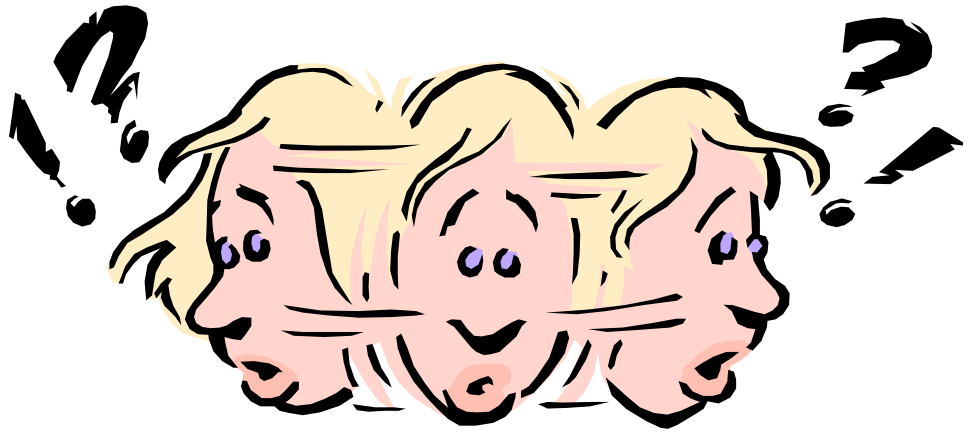


How do I Start Building a Research Career? (for PhD Students)

Indranil Gupta

Asst. Prof.

Dept of CS, UIUC

**Disclaimer: All characters and incidents are purely non-fictional and bear good resemblance to persons living and places and times.*

Tips on How to Start a Research Career

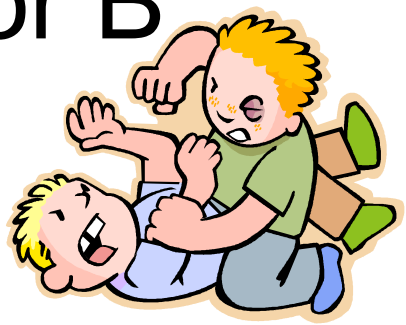
- Go to Jail
- Disagree and Fight with your advisor
- Feel inferiority complex from a senior PhD who produces 10 papers per year
  - Me (as a grad student)

Robert Morris

- Cornell CS PhD Student in late 1980's
- Wrote first Internet worm (exploited overflow in sendmail daemon)
  - Inadvertently released worm on young Internet, and brought it down
- Was arrested, tried and sent to jail. Ousted from Cornell
- Did community service
- After leaving jail, went to Harvard to complete PhD. Finished PhD sometime in mid to late 90s
- Now an associate professor of Computer Science at MIT
- Designer of many cutting-edge systems like Ivy, Chord, application-level DNS etc. Well-known (and feared) researcher in p2p systems
- Nice person!

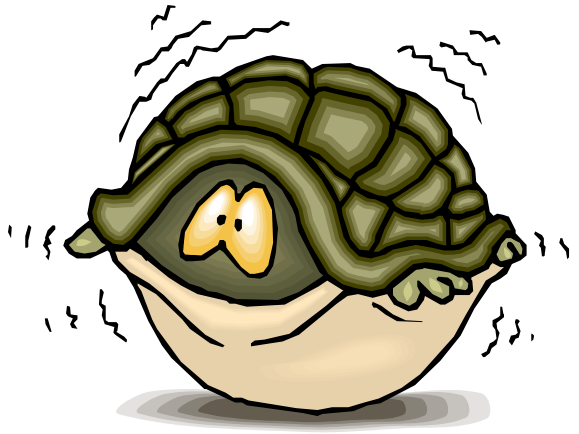
Grad Student A and Advisor B

(story as told in class)



Feel inferiority complex from a senior PhD who produces 10 papers per year

- It's important (to feel inferior)!
- It's important that you say, "Wow!"
- But it's also important that you say, "Dang! I can do that too!"
- And then do it!
- Maybe an imaginary senior PhD student ;)



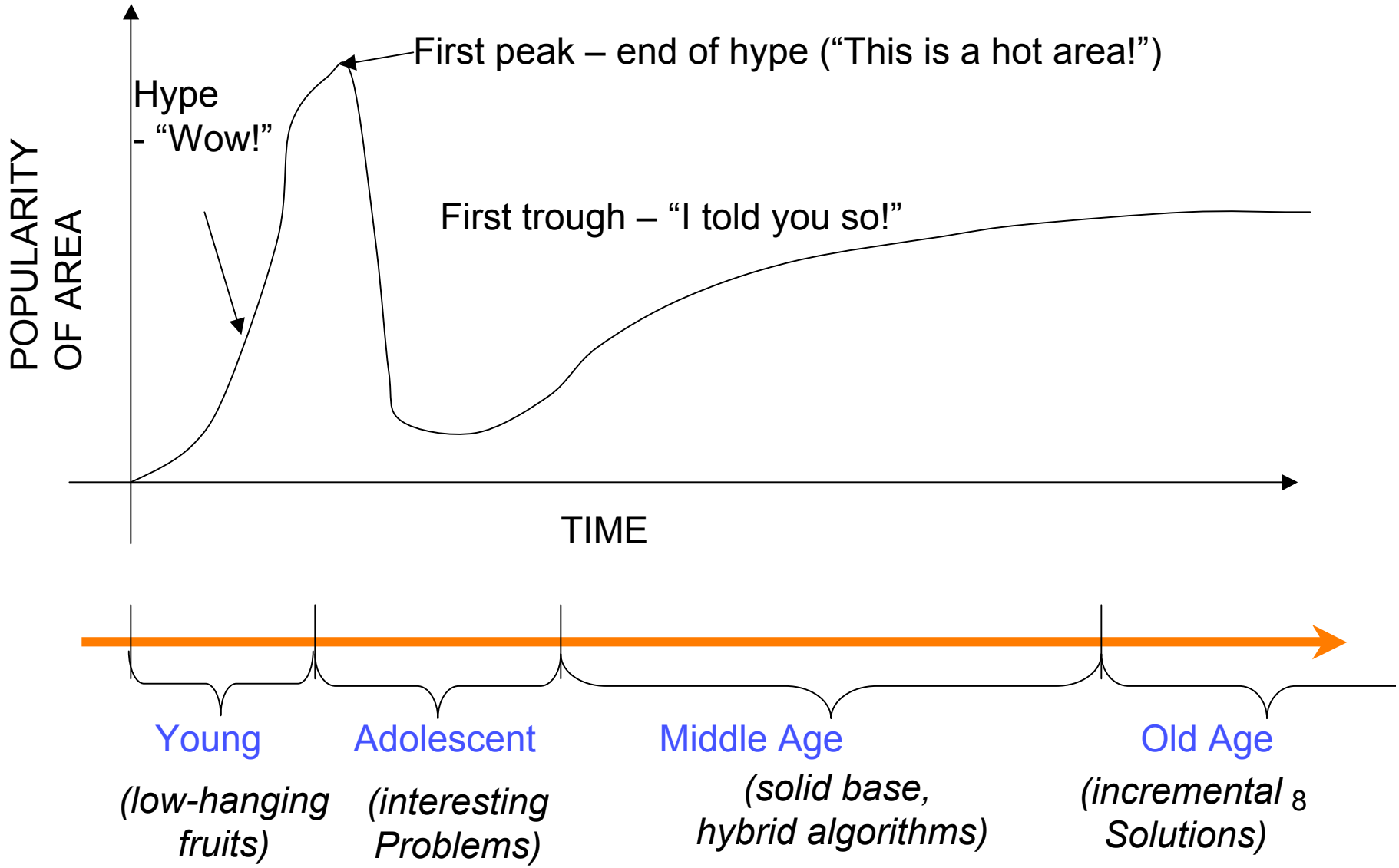
Tips on How Not to Start a Research Career

- Write your own Research Paper in isolation
- Work only with your advisor and no one else
- Talk to only grad students in your year; don't talk to any senior PhD students
- Talk to only grad students in your area; don't talk to PhD students in other areas
- Try to publish papers in the top conferences without any help
- Be ambitious without support and help
- Don't collaborate

What are the Rules of Thumb?

- First, find **one thing** that you **like** to work on
- Then diversify
- Over time, find your niche(s)
- Don’t stagnate
  - A rolling stone gathers no moss (but does gather papers and reputation)

Life of Ra (a Research Area)

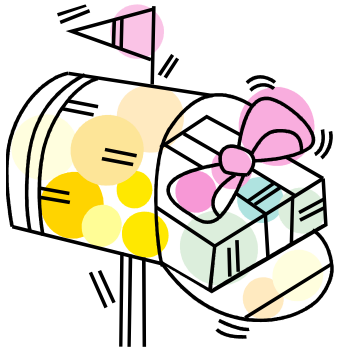


How do I identify what stage a research area is in?

1. If there have been no publications in research area more than 1-2 years old, it is in the “Young Phase”
2. Pick a paper in the last 1 year published in the research area. Read it. If you think that you could have come up with the core idea in that paper (given all the background etc.), then the research area is in its “Young” phase.
3. Find the latest published paper that you think you could have come up with the idea for. If this paper has been cited by one round of papers (but these citing papers themselves have not been cited), then the research area is in the “Adolescent” phase.
4. Do Step 3 above, and if you find that the citing papers themselves have been cited, and so on, then the research area is at least in the “Middle Age” phase.
5. Pick a paper in the last 1-2 years. If you find that there are only incremental developments in these latest published papers, and the ideas may be innovative but are not yielding large enough performance benefits, then the area is mature.
6. If no one works in the research area, or everyone you talk to thinks negatively about the area (except perhaps the inventors of the area), then the area is dead.

Which Conferences do I Submit to?

- Good ones top ones, but reasonable ones
  - Don't submit just for kicks. Spoils your reputation
  - Don't submit to a lower conference if you feel the paper can do well at a better conference
  - Ask your advisor
  - Go to conferences, make friends and contacts, and ask your friends about "reputation" of a conference
- And: submit to journals! Takes a long time, but is very important!



How do I diversify?

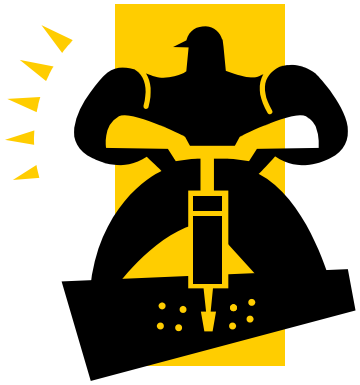
- No rules.
- Work with other faculty members.
- Perhaps outside your area, but not too outside.
  - I did some work on ad-hoc networks during my PhD (not directly related to my research). That experience is helping me do some work on sensor networks now.
- Take courses! Both inside your department (outside your area) and outside your department
  - I took courses in Applied Mechanics at Cornell. Two CS publications arose out of things learnt in that course.
- CS is multi-disciplinary, and evolving. Don't fight it, but go with the flow!

How do I measure my impact?

- Periodically, do a little ego-searching, er, Google searching…
  - Search for your own name on Google
  - On Google Scholar
  - On citeseer
  - On DBLP
  - Look for citations of your work
  - Re-evaluate and re-calibrate

- Try to have impact! (papers, citations of, industry)

What Else?



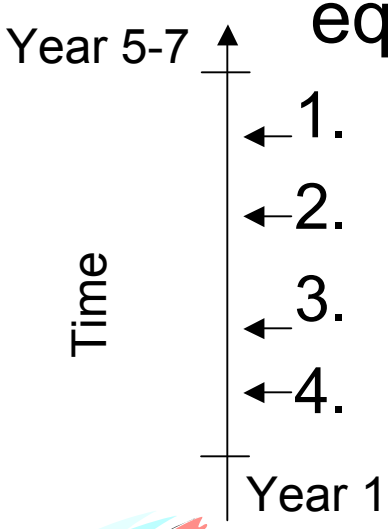
- Go work in an industrial research lab!
  - Internship!
  - I worked in IBM Research and Microsoft Research
  - Gave me good letter writers, and good future collaborators (I still work with them!)
  - Helped me make friends from among other PhD students (who now work in big companies!)
  - Gave me topics for my PhD research.
  - They interviewed me for a job, and gave me an offer
- But be careful: companies may restrict publishability of your work with them under IP (Intellectual Property)
  - Ask ahead of time. Talk to your advisor about it.

Uh, ok, but what does a PhD imply?

- Your PhD degree does not say which "stream" you got your PhD in. It just says, "XYZ is granted a PhD by UIUC" (sometimes it says this in Latin)
  - Basically, a PhD degree means you are equipped to do all the following
    1. Pick an arbitrary area (not necessarily in CS)
    2. Understand it yourself
    3. Identify problems in it
    4. Solve these problems in an innovative manner

Think: “Where am I on this spectrum?”

- Basically, a PhD degree means you are equipped to do all the following



1. Pick an arbitrary area (not necessarily in CS)
2. Understand it yourself
3. Identify problems in it
4. Solve these problems in an innovative manner

Think: How do I push myself to the next level on this spectrum?

And remember:

- A PhD is only a starting step in a long research career.
  1. Well-begun is half-done.
  2. You may end up having only 3 kids, but you will do only 1 PhD, so do it well

And remember: there are caveats to all rules

- One of my friends finished his PhD, and said "Goodbye, I'm working in industry". He's much more richer than me today.
  1. One of our alumnii (Koushik Sen) started late (had hardly any pubs until 3rd year), but is now an EECS faculty at Berkeley!
  2. Well, you could also do a second PhD in, say, sociology… ☺