FINDING A RESEARCH TOPIC

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What do our stories tell you, hopefully?

The path to find a research topic will be a zigzag road

- Don't expect to find it in just one shot

Often your research topic changes along your career

- So no need to feel that you will be stuck with your Ph.D topic for the rest of your life

OK to span two fields

- Many breakthroughs are made this way

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Selecting a Topic

Moving from coursework to picking a topic is often a low point

- Even for the most successful students

Why?

- Going from what you know-coursework with answers, to something new-research that no one knows the answer and there can be many answers

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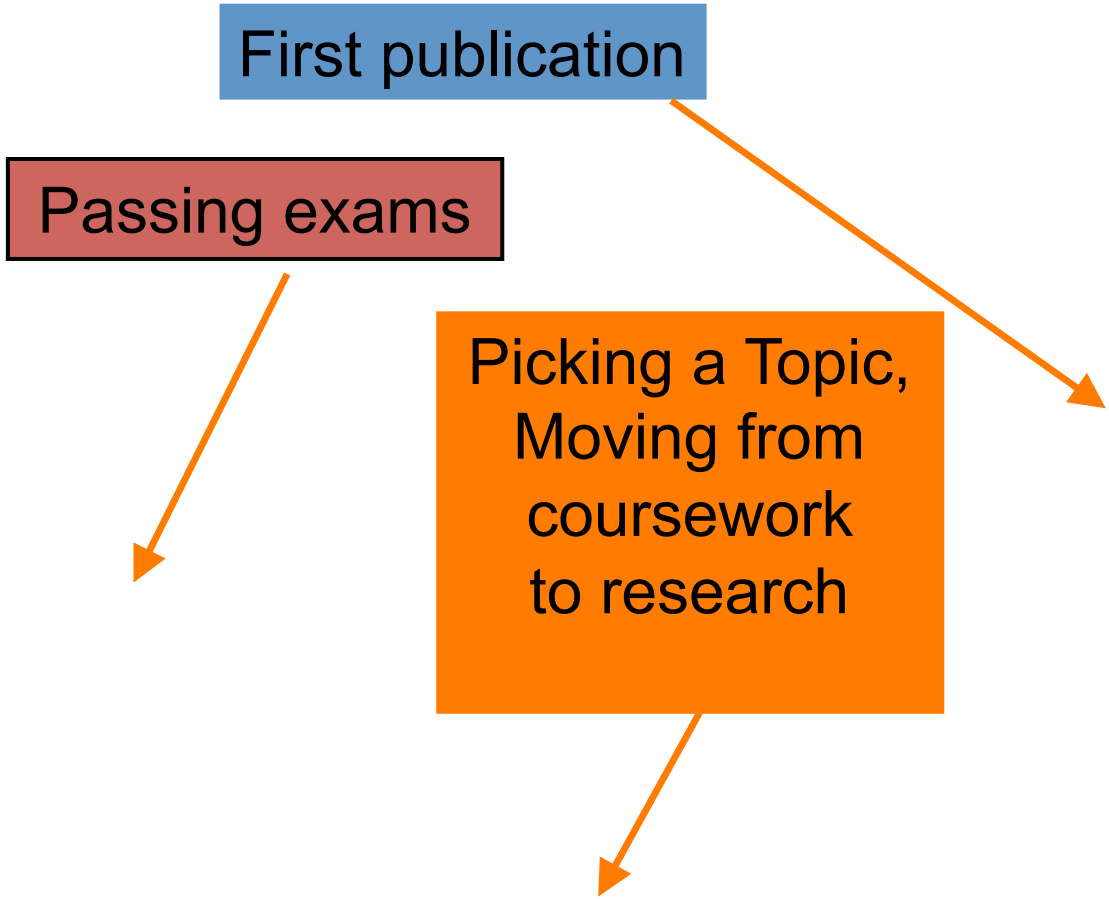

Adapted from: Carla Ellis, Duke

The Thesis Equation

Topic + Advisor = Dissertation

Adviser vs. Research Areas

What if you like an adviser but not passionate about his/her subfield, or vice versa?

Our personal opinion: Picking a good, matching adviser is more important than research topic!

- An adviser is for life
- He/she can teach/mentor you in many things, not just research
- You will be less stressed out
- You can expand to adjacent subfield, with his/her help

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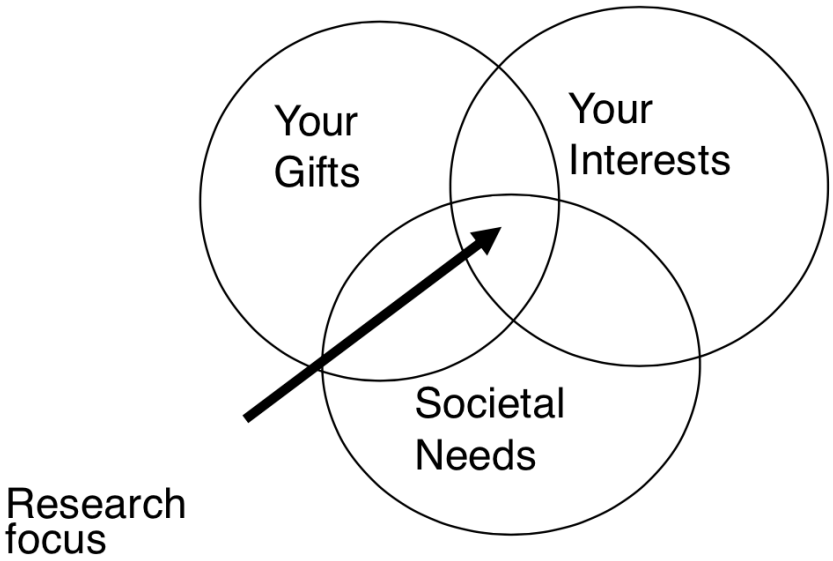
Now the harder part: Find a research topic

The path to success consists of three simple elements. Find what interests you that you can do well, and is needed by the people.



Find your own strength

Understand others is intelligence.
Understand yourself is wisdom.
--- Lao Tze

- What is easier for you?
  - Writing and modifying a complex software and debugging it?
  - Prove theorem?
  - Analyzing data?
- How to find it if you don't know?
  - Try various projects/classes

Your interests?

What make you excited?

Imagine yourself attend a talk about such topic

- Do you falll asleep after 5min?
- Or you will be awake for the whole talk, and keep discussing with your peers after the talk?

What if you are not interested in anything?

- Have you attended enough talks and are exposed to enough fields/areas?

What if you are interested in everything?

- Good! Consider the other factors
- Pick one----Ph.D is only the beginning of your career, and you still have 20-30 years to work on the others!

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Find Societal Needs

Creating an Exciting Application Scenario

"as a mathematical discipline travels far from its empirical source, or still more, if it is a second and third generation only indirectly inspired by the ideas coming from 'reality', it is beset with very grave dangers.

… that the stream, so far from its source, will separate into a multitude of insignificant branches, and that the discipline will become a disorganized mass of details and complexities."

John Von Neumann, "The Mathematician" , 1957

Exciting application scenarios will

- motivate you,
- expose the limitations of existing solutions,
- help you to focus your efforts.

Think Out of the Box

Great advancements in science and engineering often are the repudiation of generally accepted beliefs.

Anonymous

Challenge the common belief!

- Ask why?
- Can you break the assumptions?

- *Is TCP appropriate for wireless communication?*
- *Is fairness a good metric for real time computing?*
- *Is load balance is always a good idea?*

More Things to Consider

Do you (i.e., your advisor) have funding for you to work in the area?

- Working as a TA, an RA
- Having university/college, government, industry, etc… fellowship/ scholarship/grant
  - Warning: Ph.D students started with fellowship tend to do worse

Don’t chase hot topics!

- Hot topics can change by the time you graduate and are in the job market

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But don’t over-analyze

Calm down!

- Your thesis topic does not define you!
- Skillsets and experience gained is more important than the topic itself.
  - The former is useful through your entire career and even life, whereas topics are always changing.
- Go with your own pace, no need to compare with others

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Interdisciplinary Research Topic

These days, many top faculty candidates have inter-disciplinary thesis topics

- Examples: AI + Systems, HCI + Software engineering, AI + Biology/ Medicine, HCI + Psychology, database + architecture, HCI+ education, …

Benefits

- May leverage your interest/strength in the other areas
- You can find jobs in other areas/departments
- You can easily find co-advisers and collaborators
- It might be easier to bring "fresh air" to an old area or problem
- **There are so much to learn, so you won't get bored** ☺
- …

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