

Advice for Finishing that Damn Ph.D.

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*** = Current Affiliation**

My Qualifications to Give Advice

**I myself got a Ph.D., and I remember it well!
Oy!**

I watched my ex-wife get a Ph.D. Oy!

**I graduated 29 Ph.D.s in 42 years (12 W, 17 M),
...**

including 6 externally co-advised (3 W, 3 M)

I have 1 more in the pipeline (1 M).

My Qualifications, Cont'd

Only 3 of my Ph.D. students have failed to finish.

None could get his or her s--t together!

My Operating Principle as Advisor

I say to my students:

I will give you all the feedback you ask for. However, I will leave you to set your own pace and to your own devices. I have all the degrees I need, so it's your problem if you don't finish, not mine. So do not expect me to rescue you or even press you. You see, if you cannot get your own s--t together, you are not going to make it as a research leader.

Ph.D. Dissertation Requirements

Kevin Ryan offers these requirements for a good Ph.D. dissertation, and for that matter, a good paper.

You need:

- 1. a worthwhile topic,**
- 2. a correct structure, and**
- 3. a good method.**

Worthwhile Topic

Discovery or selection of a worthwhile topic is a potential killer.

It is certainly the most anxiety generating step.

If you cannot find such a topic, you are not suited for a Ph.D. career, because your future research depends on finding good topics.

Finding Topic, Cont'd

The topic must be

- **real, (Anthony Finkelstein *emphasizes* this requirement)**
- **unsolved,**
- **solvable enough to finish, but**
- **hard enough to solve that it is interesting.**

Finding Topic, Cont'd

The topic should be of *real* interest to and understandable to at least

- you, and
- at least one of your committee members, preferably your advisor

(Thanks to Todd Barlow for pointing this out!)

Finding Topics and Postdocs

I cannot overstress the importance of being able to find *your own* topic ...

and not relying on your advisor to find one for you.

(Of course, you may need to work on your advisor's topic to get paid, ...

but at least be *able* to find one on your own!)

Biggest Problem of a Postdoc

A postdoc, fresh out of grad school with a brand new PhD, with a half dozen publications, all with the advisor, under the belt ...

spends the entire postdoc trying to find a topic for the next paper and ...

cannot find one.

**The thesis topic has been wrung dry, and ...
no suitable new topics present themselves.**

A Failure to Launch

The postdoc is so used to the advisor's finding topics that he or she has not learned to find them.

He or she is great at solving problems, but is incapable of finding problems to solve.

Failure to Launch, Cont'd

I have even seen some postdocs, who ...

**when thrown some new, open, previously
unconsidered questions related to, but not
directly arising from his or her thesis research**

...

**not only cannot begin to answer the question
(which is actually OK)**

**but also cannot see the potential research
lurking in the questions.**

Failure to Launch, Cont'd

This postdoc is destined to go nowhere in a career that depends on finding research.

This is why I say that the most important part of graduate studies is finding a topic and ...

that it's best done by the student him- or herself!

You Gotta Be Curious

As I said a few slides ago, “If you cannot find such a topic, you are not suited for a Ph.D. career, because your future research depends on finding good topics.”

You gotta get to the point that you are naturally curious about a whole lot of things.

You Gotta Be Curious, Cont'd

If you are, then questions in your research area and elsewhere will come to you often enough, ...

in fact, giving you more questions than you can ever hope to answer in a lifetime, or two, or three,

But who knows, you might end up moving into other areas, as I explain later.

Still Another Good Structure

My favorite:

- **Statement of the problem**
- **Why problem is important (Thanks to Orlena Gotel)**
- **Why problem is difficult**
- **Past attempts at solution**
- **Why past attempts failed to solve problem**
- **New approach to solve problem**
- **Why believe that new approach will solve problem or at least will not fail**

Another Good Structure, Cont'd

- **Plan for demonstration of effectiveness of new approach**
- **Do it!**
- **Report success or failure to do what you set out to do**
 - **If success, lay out future work**
 - **If failure, analyze why and lay out suggestions for future attempts at a solution**

It is still acceptable if...

In a true scientific discipline, failure to prove hypothesis is acceptable, and a dissertation reporting the reasons for the failure is acceptable. Without the analysis, the dissertation is not acceptable.

It is also acceptable for the solution not to be entirely technical, even to be non-technical, *if* the problem is genuine and that's where the solution went.

Failed to Prove Hypothesis?

If you don't get the results you or your advisor hoped for, ...

remember that in a true science,

“You own the science, not the hypothesis!”

Methodological Advice, Cont'd

(* means from Kevin Ryan)

***Don't try to solve all the world's problems.**

Scope the work to something doable in 1 calendar year.

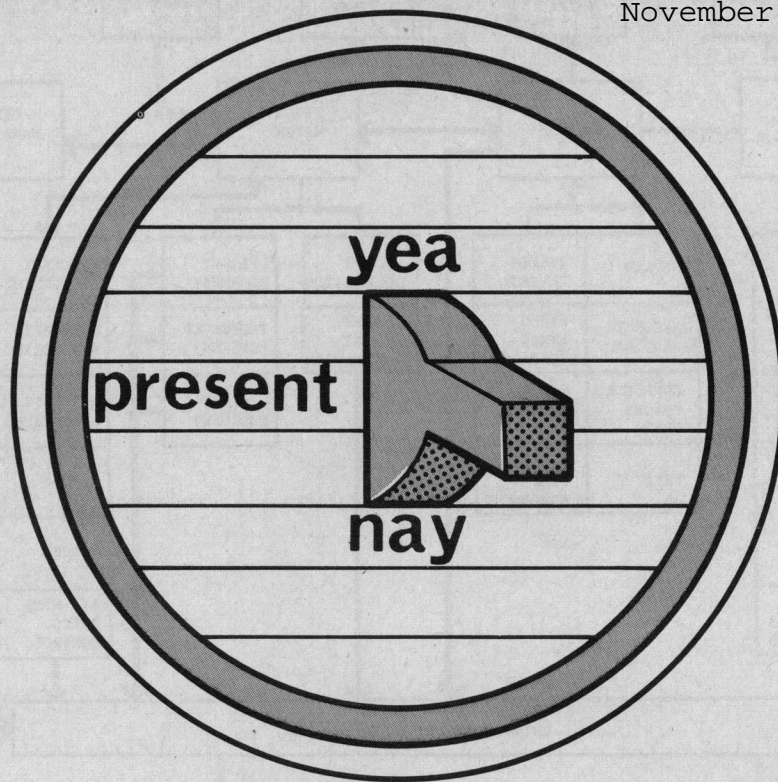
***Measure your progress.**

***Stay focussed.**

But DO Get a Life!

It's nice to have a diversion from the onerous burdens of getting a Ph.D., ...

like one Dr. Frank B. Ryan, the creator of the first ever e-voting software, had:



The Electronic Voting System for the United States House of Representatives

Frank B. Ryan

identifying himself to the system, and then depressing one of three buttons on the station – YEA, NAY, PRESENT – to indicate his preference. Cathode ray tube devices, as well



Dr. Frank B. Ryan is currently Director of House Information Systems, U.S. House of Representatives, and is on leave of absence from his position as Associate Professor of Mathematics at Case Western Reserve University.

Dr. Ryan was born in Fort Worth, Texas, on July 12, 1936. He was educated in the public schools of Fort Worth and attended the Rice Institute on an athletic scholarship in football.

He received a BA Degree in Physics from Rice in 1958. This was followed by an MA in Mathematics in 1962 and a Ph.D. in Mathematics in 1965, both earned at Rice University. His active research pursuits in mathematics include boundary behavior of analytical functions, with an emphasis on geometric function theory.

Along with his ongoing interests in mathematics and computer sciences, Dr. Ryan continued in athletics as a professional football quarterback in the NFL for 13 years. This career included stints with the Los Angeles Rams, the Cleveland Browns, and the Washington Redskins. Dr. Ryan led the Browns to the World's Championship in 1964 and was three times elected to the Pro Bowl Game.

In his current assignment with the House of Representatives, Dr. Ryan heads up a staff attached to the Committee on House Administration. His duties include the design, purchase, and installation of all computer systems related to the House of Representatives. In addition, his staff will coordinate the computer activities and data processing systems of all supportive units and offices of the Congress over which the Committee has jurisdiction. He will also act as Congressional coordinator of computer operations for the House in conjunction with other branches and agencies of government.

Creative Means of Support

The acknowledgements in Ryan's 1965 Math PhD Thesis, "A Characterization of the Set of Asymptotic Values of a Function Holomorphic in the Unit Disc", says:

"My thanks to Rice University, the Air Force, and the NFL for financial support during the preparation of this thesis ...

Most of all, let me thank my wife for her patience during the past seven years."

Weight of a Dissertation

A dissertation is the equivalent of from one to three journal papers, depending on paper sizes, the journal, and the university.

Therefore, it does not have to be a life's work. It's only your first of many, many papers (that is, if you go into academia).

Weight of a Dissertation, Cont'd

Each dissertation requires four months of uninterrupted work.

- **The last month of work takes .5 calendar month.**
- **The second last month takes 1.5 calendar months.**
- **The first two months can take years, and usually does, ...**

Weight of a Dissertation, Cont'd

but you can get it down to 4 calendar months. (How do I know? I had one Ph.D. student, Richard Schwartz, who did the entire dissertation from conception through to filing in 6 months. Of course, the fellow is very motivated and he is into his third successful start up already.)

Confront Your Fears

Anthony Finkelstein says “Identify your biggest fear and confront it!”

Fears

Two closely related fear phenomena:

- **fear of making mistakes**
- **imposter syndrome**

Fear of Making Mistakes

The fear is of making mistakes in public, either in writing or speaking.

Since writing undergoes reviewing before going out, the greatest fear is of making mistakes while speaking, when one is speaking without the benefits of notes:

Fear of Mistakes, Cont'd

e.g., during

- **research brainstorming**
- **discussions at workshop or conference sessions**
- **questioning after a prepared talk**

The latter is most frightening, because if a question that you have not thought of before comes up, you might make a HUGE mistake in answering it.

Fear of Mistakes, Cont'd

And you cannot bow out of answering a question about your work, while you can simply not speak up during brainstorming and discussions.

What Makes a Ph.D.

What makes a Ph.D. is not that you never make mistakes.

It's that you take chances with cool ideas, trying something out of the box.

Some ideas are wrong, but enough are right that you end up making significant new contributions to knowledge.

What Makes a Ph.D., Cont'd

What makes me able to stick my neck out with solution ideas, questions, comments, on-the-fly answers to hard questions, observations, hypotheses, thesis ideas, and research problem ideas is that I really don't give a s--t if what I say happens to be wrong or a mistake.

What Makes a Ph.D., Cont'd

It does not bother me to reveal that I am ignorant on some topics.

I know that I am not stupid, even though I may be ignorant about the topic at hand.

(Recall the distinction between stupidity and ignorance.)

Also I know that I am not ignorant about a whole lot of things.

If You Publish a Mistake

So what if you make a mistake!

No less than Don Knuth has. He published a correction.

Actually, he published a correction to his correction!

I Published a Mistake!

Someone wrote to me about a mistake I made building a dynamic POSTSCRIPT font for Arabic and Persian letter stretching.

While I stretched, I did not respect calligraphy rules.

I ended up being on the committee to evaluate his Ph.D. thesis that showed my mistake and how to fix it.

I gave him a high evaluation, and he passed!

Words to Remember

There is nothing wrong with being wrong, ...

if it's occasionally and ...

***especially* if you learn from it!**

Imposter Syndrome

Someone has the imposter syndrome when he has a deep seated fear that he is not smart enough to have *earned* the Ph.D. that he received, ...

and therefore lives in constant fear of being discovered to be an imposter Ph.D.

Imposter Syndrome, Cont'd

He believes that each mistake he makes publically runs the risk of exposing his imposter.

The imposter syndrome happens to be common more in women, but does occur in men too.

Self Fulfilling Prophecy

The irony is that the imposter syndrome sets up a kind of a self-fulfilling prophecy.

Your fear of being discovered to be an imposter causes you to fear to take chances, to fear to speak up.

***That* causes people to wonder how you managed to get a Ph.D. or to believe that your star has burned out, and ...**

people begin to think of you as an imposter.

The Facts Are

You *are* good!

Otherwise, you would not have gotten where you are today, close to or with a Ph.D.

On average those who determine whether your work deserves a Ph.D. are not idiots.

The Facts, Cont'd

Certainly by the time you get the Ph.D., you have passed through enough people that the chances of slipping through with only idiots judging your work is zilch.

Besides which, you are insulting us, your advisors and committee members, by implying that we don't know a good Ph.D. thesis when we see one!

Methodological Advice, Cont'd

***Expose your ideas regularly.**

***Write early and often. (Vote early but only once!)**

Publish!

Rejection Letters

Don't be afraid of rejection; you'll live!!

See the rejection letter that Ike Nassi and Ben Shneiderman got on their first paper about what became known as Nassi–Shneiderman Diagrams:

http://www.cs.umd.edu/hcil/members/bshneiderman/nsd/rejection_letter.html

Ike & Ben's Rejection Letter

One reviewer wrote, “I feel that the best thing the authors could do is collect all copies of this technical report and burn them, before anybody reads them.”

Nevertheless, they published elsewhere.

The work ended up making them famous and spawning a lot of research activity by others.

What to Do, Cont'd

Submit to another journal.

The first journal lost your paper ...

as a result of its EiC's shortsightedness in listening to the rejecting reviews!

Resubmitting a Rejected Paper

Make sure that you have revised the paper to deal with *all* real problems any reviewer found.

There is a good chance that the sets of new and old reviewers have a non-empty intersection.

Resubmitting, Cont'd

Your not having revised a reviewed paper is grounds for summary rejection!

**Reviewers' time is valuable; don't waste it, ...
*even when your paper's reviewers are idiots.***

Publishing

Go for journals, not conferences, to publish your results. Journals are a lot easier and count more in hiring and promotions. Conferences are very hard, because the committee has to reject 80% of the submissions by a short deadline. The slightest problem with the paper leads to its rejection. In a journal, the same problem would lead to the referee saying, “Accept the paper pending certain revisions.”

Publishing, Cont'd

Of course, you may need to have a paper accepted to a conference to get the funds to attend the conference.

Also, it's good to go to conferences

- **to learn what is going on in your field and**
- **to meet your future colleagues and to network.**

Publishing, Cont'd

When your paper is rejected, treat all the stupid remarks from the idiot referees as indications that *you* did not write clearly enough that even *they* would get your point.

Don't take criticism personally; it's criticizing your work, not you. It's criticizing the work, even if they say “*You* made a MISTAKE! Nya Nya!”

Publishing, Cont'd

Actually, some critics may *be* personal; there are lots of people with low self-esteem around, who have to put down others. However, *you* have the choice not to take it personally. You *know* that you're smart but human, and thus you make occasional mistakes that do not detract from your basic smartness.

Something is Rotten in the State of Conferences

Some reviewers of some conferences, particularly the flagship conferences in some CS areas, including SE areas, have inflated views of these conferences.

Each of these reviewers believes that the conference in question has become more than a just a conference, even more than just a journal.

Rotten, Cont'd

The conference has become more prestigious than its area's journals, in that a publication in the conference counts more in hiring and promotions than do the journals.

Rotten, Cont'd

The reviewer believes that his or her job is to protect the journal's virtue and prestige by driving its acceptance rate down, by rejecting as many papers as possible.

Often this reviewer is a key person in the field that people in the field respect and listen to.

Rotten, Cont'd

The clearest symptom that you got one of these reviewers is that your 10-page paper was rejected and you get a review that reads like:

“This well-written paper presents the beginnings of a good idea X.” (and you think, “So, why wasn’t the paper accepted?”, but you read on.)

“However, it fails to consider or deal with A, B, C, D, E, F, G, H, I, and J.”

Rotten, Cont'd

And you realize that to do A through J, would require an additional 10 pages, 10 pages over the page limit of 10 pages.

You know this because you had written a 20-page full paper and spent two weeks deciding what to cut out to get it down to size, hoping that the brief summary of what was cut out would satisfy the reviewers (it did not! 😞)

Rotten, Cont'd

What to do?

Just go to a journal. The conference missed a chance to have your paper.

The divine justice will be that the same conference will beg later to publish a summary of your journal paper in its journal-first track! 😊

Rotten, Cont'd

I no longer submit to ICSE and FSE/ESEC.

After 3 rejections in a row like this, in which the corresponding full papers were all accepted in the first round by journals, ...

I just stopped submitting to these conferences.

I am thinking of doing the same for RE.

Rotten, Cont'd

Some ideas require more than a conference-sized paper to do justice. It's not worth the effort to cut it down, ...

especially when everything you would cut out is critical to the paper.

Methodological Advice, Cont'd

Believe in yourself.

Have confidence in your results.

Be aware of a tendency to procrastinate.

**Doug Dykaar calls graduate students
“gradual students”!**

Methodological Advice, Cont'd

Procrastination, the ultimate seduction!

The biggest problem with many a person doing research and in particular writing a research paper, such as a Ph.D. thesis, is the lure of the immediate, easily disposed of duties: ...

Immediate Duties

e.g., checking his or her e-mail; replying to important e-mail; browsing the news sites for all places in which he or she has lived; dealing with Facebook friends; staying up to date with Twitters; updating his or her blog; staying ahead of the students in the class he or she is teaching; doing his or her daily errands, including buying food; keeping in personal touch with his or her family and friends; etc.

Immediate Duties, Cont'd

Very quickly, the day is over and he or she has done almost nothing towards finishing the research or writing.

"Methodological Advice, Cont'd"

See what Jorge Cham, the author of *Ph.D. Comics* at www.phdcomics.com has to see about the reasons for procrastination. Read it, laugh at it, but don't be like its characters!

The following strips are reprinted from *Piled Higher and Deeper* by Jorge Cham by permission of Jorge Cham.

A THEORY
PROCRASTINATION

UNIFIED

THEORY

O

PROCRASTINATION

ACADEMIA



About Jorge Cham

BTW, the author of these comics, Jorge Cham, unlike his strip's characters, finished his Ph.D. in due time and got an academic job at Caltech (the venue of *Big Bang Theory*).

About Jorge Cham, Cont'd

He resigned and became an adjunct after he determined that he could make a *lot* more money by working full time on ...

- **writing new episodes often,**
- **syndicating his comic strips,**
- **editing books of collections of strips,**
- **maintaining his Web site,**
- **scripting and producing a movie made based on the strip, and**
- **traveling the world, giving a lecture on procrastination (It's GREAT!).**

The Life Lesson in Jorge's Life

So once you have your Ph.D., it does not have to be your whole life.

Go where your interests take you.

For example, I write and publish Biblical commentary and scientific humor.

Methodological Advice, Cont'd

Beware of university deadlines.

Know when you're done.

Methodological Advice, Cont'd

Tell your advisor that you are done when you are done; don't wait to be told when you are done.

If you cannot tell when you are done, you do not deserve the Ph.D. because you will not be able to know when to stop your future research to publish.

The Exams

There are three exams that you will probably have to do,

- 1. the Knowledge Exam, proving that you know the field,**
- 2. the Proposal Exam, in which you present the proposal for your Ph.D. research and dissertation, and**
- 3. the Defense Exam, in which you defend your Ph.D. dissertation**

Knowledge Exam

The knowledge exam is the *toughie*.

It is where a number of students get flushed out.

This is where you really need to study!

It's a serious exam in all senses of the word!

Don't Fret the Others

Most students fret the proposal exam and the defense exam, but really, these exams are not all that hard.

I have never heard of anyone flushed out in either of these exams; at most you may have to repeat it.

They really should not be called exams, but tradition reigns!

In any case, the proposal exam can and should be used to your benefit.

Proposal Exam

First, the proposal exam is not a real test in the sense of making sure you know your stuff.

At that stage of your career, it is already abundantly clear that you know your stuff. The knowledge exam (or its substitute) proved that!

The issue is whether what you propose to do is enough to warrant getting a Ph.D. if you do what you propose.

Proposal Exam, Cont'd

Of course, the committee is concerned that you know all the background and previous work relevant to your dissertation topic, but if you have done your homework, you probably know this stuff *more* than any committee member.

You are already one of the world's experts.

Proposal Exam, Cont'd

Instead of fretting, use the proposal exam to your benefit, to get a commitment from the committee as to

- **the scope of your work and**
- **most importantly, what is required to get the Ph.D.**

This is where you try to arrange that a smaller amount of work be accepted as having completed the Ph.D.

Proposal Exam, Cont'd

This is where you get a commitment that doing an experiment correctly earns you the Ph.D., *regardless* of the conclusions.

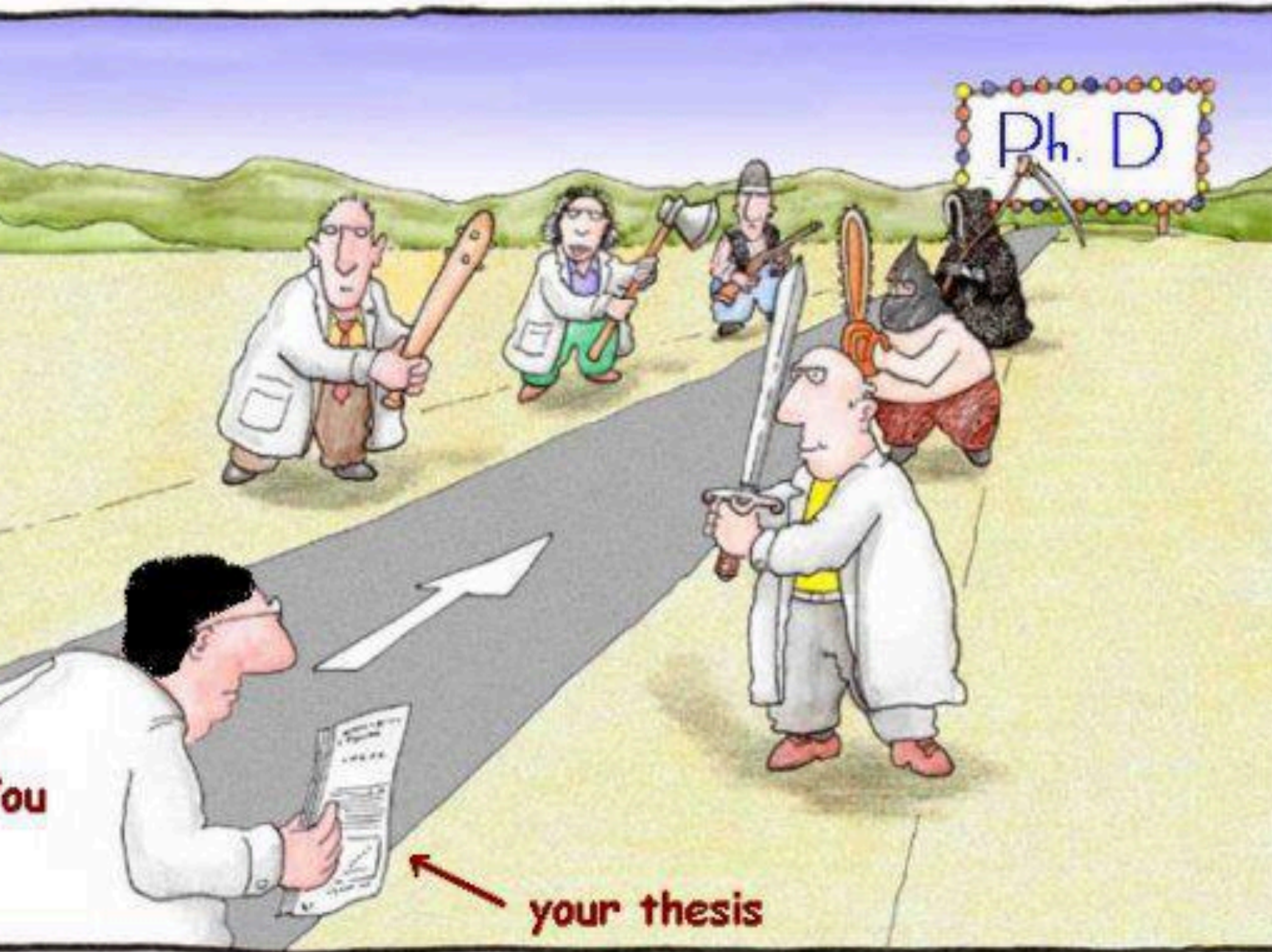
This is where you get a commitment that building a prototype of the tool and using it in a substantial case study earns you the Ph.D., *regardless* of whether or not the tool solves the problem it is supposed to!

Proposal Exam, Cont'd

Treat the exam as a negotiation; ...

**you are trying to minimize your requirements,
and ...**

they are trying to maximize your requirements.



ou

your thesis

Ph. D

Defense Exam

Most of all, do not fret the defense exam, ...

***if* you and your advisor agree that you are ready and that you have met the scope and requirements agreed to at the proposal exam.**

Remember, *you* are the world's expert on the topic, even more than your advisor, and certainly more than any other committee member.

Defense Exam, Cont'd

You should be able to walk circles around any question about the topic thrown at you by any committee member.

So, focus on being relaxed, able to quickly access all that you know, and able to think on your feet.

Go to a good movie the night before, a comedy! (not a horror movie!)