

**GRADUATE STUDIES IN CS:
RESPONSIBILITIES,
EXPECTATIONS, AND PROSPECTS**

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- My focus is mainly on the PhD program.
- I prepared all these slides and they reflect my views only.

THE MAIN QUESTIONS

- Why am I (the student) here?
- What is my advisor's role?
- Where do I go from here?

WHY AM I HERE?

- You are in the PhD program to become
 - an expert in a specific, narrow field of study, and
 - a well-rounded researcher.

- An expert in a specific, narrow field of study

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

- No one, not even your advisor, should know more about your thesis topic than you!
- How do you achieve this?

**AN EXPERT IN A SPECIFIC,
NARROW FIELD OF STUDY**

● **READ!**

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

- You read so that you learn (for your field of study)
 - the lay of the land
 - new ideas for solving problems
 - the relevant research groups
 - the relevant publication venues

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

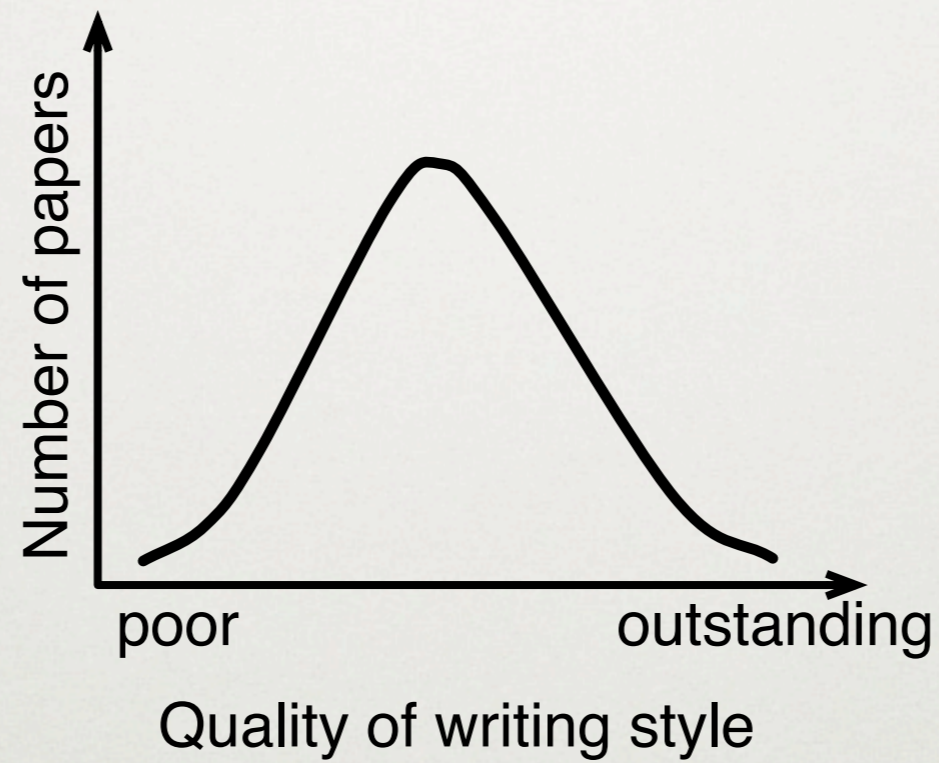
- When you read, you must pay attention to **content** AND **style**.

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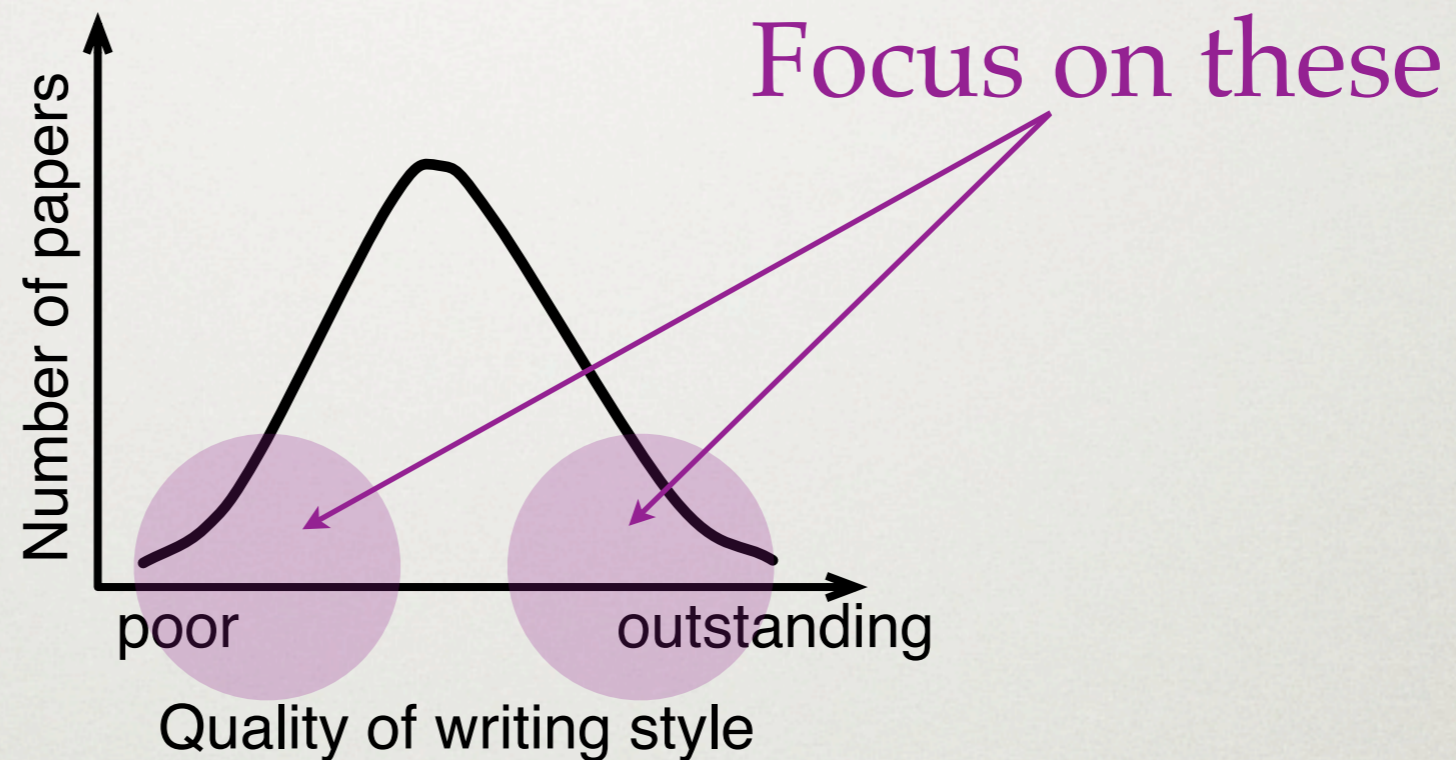
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Extremely important, and
students often neglect it!

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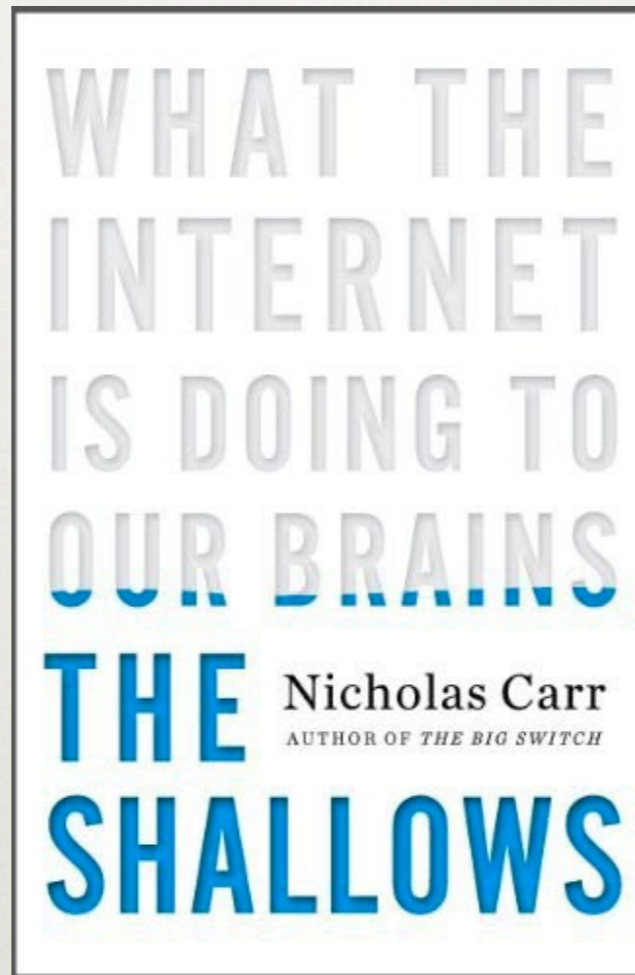


What made the style poor? Avoid it!

What made the style outstanding? Learn it!

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

Please, read deeply!



“In the quiet spaces opened up by the prolonged, undistracted reading of a book, people made their own associations, drew their own inferences and analogies, fostered their own ideas. They thought deeply as they read deeply.”

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

- Do the work!

AN EXPERT IN A SPECIFIC, NARROW FIELD OF STUDY

- Do original research.
- Go for quality, rather than quantity (of papers).
- Do as thorough a job as possible in every paper (don't go for MPUs).
- Read way much more than you write!

- *A well-rounded researcher*

A WELL-ROUNDED RESEARCHER

- Beyond becoming an expert in your field of study, you're expected to become a well-rounded researcher.
- What does it mean to become a well-rounded researcher?

A WELL-ROUNDED RESEARCHER

- Doing good technical research!
 - Is the question you pursue interesting?
 - Did you do literature search to find “all” the relevant work?
 - Did you compare (in a fair way) your solution to existing solutions?
 - Are your conclusions justified?
 - ...

A WELL-ROUNDED RESEARCHER

- Learning a good research style!
 - Do you know how to read critically?
 - Do you know how to review papers? (not only how to evaluate the work, but to never ever “take” ideas from papers you review)
 - Do you know how to cite the literature properly? (students often hate this part, or do a poor job at it)
 - Do you know how to recognize plagiarism when you see it? How to void it at all costs?

A WELL-ROUNDED RESEARCHER

- Becoming an effective communicator!
 - Can you tell a layperson what you do in 5 minutes?
 - Can you effectively communicate your work in writing (manuscripts, theses,...) and technical presentations (5-, 20-, and 45-minute talks)?
 - Can you sell your work to funding agencies, to venture capitalists,...?
 - Can you give a class lecture on the general field you work in?

A WELL-ROUNDED RESEARCHER

- Becoming an effective communicator!
 - If you speak monotonously and don't project excitement about your own work, why would you expect the audience to be excited about your work?
 - If all you want to do is sit in your office (even if doing great work) and not talk to anyone, what job do you exactly think you want to have after graduation?
 - After graduation, your job will definitely require you to make presentations, lead meetings, etc.

A WELL-ROUNDED RESEARCHER

- Becoming an effective communicator!
 - John shouldn't need to bug you to give a talk in COMP600; volunteer for it!
 - Attend department seminars and colloquia (and listen, not check your Facebook account and Google your name), as well as faculty candidate talks.
 - Just like with reading: Take note of the different styles of the speakers (the good and the bad, so that you adopt the former and avoid the latter).

A WELL-ROUNDED RESEARCHER

- Becoming a good collaborator!
 - Collaboration is hard, but is necessary, especially in today's interdisciplinary nature of CS.
 - Collaboration requires (1) learning the language of others, (2) professionalism in dealing with others, (3) demonstrating flexibility, (4) taking responsibility, (5) showing leadership, (6) having compatible styles, ...
- Chemistry is of utmost importance!
- Remember: At various stages in your career, you'll need more than one letter of recommendation; it is important to know the world beyond your advisor!

A WELL-ROUNDED RESEARCHER

- Becoming a good collaborator!
- Collaboration allows you to increase your productivity while maintaining quality (main contributor on some, and secondary contributor on others).
- This works especially well within your research group.

A WELL-ROUNDED RESEARCHER

- Becoming a good collaborator!
 - Our schedules are flexible, and this is where the danger lies!
 - Working from home, Starbucks, etc., reduces your interactions with your advisor and group members.
 - Working from home can also mean watching The Big Bang Theory, The World Cup (if you're an international student), and taking 5-hour "naps"; that is, it's not work!
 - Working from home requires exceptional discipline (I, for example, don't have that kind of discipline and prefer to work on campus).

THE AGE OF METRICS

- We live in the age of the
 - Impact factor
 - Number of papers
 - Number of citations
 - h-index
 - ??? (coming soon to some evaluation committee near you!)

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Don't be guided by them; be aware of them!

IN YOUR PHD STUDIES

- Choose a topic that excites you.
- Do research and learn the research process (read, think, collaborate, solve, and communicate).
- Take courses (this is almost your last chance to do so)
 - Take the courses that interest you; not the “easy A” ones!
- Teach!
- Collaborate:
 - Think of your research group, your department, your university, and the larger scientific community
 - It is highly desirable that you publish work that’s not even part of your thesis.

WHAT IS MY ADVISOR'S ROLE?

(OR, MORE ACCURATELY:

WHERE IS MY ADVISOR? I

HAVEN'T SEEN HIM/HER FOR

THREE YEARS!)

- Finding the right advisor is the most important step towards a successful and enjoyable (ok, less painful) PhD experience.
- There is no “universal right advisor”; the right advisor for you might be the worst possible choice for another student!

- Who is the “right” advisor for you?
 - Works in an area you’re excited about
 - His /her style matches what you’re looking for in an advisor
 - Has a good record of advising students

- The following would be nice to have in the advisor, but should NOT be among your guiding principles
- The advisor is very famous (e.g., “has a Turing award”)
- The advisor is well-funded
- The advisor’s work is “suitable” for the industry (or, for the academia,..)

- Keep in mind: advisors have very busy schedules!
- Why? What could they possibly be doing other than meeting with you?

- No, you're not the only student in the group!
- Teaching
- Serving on committees (department, university, and beyond)
- Writing grant proposals (to keep you well fed)
- Reviewing papers and grant proposals
- Traveling to give talks
- Spending some time with family and friends
- ...

- Also, keep in mind that advisors, like all other human beings,
 - do get lazy sometimes
 - do have bad days
 - do have personal issues to deal with
- That is, just like you!

WHAT **IS** THE ROLE OF THE ADVISOR?

- To listen to you (about technical and non-technical issues), brainstorm with you, support you, and make himself/herself available
- To guide you through your PhD studies by teaching you how to do research and how to communicate it so that you become an effective researcher
- To guide you towards a thesis that can be successfully defended
- To connect you with collaborators

WHAT **IS NOT** THE ROLE OF THE ADVISOR?

- To write code for you
- To solve the problem for you
- To write the papers / thesis for you
- To present your accepted papers
- To prepare your fellowship / job application

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Advisors do help with some aspects of these issues, but you should not expect them to do them in their entirety!

- Advisors are not perfect.
- If you find something in your advisor's style that you don't like, remember it so that you avoid doing it when you're a faculty member!
- Examples (very hypothetical):
 - My advisor meets with me only once a month; I can't make progress like that.
 - My advisor wants to meet with me every two days and demands new results every time.
 - My advisor wants me to write their grant proposals, review the papers they were assigned by a conference, teach their course, mow their lawn, and walk their dog while they are on some exotic island "attending" a conference.

- More seriously:
 - While seemingly not part of your thesis research, assisting in grant proposal writing, in paper review, and in teaching a course are great opportunities that you should try to actively participate in, rather than avoid!

- A good advisor doesn't want a student who agrees with him / her no matter what!
- Discuss, argue, and disagree with your advisor.

- However, keep in mind that your advisor is an expert in his / her research area and definitely has more experience than you with advising.
- So, if you want to argue or disagree, back up your argument with a “proof”; don’t just be dismissive because you think what the advisor is asking you to do is too much work!

YOU AND YOUR ADVISOR

- Choose the right advisor.
- Learn from him / her.
- Disagree with him / her and go beyond what they ask for.
- The advisor / advisee is the most important element of PhD studies.
- Your advisor would be your advocate / friend forever (in some rare cases, your enemy forever).
- Your advisor takes pride in their research and is as interested in your research as you are.

WHERE DO I GO FROM HERE?

- You have a degree in CS, so cheer up.

- As I said, graduate school is supposed to prepare you to become a researcher, not just an expert in your field!
- As a well-trained researcher, your thesis topic should not restrict the career path or research that you pursue!

THREE MAIN VENUES

- Industry (non-research): the majority of students
- Research labs: some students
- Academia: those who can't program

CHOOSING THE INDUSTRY

- Want to work on products of immediate impact
- Don't want to pursue research any further
- Like the industry culture more
- Prefer something that's closer to 9 to 5 job
- Got an offer you couldn't resist
- ...

RESEARCH LABS

- You get to do research (high-quality research!)
- You don't teach
- You don't have to seek funding (some labs require group leaders to obtain external funding)
- You don't have to serve on university committees
- You don't have to interact with students (some labs have student interns)
- More structured and better defined work schedule
- ...

ACADEMIA

- You teach
- You interact with students
- You pursue your own research agenda
- You are your own boss and there's the tenure process
- Busier, yet more flexible schedule
- You have to obtain external funding
- You have to serve on committees
- (and, some faculty can and do program)
- ...

- Which one of these venues you choose to pursue should not affect the quality of research you do.
- In particular, you don't do "light research" if you want to go to the industry and "hardcore research" if you want to go to research labs or the academia.
- Similarly, the advisor doesn't advise differently based on the career path that the student wants to follow.

- It's "easiest" to get a job in the industry (of course, depends on the economy).
- It's "hardest" to get a job in the academia (high supply, low demand)
- I'd be happy to give a separate talk (if there's interest) on the academic job application / interview process and what it takes to be a faculty member at a research university.

- The standards (quality of publication venues, number of papers, etc.) are becoming higher almost every year for a faculty position in top-tier departments.
- How do you meet these high standards?
 - Remember: Collaborate and you'd increase your productivity (while maintaining good quality)
 - Think of a post-doc position.

- A post-doc position should not be viewed as a backup plan (“I’ll take one only if I don’t get a faculty position”).
- In biology and biomedicine, for example, no one thinks of applying for a faculty position without a post-doc experience!
- A post-doc is your opportunity to focus solely on research, formulate your own research agenda, become more independent, and increase your visibility.

MOVING UP, DOWN, AND AROUND

- Faculty members move to the industry
 - Some take up leadership positions
 - Some join the research arm and do research
- Your work has to be related to the company / lab

MOVING UP, DOWN, AND AROUND

- Researchers move from the industry to the academia
- You have to build a research portfolio equivalent to that of professors in the academia

MOVING UP, DOWN, AND AROUND

- It is relatively easy to move from some university to a lower-ranked one.
- It is much harder to move from some university to a higher-ranked one.
- Therefore, when you choose a university, don't think "well, I'll take the job for now, and will move in 4 years").

SUMMARY

- Choose the right advisor.
- Choose a topic that excites you.
- Do proper research (again, read!).
- Defend a thesis that you're proud of.
- Do what it takes to get the job you're most interested in.

THANK YOU!



QUESTIONS?