Learn from others

• Whenever you read papers, and attend seminars
  – Notice what helps you as audience/reader
  – Notice what annoys or confuses you
  – Discuss your reactions with colleagues and supervisor
• Make sure you adjust your own writing or talks as a consequence

Overview

• Motivations
  – of the Researchers
  – of the Targets (audience, readers)
• Writing Papers
  – Conference/journal
  – Thesis
  – The Introduction
  – Literature review
• Giving Talks

“Know thyself”

• To communicate well, you need to understand your own goals in the activity
  – What outcome do you hope for?
• Common reasons for people to want to communicate research
  – Make impact; change the world
  – Build reputation; be known
  – (because it’s required, eg thesis)

Impact

• You really believe your ideas will help the community
  – So you want the people working on related projects to adopt your ideas in their own work
• Target: a small group of specialists
• Goal: convince them that your ideas are worth following
• Key: clarity (explain what is your key contribution, what evidence backs it up)

Reputation

• You really want people to think highly of you
  – Vital for your career (references for jobs/promotion; invitations to prestigious positions; connections to help your students or junior colleagues)
• Target: a broad group of opinion makers
• Goal: associate you with “clever/important”
• Key: excitement (catchy terms, links to important issues)
  – See R. Snodgrass and M. Brucks, “Branding Yourself”, ACM SIGMOD Record, June 2004
“Put yourself in their shoes”

- Effective communication needs to meet the needs of the audience/reader
- Why do they spend the time to listen/read?
  - Don’t assume they care about you or your goals
  - You must offer them value toward their goals
- How do they think about the topic?
  - There is often a “standard worldview” in a community
  - You must relate your work to their interests, approach, emphasis

Generally interested

- Most of the audience/readers will not be specialists in the topic
  - Eg audience at a departmental seminar
- They want to know what’s going on in the field, what are key topics
  - They have not read all the recent work you built on
- They may leave or lose interest if you get too technical

Specialists

- There will be a few people who work in the field (eg authors of the papers you read!)
  - They are not usually eager to accept your work
    - They often start by assuming that they already did whatever is needed, so you are wrong/ misguided/etc; they will be seeking to show your mistakes; they look at your work starting from their own assumptions
- They can fill in lots of obvious steps, but they want to see how you overcome the hard problems

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Writing a Paper

- Write for a particular community
  - Know which conferences/journals the community uses
  - Know the expectations (eg performance?, proof? etc)
- Don’t worry about length/format etc at first
  - It’s easy to change format
  - It’s possible to cut length as needed
    - Provide the extra material in a technical report
- Process may be top-down, or bottom-up, or (most often) mixed

Top-Down Writing

- Start with section headings
- Then choose subsection headings
- Then, key idea of each paragraph
  - i.e. paper as list of bullet points
- Finally, fill in fluent text of one paragraph at a time
- Then revise
  - Get feedback from friendly readers
Bottom-up writing

- Write fluent text fragments
- Then arrange them into a structure of sections etc
- Then do a pass to check it flows easily
- Then revise, based on feedback

Abstract

- One or two paragraphs
- Aim: to help a potential reader decide whether or not they are interested to read the rest of the paper
  - So make clear the key domain of your work
    - Eg automated analysis or manual analysis
    - Eg fault-tolerant or not
  - Also, indicate what you actually achieved
- Understandable by anyone in the field

Introduction

- General readers will concentrate on this section
  - Make sure you fit your work into the general agenda of the community
  - Discuss implications of your work for the field
- State your contributions explicitly and succinctly
  - Usually at end of the intro, just before (or integrated with) the overview of the paper’s structure

Related Work

- General readers will use this as survey of the important ideas of your field
  - it will help build other people’s reputations
    - So be sure to cite the seminal work
  - It must be well organized
- Specialists will check that you have cited them sensibly
  - And use this to help see how your work fits into the field
  - So be sure to explain how you differ from each cited source, esp if you make different assumptions or solve a different problem!

Core Technical Sections

- General readers will likely skim this
  - Make it easy to start in any subsection
    - Initial sentence re-establishing key idea
  - Make it easy to find things used later
    - Put key definitions, notation, restrictive assumptions in groups, with use of bold to draw attention
- Specialist readers will be seeking obvious errors or weakness
  - Make sure you defend, by dealing with issues
    - Eg point out a difficulty you had to overcome
    - Eg acknowledge drawbacks, and explain why this isn’t fatal

Common Paper structures

- Abstract
- Introduction
- Related Work
  - May be moved to later
- Claim
- Evidence
  - Maybe called “Evaluation” or “Proof”
- Conclusion and Future Work

Common in Systems and Theory, where Research Method is obvious
Conclusion

• This section is usually short
• Re-state the main contributions, and the sort of evidence you provide
  – Often similar wording to end of introduction!
• It’s usual to mention ways in which you would/could extend the work
  – Partially as “turf claim”
  – Partially to increase interest in the work

Shortening the length

• Conferences usually have very short papers (eg 5 pages in AI, 10 in theory, 12 in databases)
  – You will often need to cut material from the paper to meet this “page limit”
  – Reference a technical report where you publish the full version
• Reduce the technical material, but leave indications of what was difficult
  – Eg replace proof by “sketch of proof”, or leave out design detail
• If needed, cut words, cut sentences, join paragraphs
  – especially where paragraph has just a few words on the last line
  – play with white space

Common mistakes

• Historical focus (“Diary” style)
  – Paper follows wrong turns, shifting ideas
  – Paper concentrates on an implemented or designed system, rather than on the ideas that are the contribution in the design, or the understanding that resulted
• Hidden assumptions
  – Paper doesn’t clearly indicate restrictions on applicability (eg “this requires a workload with mostly read-only ops”, “our design doesn’t deal with faults like message loss”)
  – Paper doesn’t state which performance aspect you are trying to do well on (eg “we aim to reduce peak congestion”)

Tools

• Microsoft Word is very common
• Especially in theory community, LaTeX is often used (for excellent equation support)
  – There are environments that give WYSIWYG
• Standard styles for each conference series, journal etc
• Tools to manage bibliography (eg BibTeX, EndNote, Refer)
  – Keep a single repository with info about all documents you might cite

Thesis

• Thesis structure is similar to a paper
• But with much more detail, and a different goal
  – To impress a few markers!
    • For PhD, MSc the markers are experts
    • For Hons/MIT, the markers are not experts
  – So show your breadth of knowledge, your insights, your care in evaluation

The Introduction

• The Introduction to a thesis should tell the reader what was accomplished and why one cares about this
  – Suitable for generalist
  – Many staff or potential employers will read this, and nothing else, to judge author’s skills in both research and exposition
• It provides the “big picture” that puts the later details in context
• Typical length 5p to 15p
Road-map to the Introduction

- The following rhetorical structure is very common, though often implicit (work of Swales)
- I: Establish the field
- II: Summarise previous research
- III: Prepare for current research
- IV: Introduce present research

Adapted from talk by Prof Janet Wiles (UQld)

I. Establish the field

- Describe the whole subfield and its main purpose(s)
  - Try to show importance for industry, society etc
  - Eg “the field of multimodal interfaces aims to make computers that can be used by people in the styles they already use for inter-human communication, like speech or gesture, because these should be easier to learn than a restricted command language that must be typed”
- This discussion can be repeated at several levels of specialization
  - Eg “HCI; interface design; multimodal interfaces; gesture-based interfaces”

II. Summarise previous research

- What are the core ideas that have been accepted in this subfield
- Cite seminal papers, but don’t discuss each in detail
- This should leave a positive feeling: “look how much we know/understand”

III. Prepare for your research

- Identify at least one gap: what is not known yet
  - Eg “so far, all the methods decide to cache or not one relation at a time; systems have not tried to cache some rows only from a relation”
  - The gap may be an interaction “we can optimize register usage, and we can optimize power, but it is not yet known how to reduce both at once”
- Show implications of solving the gap
- Discuss possible methods to solve the gap

IV. Introduce your research

- Clearly state what contribution(s) you have made
  - Or “will make” if you are writing a proposal
- Clearly state what evidence you offer for the contribution
  - Relate the evidence to a standard research method (unless that is obvious)

Literature Review

- In a thesis, the literature review is used to show that the author knows and understands the connections between their work and the field
- Typical length 10-20p
- Often could stand alone as a survey of the field
  - See articles in ACM Computing Surveys for inspiration
Styles of literature review

- Present some taxonomy of the field, and then discuss each aspect
  - Eg “A security system needs to (i) somehow identify the principals, (ii) classify the operations, and (iii) decide who can do what”
- Identify several axes of variation, and place works along these
  - Eg classic “Gartner quadrant”
    - Lazy propagation
    - Eager propagation

Discussion of each previous work

- Do explain the key contribution of the work (at the time it was done)
  - Don’t just repeat the words of the paper
  - Show context (eg “this was done to remove XXX feature of [cite]”; “this was extension of the authors earlier work [cite]”)
- Do show how terminology of paper corresponds to later/standard/your terminology
- Do discuss strengths of the paper that are out of scope of your research
  - Don’t just criticize paper for not solving what you are interested in
    - Be respectful but not fawning

Conclusion of literature review

- Identify the community
  - Their main publication forums
- Identify main relevant goal(s) of the community
- Identify what the most significant ideas have been
- Show achievements and gaps
  - Your thesis will presumably address one gap

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Types of Talks

- Conference talk
  - Usually 15-25 mins
  - Audience is in the broad field (often authors of other papers at same conference!)
  - Mainly to persuade audience to read the paper in proceedings!
- Seminar talk
  - Usually 50-75 mins
  - Audience is very diverse (eg students and academics from a whole department)
  - Mainly to build your reputation, and to increase interest in your field

Structure

- Introduce yourself (brief!)
- Introduction (about 40% of the time)
- Key ideas (about 20% of the time)
  - You don’t have to cover the details (they are in the paper)
  - Focus on something hard or clever, and show why it is hard/clever
- Further work
- Conclusion: repeat the contribution
  - What the audience will remember from your talk!
- Questions
  - at least 5 mins; at a conference the session chair will set your time limit to allow this!
### Tools
- Microsoft Powerpoint is almost universal for producing presentations
  - There are alternatives such as Latex Beamer class
  - A laser pointer can sometimes be helpful, or use the computer’s mouse cursor to focus attention on key part of diagram
- Have a backup printed set of OHPs
  - In case hardware/software is incompatible, or simply broken at the time
- If your voice isn’t strong enough for the venue, use microphone

### Mistakes in preparation
- Too much detail
  - Not enough introduction for general audience
- Not enough structure
  - Audience gets lost and finds it hard to rejoin the argument
  - Repeated outline overhead can help
- Too much animation in overheads
  - Or too many fonts/colours/artwork
  - The audience should be able to get the key ideas just from the overheads

### More mistakes
- Poor or missing concrete examples
  - General ideas need to be shown in specific situations
    - Eg trace one execution of your algorithm or system design
    - Eg show screen shots of an innovative UI, or sample programs in your new programming language
- The examples need to be simple, and illustrate the important point
  - Keep them consistent: it’s very hard to find an example which can illustrate several different aspects, but the benefit to listeners is great
- Don’t try to invent examples “on-the-fly”

### Mistakes in Delivery
- Reading the overheads
  - Instead of talking around/about them
- Not enough eye contact and vocal variety
- Bad timing
  - Audience suffers if you have to rush through the last part of the talk
  - Or if you don’t get to it at all
  - Less damage from a talk that’s too short
- Bad pacing
  - Speaker moves ahead into details/solutions while a previous overhead is still showing, so when the next overhead is shown, it has already been discussed!

### Rehearsal
- Get the length and pacing right
  - It’s hard to judge until you actually speak it
    - One overhead might take 1 minute, or 5 minutes
    - The same overhead can be stretched or shrunk
- Make yourself comfortable with the structure, and content
  - Know what is ahead
  - Also, get fluent (don’t stumble over words)

### Job talk
- In academic hiring, it is normal to have the shortlisted candidates give a seminar
  - In US, also spend a few days, meeting everyone in the dept
- Similar to normal research seminar, but
  - More on the future research agenda
  - Often cover many pieces of previous work, and try to make them look coherent while showing diversity of speaker’s skills!
  - Speaker is showing how clever they are
  - Speaker is showing how clearly they can explain a field
Key lessons of this lecture

- Keep in mind the goals and assumptions of your targets
  - Make the presentation useful to them, and to your own goals
- Revise, revise, revise!
  - Give practice talks, have friends/supervisors read draft versions of papers
  - When someone misunderstands something, you must revise to prevent the same mistake by others (misunderstanding is the fault of the author, not the reader!)