a woman who would spend five minutes apologizing for a screwup... and then make the exact same screwup next week. Contrition and excuses are not useful: I want the problem resolved.

When accepting guilt, do the following:

- Make a brief statement of contrition,
- accept guilt,
- explain briefly how you are going to solve the immediate problem, and
- explain how you are going to prevent this from occurring in the future.

For example:

'I'm sorry,

I didn't clearly explain to Mike which include files to use.

I will personally go rebuild the kernel now - it should be ready at about 4:30.

I'll also go put a comment in the README file about which include files to use.'

(Note that if a subordinate screws up, you accept the blame as being your fault. If they did something wrong, you didn't train them right, you didn't give them adequate instructions or equipment or something. If you blame them you look like a whiner. If you protect your people, however, they will follow you through the depths of hell.)

Insecurity

Now, some people get really nervous about the idea of admitting guilt, being afraid that it will make them seem less competent. Here's what you need to know:

#1: Everybody screws up.

Everybody. It happens all the time. I know you are all freaked because you've all had profs who gave zero partial credit on the grounds that if the sign is wrong, the bridge will fall down. This is true; but there are an enormous number of checks in the real world to make sure that the sign is not wrong.

You design, then simulate, then redesign, then simulate again, then prototype, then test, then redesign, etc. etc. etc. Engineering is an incredibly iterative process, and it is that feedback loop that keeps the bridges from falling down, NOT that everybody but you does everything right the first time.

#2: EVERYBODY is insecure about their job performance.

I read an article in Psychology Today when I was in college that interviewed people at all different levels of corporations. They were surprised to find that the higher you went in a corporation, the more successful people were, the more insecure they were about their jobs!

There was a real strong fear among high-placed people that someday they'd be found out! That everybody would suddenly realize that they were totally clueless! Moral: nobody has a clue, so relax already.

#3 The most successful people are NOT those who screw up the least.

The most successful people are those who learn best from the screw-ups they make, and act fastest to make amends. I was at a startup that was very careful about who they hired. They only tended to hire people who had always had raging successes. Unfortunately, this left them ill equipped to deal with a troubled project.

My friend Anne says, 'I have been on some large, highly successful projects, but I didn't learn as much from them as I did from the small, disastrous projects (which failed because they were small and we thought we didn't have to do all the stuff you have to do for a big project — WRONG!)

I know someone else who observed that at Intel, the people who were on projects that failed miserably eventually ended up as corporate VPs - because they had learned so much more than their colleagues whose projects had succeeded.

It's very difficult to examine a success and figure out why it went right. It is much easier to take a failure and figure out why it went wrong. So look at your screwups as valuable learning aids!

Measure Your Job Performance

Now, this doesn't mean you shouldn't pay attention to your job performance. It is a really good idea to figure out some way of measuring your performance - something, anything. My friend Anne quoted Gilb's law (from the book *Peopleware*): any measurement you make is better than no measurement at all.

I'd advise as a minimum generating weekly status reports (regardless of whether your boss asks for them or not). Mention what you are working on, why it has taken you longer than you thought (because it always does), what would help you in terms of equipment, cooperation from other departments, etc.

Benefits of Being Female

There are some benefits of being a woman surrounded by men.

Men Like Women

Most men like women. It's a strong evolutionarily favorable trait. So all other things being equal, you may well get more cooperation from men than they would give to other men. Part of this also is that men can be really territorial around other men. They can play all kinds of status games with each other that can make them real jerks to other men. Women by and large not only don't play those games, they are oblivious to the fact that they are going on. This means that men can usually relax more around women.

Being Remembered

Because there are relatively few women around, if you are the only woman in a meeting of thirty, guess who the Vice-President is going to remember? Yes, you will be more exposed. Yes, your screw-ups will be more visible. (I don't remember who said it, but I liked the quote: 'Women have not yet achieved the right to be mediocre.') But your successes will also be more visible.

Exploiting the Underground Economy

Women also tend to be more empathic and more diplomatic, two traits that are highly useful in collaborative efforts. Companies are all dependent upon what I call 'the underground economy'. This is an economy based on personal ties that has nothing to do with the formal power structure.

This is what I invoke when I get on the phone and say, 'Psst! Hey Dottie! I got a sputtering system down, and I need some oxide wafer to qual it and bring it back up. The fab manager is breathing down my neck, but hotwall is down and can't get me any wafers. Can you get me about twenty oxide wafers?' And then Dottie shows up five minutes later, slips me a box of wafers, and says, 'Here you go. Don't ask where I got them.' (It isn't that she stole them from somewhere, it's that company policy frowned upon hoarding wafers. I presume that she knew a technician who had some oxide wafers in his or her desk that were left over from some experiment, and she called in a favor from that tech, and I ended up with wafers.)

This kind of thing happens all the time in The Real World. Frequently the unit of exchange is not physical, it is information. Also, exchanges don't even necessarily stop at company boundaries. I have friends call me up and say, 'My boss is afraid to use an aluminum casting for this part because he says it won't be waterproof. What the hell is he talking about?' Or I call up friends and say, 'Honey, sweetie, darling, I'm having trouble with my computer and I think it has to do with file locking; could you explain to me again how file locking works?'

I think that all other things being equal, women tend to be better networkers, because they do tend to pay attention to other people's needs.

The Rules

Women have a lot fewer rules that they have to follow. Men are practically handed a rule book at birth and told, 'If you break these rules, you will be Not Taken Seriously.'

Women used to have a whole set of really rigid rules as well, the whole barefoot and pregnant routine, uncomfortable shoes, etc. That finally became so unbearable that The Rules got challenged to the point where it is common for them to be broken. The remnants of The Rules still linger, and give women all kinds of grief, but if you think you are oppressed, think about all the Rules men have to follow!

- If you weigh less than 200lb and are less than 6' tall, you may not wear pastels.
- You may only wear a skirt or dress on Halloween.
- You must wear a tie to formal occasions.
- You may not be neutral about The Super Bowl.
- You must always have a job.
- You may NOT stay home and raise kids.
- You may not touch another man, unless your are thumping him on the back, shaking his hand, punching his lights out, or participating in a sporting event.
- You are allowed to exhibit only one feeling: blinding anger.

For example, I have one friend who had large sums of money in the bank and didn't like his job. I told him he ought to quit his job and go travel around the world. He rather liked the idea, but couldn't. He absolutely could not bear the idea of someone asking him, 'Where do you work?' and not having an answer.

Men are starting to notice that they have all these Rules, and are starting to rebel: asking for custody of children, staying home, wearing pink, but as we know, it is a slow path to equality.

About The Author

The author is an expert on Internet communications and how to explain them.

Her email writing guide, *A Beginners Guide to Effective Email* gets 600,000 hits per year, she has written 2 email programs.

She won a GNN Best of the Web award in 1995

Log onto www.webfoot.com for more information about the author.

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