

Academic Research and Career

Reasons & Motivations: A journey through PhD Comics

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Professor Responsibilities

So lets start with a basic question:

What do you think a professor does? Any ideas?

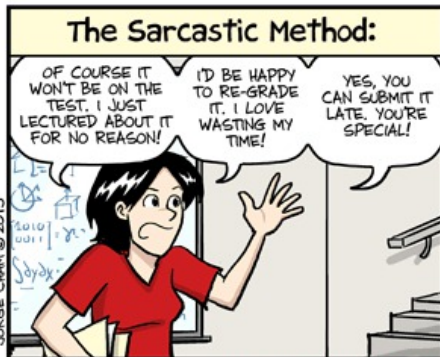
So lets start with a basic question:

What do you think a professor does? Any ideas?

- Give classes;
- Correct exams / works;
- Give student support

Give Classes

Teaching Methods



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Correct exams / works

GRADER TYPES



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Student support



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But what else does a professor do? Any ideas?

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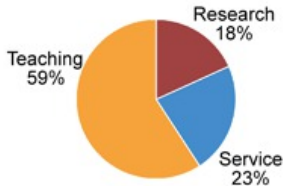
For a lot of people what Professors do is still a big mystery...



Lets have a look at how Professors time is usually spent:

HOW PROFESSORS SPEND THEIR TIME

How they actually spend their time:



Source: Higher Education Research Institute Survey (1999)

How departments expect them to spend their time:



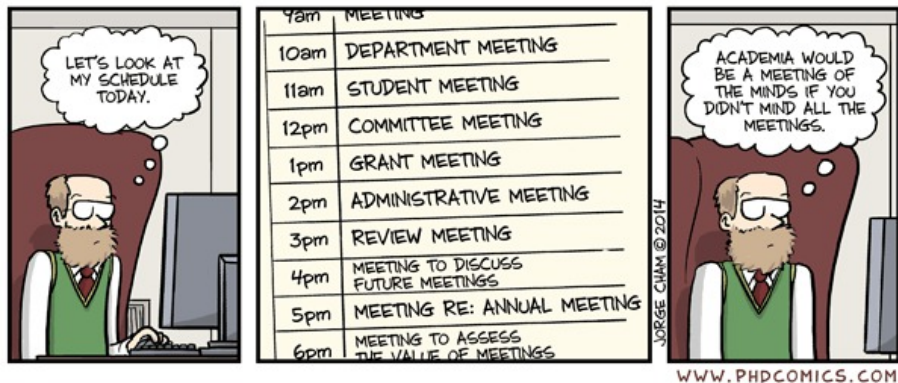
How Professors would *like* to spend their time:

Don't tell me what to do

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Service

Significant portion is dedicated to servicing the institution:



Research

Research however also takes a significant portion of our time:

What is research? Any ideas?

Research

Research however also takes a significant portion of our time:

What is research? Any ideas?

Given a problem X:

- Why is this problem important?
- Have other people worked on the problem?
- How is your result different?
- How does the data prove your result?

Research Example



Several questions are possible to be made:

Do the algorithms detect object better?

What is the definition of better?

Do they correctly classify objects a higher number of times?

Do they correctly classify objects faster?

How does your work compare against others?

There is a wide range of problems to be solved in science:

- Varying complexity and size;
- Small problems may be incredibly complex;
- Some problems may not even have a solution:
 - *E.g.*: Entscheidungsproblem

So the question now is:

How does one do research? Any ideas?

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Would you as undergrad students know where to start?

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How does one do research? Any ideas?

Would you as undergrad students know where to start?

- Masters Degree
- Doctorate Degree
- Post-doctorate Degree

Graduate Degree

What is a graduate degree? Any ideas?

- Diploma in an area
 - e.g.: Computer engineering
- Student perform courses;
 - lectures, seminars and lab sessions
- Usually has a graduation completion work on the end.

Graduate Degree



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Masters Degree

What is a masters degree? Any ideas?

What is a masters degree? Any ideas?

- **Specialization** diploma in a field of study
 - e.g. Embedded systems in computer engineering
- **Duration:** 1 - 2 years
- More advanced than an graduate course.
- Student perform courses;
 - Lectures, seminars and lab sessions
- Emphasises **training** and original **research** on a specialised project.
- Usually has a thesis work on the end.

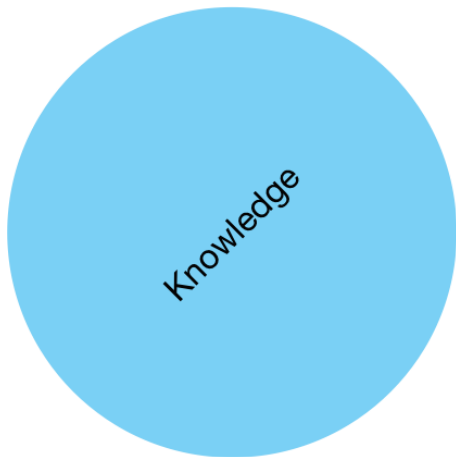
Master Thesis Main Objective

What is the main objective of a masters degree? Any ideas?

Advance your subject knowledge within a specific area of your field.

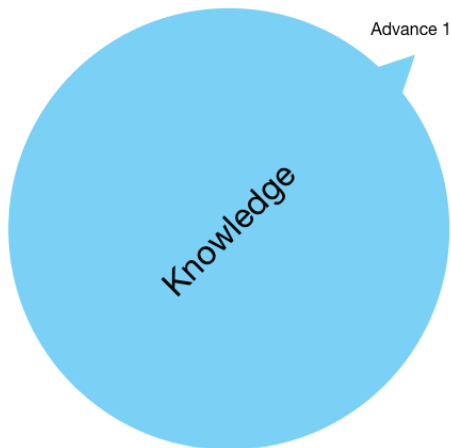
Knowledge

Imagine your field's knowledge to be represented as a circle:



Master Thesis Knowledge

MsC advances your field knowledge:



Doctorate Degree

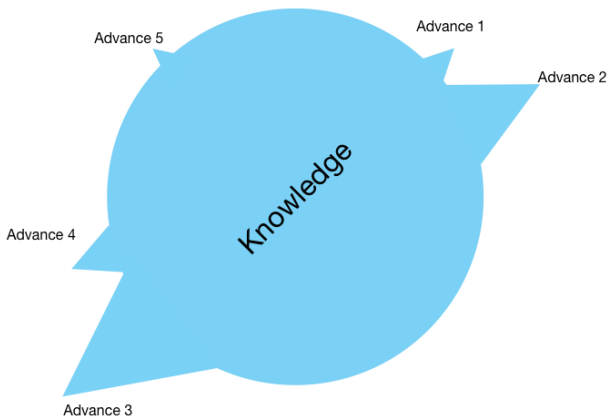
What is a Doctorate degree? Any ideas?

What is a Doctorate degree? Any ideas?

- **Highly specialized** diploma in a field of study
 - e.g. Quantum walks (\in quantum computation \in computer engineering)
- **Duration:** 4 - 7 years
- More advanced than a masters degree;
- Emphasises **research training** and **original research**;
- Usually has a thesis work on the end.

PhD Thesis Knowledge

PhD advances your field knowledge:



How to do research?

Regardless of whether it is a MsC or a PhD:

How does one do research? Any ideas?

How to do research?

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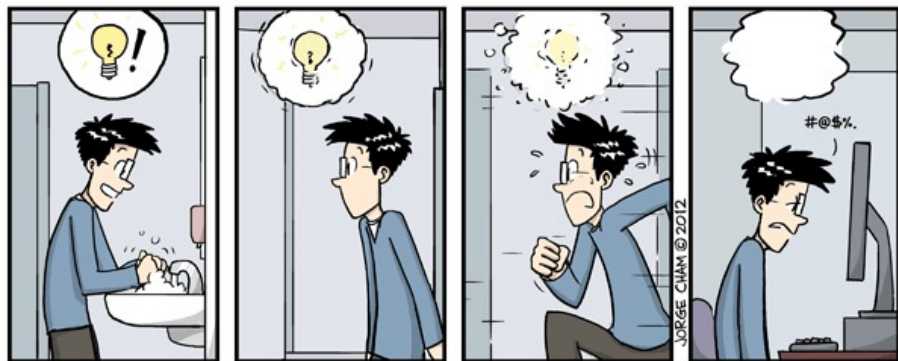
How does one do research? Any ideas?

“Easy” recipe:

- **Step 1:** Start with an idea;
- **Step 2:** Refine your initial idea;
- **Step 3:** Discover that your idea has been published;
- **Step 4:** Supervisor feedback;
- **Step 5:** Continue for the duration of your research;

How to do research?

Step 1: Start with an idea:



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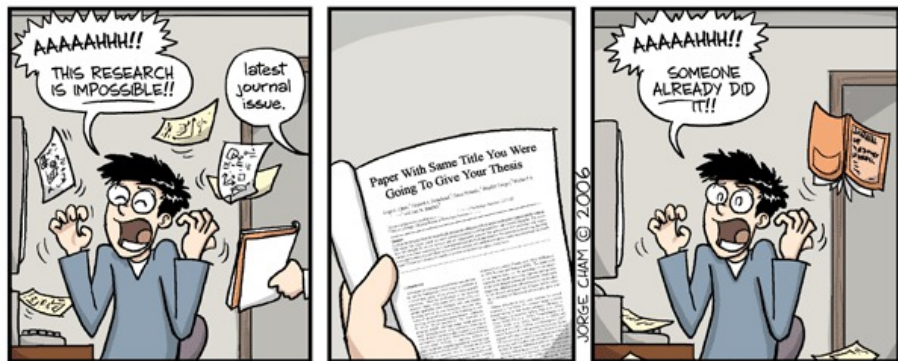
How to do research?

Step 2: Refine your initial idea



How to do research?

Step 3: Discover that your idea has been published:



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How to do research?

Step 4: Supervisor feedback;



How to do research?

Step 5: Continue for the duration of your research



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Research Validation

After you have written an article containing all your results:

How is your research validated? Any ideas?

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Research Validation

After you have written an article containing all your results:

How is your research validated? Any ideas?

- Your supervisor saying that it is good? **NOPE**

So if not for your supervisor how is your research validated? Any ideas?

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Your results need to be evaluated by your peers:

- Several formats exist:
 - National conferences;
 - International conferences;
 - National scientific journals;
 - International scientific journals

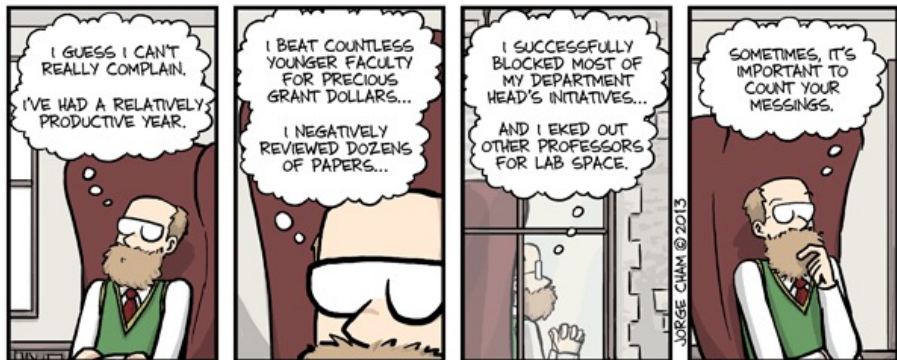
So if not for your supervisor how is your research validated? Any ideas?

Your results need to be evaluated by your peers, usually

- Reviewers are experts in your area that give their feedback:
 - Yay
 - Nay
- The higher the journal reputation the more difficult it is;

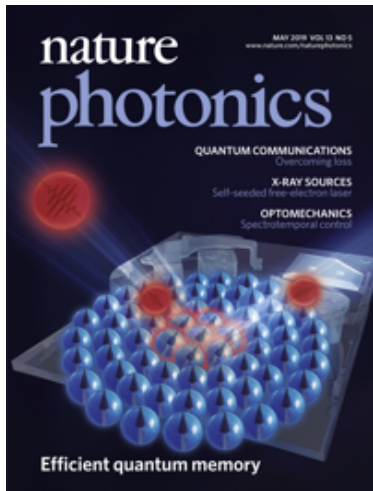
Paper reviews can be brutal...

- Anonymous;
- Reviewers can **hate** your results;
- And they will be quite honest with you;



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Some of the most famous journals:



Why do research?



If academic research is so difficult and long then...

Why do research then? Any ideas?

Why do research then? Any ideas?

Lets start by stating reasons why **NOT** to do:

- Do **NOT** do if you do not LOVE research;
- Do **NOT** do if MONEY is your FIRST priority;
- Do **NOT** do because you do not have any other option;

Why do research then? Any ideas?

Reason 1: Some problems are very **interesting**:

- AIDS / HIV / Cancer research;
- Computation research;
- Environmental research;

Some of these are enough to motivate for a **lifetime**

- Are you passionate about research?

Why do research then? Any ideas?

Reason 2: Collaborating with other colleagues expands your knowledge:

- Fruitful combination of cross-area knowledge;
- Medicine and computation research to produce new drugs;
- Environment and computation research to predict climate change

Why do research then? Any ideas?

Reason 3: Research teaches you the art of **problem solving**

- Skill that can be applied to all areas of your life
 - How to tackle hard problems;
 - How to evaluate something objectively;
 - How to motivate;
 - How to market/sell your ideas/theories;
 - How to learn from others

Advance diplomas also translate into higher income over a lifespan:

Average Work-Life Earnings After a Bachelor's Degree				
Major	Bachelor's Degree	Master's Degree	Doctorate Degree	% Difference in Doctorate/Master's Earnings
Biological Science	\$2,288,000	\$2,757,000	\$3,511,000	27%
Business	\$2,563,000	\$3,257,000	\$3,535,000	9%
Communications	\$2,333,000	\$2,552,000	\$3,306,000	30%
Computers and Math	\$3,044,000	\$3,541,000	\$3,890,000	10%
Education	\$1,798,000	\$2,260,000	\$2,802,000	24%
Engineering	\$3,349,000	\$3,918,000	\$4,176,000	7%
Liberal Arts	\$2,046,000	\$2,448,000	\$2,705,000	10%
Literature	\$2,083,000	\$2,444,000	\$2,755,000	13%
Physical Science	\$2,527,000	\$3,193,000	\$3,825,000	20%
Psychology	\$2,001,000	\$2,366,000	\$3,157,000	33%
Science and Engineering Related	\$2,587,000	\$2,925,000	\$3,814,000	30%
Social Science	\$2,406,000	\$2,986,000	\$3,490,000	17%
Visual Arts	\$1,966,000	\$2,227,000	\$2,545,000	14%

Figure: Source: US Census 2012

There are a lot of reasons to do research, the main question should be:

Do you like problem solving? If so, then research can be for you =)

Thank you for you time =)