Qual Mentoring 2008

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Overview

• Four sections
  – What is the purpose of the qualifying exam?
  – Structure of a formal presentation
  – How to deliver a high-quality presentation
  – Handling the Q&A portion of the exam

• Discussion after each section
Purpose of the Qualifying Exam

Justin Ray
What is the Qualifying Exam?

• The qual is a model conference:
  – Write and submit a paper
  – Present it at a conference
  – Defend your work

• Work does not have to be “conference quality”

• You must prove that you can represent CMU out in the world
What is the purpose of the Qualifying Exam?

• To show that you understand what research is
• To demonstrate that you know the fundamentals in your area
• To prove that you can speak in front of an adversarial audience
What is NOT the purpose of the Qualifying Exam?

• It’s not:
  – A thesis proposal
  – A thesis defense
  – A transfer of technical information
What will my committee look for?

• Show that you understand research
  – Clear statement of your contribution
  – Understand of the strengths and weaknesses of your work
  – Understand how your work relates to the three papers
What will my committee look for?

• An understanding of background materials and fundamentals
  – What is considered fundamental varies by area
  – Demonstrate breadth and depth of knowledge
  – Be able to solve simple problems and work out examples
What will my committee look for?

• The ability to speak in front of an adversarial audience
  – Present your ideas clearly and concisely
  – Think on your feet
  – Stand up to scrutiny and questions without getting rattled
Do I need good research results?

• Short answer: No, but it helps
• A positive result is easier to present
• If you have a negative result
  – You need to have a good motivation
  – You need a clear understanding of why it didn’t work
  – If possible, some idea of how to fix it
Do I need good research results?

• A positive result is easier to present
• You can present a negative result, but…
  – You need to have a good motivation
  – You need a clear understanding of why it didn’t work, and some idea of how to fix it
• What about preliminary results?
  – You must have *some* results
  – Have a clearly defined plan for future work
  – Have an idea of what results you expect and why
What does it all mean?

• The exam is designed for you to pass
• Don’t be intimidated by faculty or the process.
• Don’t put it off!
  – Study!
  – Practice your presentation
    • in front of an audience
    • as often as you can.
How To Prepare a Formal Presentation

Tudor Dumitraș
Structure of the Presentation

• State the **problem** you are addressing
  – a.k.a. the “motivation”

• Describe your concrete **result**
  – a.k.a. the “description of approach”

• Explain how you **validate** your approach
  – a.k.a. the “experimental results”

• Discuss the **consequences** of your approach
  – a.k.a. the “conclusion”
Problem

• Examples:
  – “How do we do/create/automate X?”
  – “How can I evaluate the quality/correctness of X?”
  – “What is property X of artifact/method Y?”
  – “Is X always true of Y?”
  – “Does X exist, and what is it?”

Explain the impact of the problem and what makes it hard
Result

• Examples:
  – New/better way to perform a task
  – Tool/device/artifact that embodies a model or technique
  – Analytic model that permits formal analysis, automation
  – Empirical model based on real data

Insert a “startling” (but correct) claim to command attention
Validation

• Examples
  – I have the result satisfactory through [proof/experiment]
  – My result has been used, showing [data from 3rd party]
  – Here’s how my result works on a small example
  – Given these criteria, my model [describes/predicts …]
  – I thought hard about this, and I am sure it works

The validation must fully support your initial claim
Be Precise

“I have developed a high-performance [...]”

• State quantitative improvement
  – use established terminology

• State variability
  – max, min, standard deviation

• Establish statistical significance of result
  – compute $p$-value using a significance test
Be Rigorous

• Explain why your experiments are:
  – Realistic
  – Repeatable
  – Comparable

• Don’t oversell your result
  – Leave no gap between:
    • Claims and results
    • High-level goals and actual implementation

• Explicitly state your assumptions
Be Professional

• Don’t put too much text on a slide
  – Sans-serif fonts (e.g., Arial, Helvetica) are more readable on a projection screen
  – Minimum size: 18pt
  – When in doubt: print the slide on letter paper, drop it on the floor and try to read it while standing

• Make your presentation easy to follow
  – Respect order from outline and provide internal summaries
  – Use animation sparingly
  – Number the slides

• Strictly respect the timing
  – Leave room for a few clarification questions during the talk

• Give handouts
  – At practice talks
  – At qual
What is Specific to the Qual?

- Committee members may not be experts in your area
  - Provide high-level motivation for approach
  - Compare with 3 background papers

- Result may be negative or inconclusive
  - Must state it explicitly

- Validation may be incomplete
  - Should have some preliminary results
  - Explain the validation plan
Prepare your Talk Seriously

• The presentation should answer any possible questions about your work

• Common questions:
  – What is your hypothesis?
  – Why should we care?
  – What is your secret sauce?
  – Why is this hard?
  – What is the validation plan?
  – …
Resources

- Priya Narasimhan, “How to Write a Good (no, Great) PhD Dissertation,” ICSOC 2006 PhD Symposium  
  http://www.cs.cmu.edu/~priya/tech-writing.html
- Phil Koopman, “Thoughts on Ph.D. Qualifiers”  
  http://www.ece.cmu.edu/~koopman/student_info/quals.html
How to Deliver a High Quality Presentation

Vas Chellapa
Overview

- Preparing your slides
- Practice presentation/Q&A sessions
- At the qual.
Preparing Your Slides

• No animation
  – Also: don’t reveal lines one by one (annoying)
• Use color sparingly
• Not slides of text after text after text
  – (like this one 😊)
• Number your slides!
• Overly-complicated slides:
  – At best: no one listens/understands
  – At worst: people are annoyed
Preparing Your Slides

• Capture important idea in one line at bottom, every few slides
• Redo images to make them look good
• Rule of thumb: 1 minute per slide at most
  – NO MORE slides than # of minutes!

Goal: Attractive, professional, classy slides without glitz
Practice Presentation / Q&A

• Definitely plan on doing multiple practice presentations
• Always in front of an audience
• Bring cookies!
• Go to other people's practice talks
• Re-tune your talk once you know your committee members
  – Invite your committee members’ students once you know your committee

Practice talks are very important!
At the Qual. Exam

• Dressing: business casual
• Bring a bottle of water

• Handouts:
  – 2 slides a page
  – Page numbers!
At the Qual. Exam

- **Body language**
  - Sincere eye-contact with your entire audience
  - Avoid focusing on a section
  - Use the 3-second rule
  - Even if you feel an individual is not listening

- **Speaking style**:  
  - Clearly
  - Speak with conviction (let people know you believe in your material)
  - No reading from slide/notes
  - Pause! (especially between slides/sections)

- No/sparing use of a laser pointer
At the Qual. Exam

- Time yourself! Do NOT overrun!
  - +/-1 minute is very easy to achieve with practice
  - PowerPoint's timing feature

- When handling clarifying questions:
  - Be very concise, brief
  - Keep in mind: ideally, bigger questions are asked after the presentation
Final points

• Try to relax
  – Most people do better when somewhat relaxed

• Try to “teach your audience" something
  – Helps you explain your topic well
  – Keeps it interesting

• Use simple examples

• Frame your problem as a research problem
  – Your committee is evaluating you as a researcher

Good luck!
Resources

Handling the Q&A

Amy Wung
What are the questions?

• Anything in your paper or slides is fair game, especially equations
• Anything the committee can think of!
What are the answers?

• Only answer the question that was asked
• Pause to collect your thoughts, and then explain your approach before you begin scribbling all over the board

It’s not all about the answers.
It’s also about how you think!
When you don’t know

• Asking the right questions is just as important.

• It’s okay to say you don’t know. The faculty is trying to find the “boundaries of your ignorance.”
Frankie says “Relax”

- Be respectful
- Don’t get overly defensive

- Be able to handle interruptions. Sometimes it’s more of a collaborative discussion than an inquisition.
Don’t buy into the mind game

• Act confident!

• Don’t let them rattle you!
Wrapping Up
Wrapping Up

• Announce list for practice talks:
  – ece-qual-practice-announce@lists.andrew.cmu.edu
  – most people already subscribed

• Qual exam debrief
  – On or around Graduate Progress Review day (Friday after the qual)
  – Anonymous feedback to the department