

## **Hints to have a good career, and a few unsolved problems**

By Ferrin Harrison in September, 2009

to statistics students of the University of Missouri-Columbia

any opinions expressed are of the author and not necessarily their employer  
or as a fellow employee put it, “if you believe everything I say, you’re a fool!”

Remember that the method you have chosen to have a good career includes obtaining a graduate degree. This shapes the rest. At the doctoral level, you should bring new knowledge to the society. At the masters level, you should preserve all of what is known in your discipline without loss.

What is a scientist?

- a sentinel, a speculator – a bringer of new truth to the society
- if you lie, goodbye
  - the society will have enough trouble with the things you say which are true and the society has great confidence they are false
- if you are too timid to look a committee in the eye and tell them you think you merit a degree, how will you handle the similar test of persuading the society of something it is sure is untrue?

What do we bring to the society more abundantly than most other disciplines?

### **Analytic thinking!**

- try to keep the focus for analytic thinking, beware of
  - cell phones, blackberries – any constant interruption structure
  - multitasking
  - industrial engineering estimate you lose 45 minutes productivity per interruption
    - so at 11 interruptions per day, all productivity is “lost”
    - is not necessarily zero, but you cannot work at the same level of depth
    - you have simpler, shorter thoughts – subtract one degree?
  - symptom: unable to receive and understand more than a sound bite
  - beware of Twitter, Facebook, email, PowerPoint
  - the connections you don’t make between concepts are important – making those connections an integral part of what makes you different from a layman
    - if those connections are the only way to make progress, your productivity could truly be zero in a multitasked or interrupted mode
  - why am I using PowerPoint and bullets now? sorry, can you show me how to do better?

1. In a large organization, be prepared to handle the rules and paperwork people generate

- it is generally not generated for your benefit
- usually it is generated to cover someone, possibly exactly one, against responsibility
  - the author of the form usually hates filling out forms as much as you do!
- the higher you are in the organization, the more
- I operate at the one, 20, 150, 2200 and 12000 employee levels
- estimate I have the equivalent of an associate degree in paperwork and connections

## 2. In a large organization, be prepared for more office politics

- the larger, the more layers of people between you and principles of nature
- by necessity or craft, some will seek their profit through politics instead of manipulating nature to the society's profit – the core job of science
- as statisticians, we are generally weak in presentation-sales-politics
- I play defense to compensate, expecting the other guy to generally win more in a fight than I do

### Office politics example

- I thanked a guy for showing up at work until we had a falling out
- he wrote an email every few months showing my bosses 1-2 layers higher that I cannot or will not do my job
- I countered defensively, showing I was doing my job as assigned and as well as resources allowed
- never implied he wasn't doing his job – we need him!
- after about nine months, he concluded this was ineffective and declared peace
- sparrow against box turtle contest – bird is all over the place trying to harm the turtle, but can't penetrate the shell – may as well call the whole thing off
- “you are too tough for me”

### What pays your salary?

- another UMC student worked for the airline industry, and made his salary for decades by correctly predicting the computational demands on the Sabre reservation system would level out. he wrote a program to switch between Poisson and normal, but it was the recommendation to not buy the next computer which paid his salary, not clever programming or math
- in WW2, Barlow and Proschan were analytic enough to refocus aircraft reliability from hardening where the bullet holes are, to hardening where the bullet holes are not
- in my case, I expect influencing the 12,000 employee agency to buy good computers and software for 150-300 statisticians and other disciplines to have more impact than the finest research I could possibly do as a force of one. Better

tools than “why can’t you do your analysis in WordPerfect? circa 1990s or “why can’t you do your analysis in SAS on a laptop?” circa 2000s.

- in short, my estimate is that cunning math covers some 25% of your success
- be ready with the analytic thinking and flexibility to cover the other 75%

My prevision is that the world economy will shrink and simplify for decades to come. This will be hard on us graduate educated folk. Jobs for which we are not overqualified will tend to shrink and disappear.

- too many industries in which management and labor have agreed to loot the company over years by setting salaries above the value of their work
- too many industries being converted from knitting to law, either suing or getting sued as the core business
- you are not a lawyer – if your job is becoming peripheral to the core business because the new core business is law, I recommend you look for new employment years or months before pink slip delivery
- do not expect to make a profit on your degree. be thankful if you have the privilege of telling your boss when he is wrong.
  - tell your boss gently and respectfully he is wrong
  - your first thoughts after your boss says something dead wrong should be
    - is it my mistake I briefed him badly
    - have I made it clear to him we need more time to complete the briefing
    - is the error small enough that the cost of better briefing exceeds the value
- sad result – the industry which was built up to high value (you can use summed stock prices as a good surrogate) is getting reduced in value
- stock price 0 ~ bankruptcy, no job for you at the former firm
- maybe more jobs for you at the smaller firms rising to take its niche
  - but no illusion of security

What should you do to live in a world of small business

- be willing to become a generalist – e.g. the computer specialist and interviewer as well as statistician
- be resourceful
  - one fellow student was dismissed in disgrace for spending most of their three month military contract analyzing the wrong Oracle database
  - another was dismissed in disgrace because the hard disk failed and there was no time allowed for backup, no backup existed
  - be resourceful any way you can. if it means an hour of free work per week, isn’t that better than an employer on your resume with nothing good to say?
  - your skills are worth more than your “job”

- continue learning to keep it that way
- if your answer is no, that hour is better spent with my family or better, try to take the consequences with a smile on your face
- in a low economy, employment shifts from the commercial sector to family
- the original meaning of credit is credibility
- having the competence and integrity to have credibility with your family and others instead of a job and title is not a bad thing
- if it comes down to choosing between sweeping the floor and growing a garden, why should you care?

#### More on living in a world of small business

- learn UCC, Uniform Commercial Code, first year law school course in contracts and leases
- can do from a book, Nutshell or For Dummies series
  - you should be honorable. Most people will not be, so learn enough law to practice legal self-defense
  - don't be a suit for negligence vulture, this class contributes to the non-existence of employers
  - when you grieve, you win your grievance and lose your career
- an honorable friend made their million in the import-export business in less than two decades
  - no need for written contract reviewed by lawyer, their word is their bond – changes the entire business model
  - if you find one you can sell your labor through, hang on! they are golden
  - if you don't find one, do something more constructive than whine, moan and groan
- making low opinion of your “employer” is an extracurricular activity
  - your “employer” is a market or market maker through which to sell your valuable labor, a middleman
  - your “employer” is not an avatar, god or end point
  - in this sense, we are all self employed, whether as the head of our business or swimming in a sea of over a million employees
- there is a market for the sale of labor
  - like all markets, the value of your labor can change upward or downward
  - don't be ashamed to trade at the market price
  - the market for fine goods and fine labor can expand or shrink
  - don't be ashamed to trade at the market quality, plus a little more

- don't try to beat any market unless you have the skills to justify beating the market
- a typical contracting format at the graduate level would be 3-6 month contracts with renewal
  - if you continue to appear useful to the particular business
  - with its current business model
  - their business model can change
  - their business model might not be optimal
    - not your job to worry about it unasked and unpaid
  - in the 1800s, "job" meant job for a day, hauling goods in a wagon for example
  - the complexity of evaluating the quality of our work takes job duration up from a day toward 3 months

#### Unsolved Problems

- For many years, a university deliberately assigned problems to students for which the solution was not known
- First student to solve the problem "frost the inside of a light bulb" became a millionaire
- In a static economy, solutions are at the back of the book
- After a great fall, the economy will be dynamic – when enough people are so tired of low economy they are willing to change

#### Unsolved: Biased p-values in random (mixed) effects models

- first random effect brings in the bias, p-value is too small for the data
- presence of fixed effects does not remove bias
- pure fixed effects linear models have unbiased p-values
- bias shrinks as sample size increases
- response non-linear in parameters increases this bias
- proposed simulation specialized to the case at hand – I think it works but I don't see people using my solution
- is there a solution in GDF (Generalized Degrees of Freedom)?
  - moments above 2 used to be studied – largely dropped because estimators unstable
  - will the partial derivatives to estimate GDF empirically be so unstable it isn't overly useful?
- is there a solution in better obtaining the true likelihood?
  - alternatives to local Newton for nonlinear parameters
  - alternatives to numerically integrating out random effects
- is there a better solution to unbiased the p-values in random effects models?

Unsolved: violation of normal theory assumptions

- fails for economics
  - counterexamples: 1720, 1929, 2008, many others
- fails for weather and geology
  - counterexamples: Missouri flood, Tsunami, Katrina
- proposed solutions – to be developed in extreme value theory, power law, fractal models
- kernel reflects relative sizes being bigger in weather-geology than in economics
- fractal regression models limited by inability to fit

Unsolved: violation of Homogeneous Poisson Process assumptions

- not a great description of human survival

Unsolved: missing for cause (not MAR, MCAR etc.)

- patient leaves clinical trial because they feel bad rather than good
- drug that makes you feel so sick that no sick people can stand it is not a good thing

One of our core jobs in reviewing what the sponsors submit to show their medical product is safe and effective is to look at the appropriateness of the statistical methodology.

Questions you should ask the teachers about each statistical methodology

- what are the regularity conditions – sufficient, necessary, good form
- what are the operating characteristics – how does it perform, when better

Another component of my prevision is that in a low and shrinking world economy, moral standards will fall – correlated time series

If you lower your moral standards to match or beat your neighbors, you are part of the problem

If your only moral basis is “I get into trouble when my moral behavior is worse than my neighbors”, then what is your basis for not lowering?

Part of what I’m asking of you is to be part of the solution, not the problem.

The only stronger moral basis I know is religion with at least partial western flavor.

The eastern ethic of social harmony might imply you should lower your moral standards to stay in harmony with your neighbor – I do not recommend this. Taking it back to the west, if what the Romans do is wrong, do **not** do what the Romans do when in Rome.

But Ferrin, this is not what I wanted to hear!

- life does not always give us what we want
- sometimes we volunteer for uncomfortable circumstances

- sometimes we get drafted
- to a person who has never experienced a temperate climate winter, snow and all, it is a shock
- but winter ends and another cycle begins
- in the case of economic-social-moral-regulatory cycles, the time frames are not fixed to years
- a typical day contains a stock bear market and a stock bull market by five minute prices
- larger cycles can contain centuries of growth or depression for a single movement
- but even the largest cycles begin and end, at least within the limitations of our empiricism

If you can reserve the last 5-10% of your efforts to do something more than look after yourself, you are typical. Doing more can be heroic, doing less can be villainous. How do you expect your children and grandchildren and others of their generation to regard you when the fuss and bother is all done? Will you deserve more respect than you receive?

What I ask of you is to live your life with enough integrity, persistence and competence to deserve more respect in your old age than whatever would result haphazardly. No matter what condition the world economy is in when you are in your death bed, I hope your grandchildren look at you and say it would be worse without you.

Questions?