How to have a **good** career in computer science

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First…

- Who am I? (why should anyone believe me?)
- This is *advice*, not a rulebook (ask around)
- This mostly isn't about doing good research (you need to do that too)
- Please interrupt and ask questions

Today's problem statement

- Input: N years of your effort
- Goal: you get a job
  - Mainly focused on academic or industrial research, but applies for all jobs

- Problem: what should you do during those N years to maximize your job options?

What do **you** think is important?

- Research quality?
- Who your advisor is?
- Problem selection?
- Being able to hack?
- What school you come from?
- Story-telling?
- Being able to prove theorems?
- Publications?
- Who you know?
- Speaking and writing skill?
- Thesis?

Getting a job: top down

- How do you get a job?
  - You interview (1-2 days)
  - Give a great talk on fascinating new research
  - Impress *everyone* in one-on-ones
  - Various political issues outside your control
- How do you get an interview? (in order)
  1. The people there **already like you**
  2. You have **great letters from leaders** in field
  3. You have **publications in great places**
  4. Other…(a very hard place to be)

Today

- Networking
- Communications
- Research issues
- Misc tips

Networking
(not packets, but people)

- *It's not who you know, it's who knows you*

- **Myth:** your work speaks for itself (and you)
  - Little Reality #1: most people haven't read your publications (feel lucky if they skimmed it)
  - Little Reality #2: many people attending your talk were gossiping in the hall or didn't listen
- **Reality**: it is **your** responsibility to be "known" to your community, not their responsibility to know you
  - But your advisor, friends and colleagues can help

Networking at conferences/workshops

- **Show up**
  - Go to the top conference in your field each year (even if you have to pay some/all of your own way!)
- **Become visible**
  - Spend time with people from **outside UCSD**
  - Grad students from other schools. Why?
  - Faculty/researchers from elsewhere
  - Your advisor, friends can help (how?)
- **Learn to have a conversation**
  - There are interesting topics outside your research
  - **Do not be arrogant**, but don't be a pushover either
- **Follow-up**

Networking via research internships

- Do them if you can (why?)
  - Learn about other research, ways of doing things
  - Get strong external letter
  - Be introduced to wider group of people in your community
  - Ok to even do 2-3 (best not in last couple years)
- Plan to write a paper on what you did (even if you have to do all the work)
- If you have choices pick based on mentor and not based on project
  - Keep in touch with your mentors (and fellow interns)
- BTW, you'll make a pile of $$$ vs TA/GSR

Networking at home

- **Other faculty**
  - You will need 3-5 letters, yet you don't have 3-5 advisors… hmmm?
  - Go to seminars in your area regularly; introduce yourself to other faculty; if your advisor is amenable do a project with another faculty member
- **Other students**
  - Leave your lab
  - The senior grad student down the hall may be on the hiring committee at some school in two years
  - You have to know more than just your field
- **Visitors**
  - Go to distinguished lectures in any area (why?)
  - If there is a chance to meet visitors in your area, do it

Communications issues

- **Myth**: great research shines through
- **Reality**: great communications skills are as important (if not more so) than research

- Key issues
  - **Story-telling**
  - **Writing**
  - **Presentation**

Storytelling

- All papers and talks are first and foremost exercises in storytelling
  - How should you think about my problem?
  - Why should I care about the problem?
  - Why should I care about your solution?
  - Must grab attention without being arrogant
- This isn't just sophistry: the *story* is a HUGE part of the academic contribution
  - Example: RAID
- Terribly under-rated in importance…

Beginning story-telling tips

- Figure out what *kind* of paper you're writing
- Find good examples of that *kind* of paper
  - Ask around if you're not sure
- Try to understand (or copy) the approach taken by those exemplars

Newell's kinds of theses (applies equally well to papers)

- **Opens up new area**
- **Provides unifying framework**
- **Resolves long-standing question**
- **Thoroughly explores an area**
- **Contradicts existing knowledge**
- **Experimentally validates theory**
- **Produces an ambitious system**
- **Provides empirical data**
- **Derives superior algorithms**
- **Develops new methodology**
- **Develops a new tool**
- **Produces a negative result**

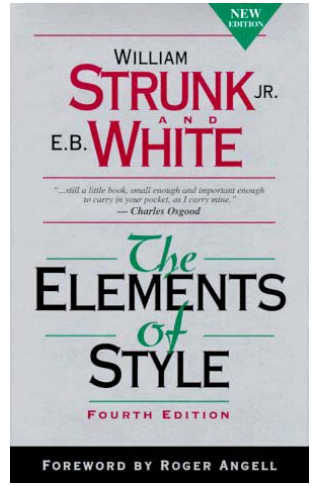
Other paper philosophies

- Butler Lampson: three "kinds" of papers to strive for
  - First paper
  - Best paper
  - Last paper
- Andy Tannenbaum's rule
  - One key idea per paper; more can be confusing and less is worthless

Intros: writing and presentation

- The Intro is perhaps the most important parts of any paper/presentation
  - Sets context
  - Explains how to look at the problem
  - Presents most impressive result
  - Keeps interest of reader in the first minute/page
- What needs to be in there
  - Why does anyone care about this problem?
  - What is done currently?
  - What is your key insight into improving it?
  - How much better are you making it?

Writing



- Writing is absolutely critical
  (by far, easiest way to get your paper rejected)
- Read Strunk and White
- Read examples of well-written papers in your field
- Think about writing in three pieces:
  - Introduction (sells the story)
  - Organization (what is beginning, middle, end)
    - What does each section need to demonstrate ?
    - How is it linked to its neighboring sections?
  - Paragraph structure within each section
    - Transition, context, meat, resolution, segue
- You must practice
  - Multiple drafts; write routinely and throw it away
  - Try not to get in the habit of letting your advisor write your papers
  - Get help from other students or from other campus resources

Common writing mistakes

- Writing like you speak
- Bad segues (why did the last paragraph end)
- Flat introduction (most important part of paper)
- Don't define terms (what's a quatloo again?)
- Don't mention limitations or hide weaknesses (kick me)
- Aren't clear what's *been* done vs what *could* be done
- Related work (not researched, or dumps on everyone)
- No spell check or grammar check
- One draft and ship it
- Run-on sentences
- **Passive voice**
  - Experiments have been conducted to test the hypothesis (passive)
  - We conducted experiments to test the hypothesis (active)

Presentation

- Critical – easiest way to not get a job after getting an interview
- Need to condense story into 20-30min (paper talk) or 50min (job talk) slot
- Need to hold interest and not lose people, yet clearly do something important and hard
- But can’t possibly cover all details
- Need to speak clearly, concisely and confidently
- Then people will try to tear you down (Q&A)

Presentation Tips (mostly from David Patterson)

- Use illustrations – minimize text (this is a bad talk BTW)
- Be concise in using text (no sentences)
- Use large type (24 point min)
- Use color to separate features
- Skip slides if you need to (figure out which ones you can skip in advance)
- Do not over-animate (only use animation of it helps understanding)
- Allocate 2 minutes per slide and leave time for Q&A
- Humor – but only if you're funny (its not up to you)
- Go to other people's practice talks
- You **MUST** practice in front of real people – multiple times!
- Video – if you're hardcore

Q&A issues

- Do practice Q&A – really… do this.
- Prepare backup slides around obvious questions
- Make sure you understand the question before you answer
- If you don't know the answer, **don't** make one up – **ever**.
- Prepare how to handle tough questions:
  - Questioning the premise
  - We did it at IBM in the 1950s
  - I believe there is a flaw in lemma 6
  - How is this different from xxx?
- Learn how to defer
- If you're *very* funny, learn how to use humor to diffuse

Quick aside: personality

- Personality issues count
  - Likeable/admirable people get better support
  - From employers, advisors, colleagues, etc
- We all have personality defects
  - Arrogant, undermotivated, underappreciative, martyr complex, gossip, loner, mean-spirited, unempathic, immature, poor sense of humor, sycophant, manipulative, etc
  - Learn to know yours and try to improve…
  - More than anything else learn to be **modest, gracious and hard-working**
    - Screwing up on these can be career-limiting

Research issues

- Topic selection
  - Pick a topic that **someone** cares about
  - Improvement on known problem vs new problem (how to demonstrate innovation)
  - Short term vs long term (tradeoff)
  - Track technology trends and changes
  - **What is your secret weapon or unfair advantage?**
- Problem definition
  - Avoid LPUs
  - But don't need to solve everything in one paper (art)
- Publications
  - Venue more important than quantity
  - Collaboration is good, not bad

Quick aside: collaboration

- Myth: I shouldn't work with other students because then I have share the credit
  - This is a **HUGE** mistake
- Reality:
  - Huge multiplier in publication (breadth, quantity and quality)
  - Provides more opportunities to learn
  - More opportunities to impress faculty (remember those 3-5 letters)
  - Moreover, in industry and labs, working in a group is the norm – people look for this

Research issues #2

- How long on a problem?
  - Your approach will have flaws (don't give up)
  - Don't follow a rat-hole forever (no results for a year is a big warning sign)
- Methodology
  - Be rigorous in your evaluation
  - Strive to do realistic evaluations (counter-example: economic computer virus analysis)
    - This may mean implementing something!
    - Or at least get real data!
  - Experimental fields: especially true
  - Most compare to best known work

Meta issue: Understanding your community

- You need to understand your community, both for selling your research and for networking
- What is a community?
- Who are the leaders in your community
  - Whose papers get published?
  - Who is on the PC?
  - Who is being cited?
- What are the hot/contentious topics?
  - Read the last two proceedings of the top conferences
  - Ask around which were the best papers
  - Ask why? Do you agree?
  - Join community mailing lists and organizations

Graduate Career Pitfalls

- I need the most famous advisor
- I rule (arrogance)
- I suck (self-deprecation)
- Wait for advisor to tell you what to do (XXX)
  - Be assertive about what you need
- Follow advisor's advice blindly
  - Need to be able to argue with advisor
- I need to do great work from day #1
- I need to work solo/carve out my niche on day one
  - Group projects help your career
  - Counterpoint: be careful with very large group projects (2yrs+)
- Not honest with self about career prospects

Other resources

- http://www.cs.berkeley.edu/~pattrsn/talks/BadCareer3.ppt

- `www.cs.berkeley.edu/~pattrsn/talks/writingtips.html`

Questions?