

Science-linked Careers for Women

Some history of social change in the United States
A personal adventure at the forefront of change

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Why is this relevant to you?

- Change has patterns
- Japan today is like US –pick a date -- 1970?
–with regard to careers for women

Do not believe the messages (explicit or implicit)
that limit your choices!

My mother and my teachers, the generation born 100 years ago

- Career incompatible with marriage and children
- “Old Maid”, “Blue stocking” negative stereotypes
- Essentially only teaching and nursing as career options, seen as jobs for needy young women until they found a husband to support them

Most women who worked had jobs, not careers

Worked only if they “had to” because they **failed** to marry or their husband (or father) **failed** to be able to support them

World War II

- US needed women as factory workers (men overseas)
- Women took community leadership roles

- Rosy the Riveter
Song and image to recruit

After the war, back to the house!

--but maybe a key change
in women's assumptions



My generation (born '40's) (late '60's) vs Today

- Women PhDs in physics 2% recent PhD 13-15%
- Women doctors 7-8% ~30% (all ages)
(>50% of med school applicants)
- Women Lawyers 4-5% ~30% (all ages)
(close to 50% of law students)

Math linked careers (engineering, physical science, computer science) lag others, look more like physics.

My daughters generation (born in '70's)

- In high school a teacher asked
- girls expecting a career ~90%
- boys expecting their wife to have a career ~5%

Changing times = mismatched expectations!

The girls had it right!

In US today, most college graduate women expect real careers,

- Marriage at a later age
- Children in late 30's (10 years later than my generation)
- Higher divorce rate (cannot rely on lifelong support from a husband)
- Need two incomes to support middle class lifestyle

Why **still** so few women in physics?

- All math-rich careers are slowest to change
- International variance (not always what you think)
Italy now 30% women among recent PhD's in physics,
Sweden less than 10%

All answers are speculative, regional, and personal!

Contributing factors

- Parental expectations of interest
- Peer pressure
- Social norms impacting math self image
- Teacher and mentor expectations
- Stereotypes

Parental expectations

“I must take my son to the science museum”

“My daughter would love that ”

- a doll, a craft project, toy cooking pots and stove

“My son would love that”

A robot, a toy weapon, sports equipment, a building toy

Gender stereotypes send strong social messages!

Peer pressure

- The pressure to “fit in” by doing what others do
- Pervasive and powerful in schools,
 outliers are often bullied
- Media (particularly advertizing) reinforce the social norms
- Even when in the same school,
 girls and boys live separated and different experiences

I believe this is particularly potent in Japan

–how does it define you and your choices?

Mathematical ability and mathematical confidence

- At the same level of ability (in US)
- Boys **over**estimate their ability - I'm good at math
- Girls **under**estimate their ability - I'm not good at math

Reasons ?? **Maybe**

Socialization differences -> Girls perfectionism

- Reduces girls aspiration for math-rich careers

Teacher and Adviser expectations

- Embody gender norms of prior generation
insults and messages are often inadvertent
- Transmit low expectations for girls careers
(both explicitly and implicitly)
- Less inclined to push girls to achieve

Will support you
when you make it clear you know what you want
and are willing to work for it.

Stereotype Threat

- I don't see others like me doing it
People said to me “**You do not look like a physicist**”
- I don't expect it will work for me
sense of not being good enough (everyone has it)
- I do worse when others invoke the stereotype
afraid to try because I might prove them right

subconscious avoidance of challenging the stereotype

(Mis)perceptions about the life

- Too demanding, no way I could enjoy life and succeed
--all rewarding careers are demanding!
- Only for nerds (ie male and socially challenged)
-- you'll meet many interesting people
- I am not smart enough
--you'll never know unless you go for it

My own experience

- Engineer father who loved to foment family debates
- 3 brothers to compete with in these debates
- Girls only school k-12 (in Australia)

less stereotype pressure
no boys to try to impress

- Excellent math teacher in high school who said:
You could be a mathematician –because you are so lazy!
You will never do a problem the hard way,
you always have to find a better way.

My family (Melbourne, 1958)



Move to US, 1962

Opened new horizons

– as an immigrant less stereotype pressure

Of 2% women in US physics PhD's my age

--most educated outside US prior to graduate school

Married fellow physics student Daniel Quinn 1966

Obtained PhD 1967

Postdoctoral position in Germany 1968-70

(difficult time, no support for my career)

My most productive science years

Children born 1971, and 1974

Papers written 1971-1976 are my best known work



Career AND Children (my experience)

- A balancing act but possible
- Both husband and wife must agree that it is worth it
- Sharing the load of children and household is never equal
- A husband who believes his wife's career is important is more critical than one who can take on a 50% share at home --I was (and still am) fortunate to have one.

In my office at SLAC

- Every career has
Setbacks and challenges

As well as successes

What matters is how you
deal with them both

Neither define you!



Don't let the stereotype define you!

- Make your own decisions about what you want
- Follow your interests, hone your abilities
- Build a community that supports you, **nurture others**
- Choose work that enriches your life

Surviving despite prejudices

- Don't let others decide who you can or should be
- Don't let challenges make you bitter (find the humor)
- Find friends, study partners, and mentors who believe in your goals -- **male as well as female**
- Show the doubters they are wrong, by succeeding!