



Research A

Lecture 2: Elements of a research project

Lejla Batina and Peter Schwabe

Slides credit: James Mc Kinna



Outline

- Admin and status
- Your research project
- Proposal writing
- Presenting your work

- **Disclaimer:** This is not a course on Academic (English) writing!

Part 1: Admin and guidelines

Organisation

- Officially, we should meet on Wednesdays
 - 35+(!) students in BB (17-18 groups)
 - => progress meetings from 9:00 and in the afternoon (Wed)
- Blackboard will be used for
 - assignments, reading material
 - grading
- So: make sure you are enrolled, and that you are comfortable with Blackboard (!)
- When sending e-mail please put **Research A** in the subject line (send it to **both** teachers)
- Remainder: next Tuesday is your first deadline
 - e-mail with 2 names, title of your topic, supervisor

Next deliverable deadline: Proposal submission

- Friday, Sept. 27, 15:00!
- Send e-mail to Peter and Lejla
 - Attach your slides as “Names_proposal.pdf”
- Presentations on Oct. 2:
 - 10 min + 5 min Q&A
 - Both students should speak
 - Timing!

Goals of the Course

- **Ultimate goal:** to produce a research paper
- ... and the associated proposal and slide presentations
- To understand what makes a good, or bad, paper
- Around 2 broad themes:
 - **Big Data**
 - **Internet of Things**
- Work in groups of two; individually – only by agreement with us (*very* exceptional)
- Main focus is on **methods** (literature search, writing skills, time management, ...) rather than original research contributions

Standards

- Language is English
- File formats: .pdf for papers and slides
- Which tools you use to produce them is a matter of choice
- Later in Research B, you will be expected to use LaTeX, so consider learning it now

Obligations

- Lectures are optional (slides will appear online)
- Attendance at presentations is **mandatory**
- Additionally: periodic (every 2 weeks, typically) progress reviews with us and supervisors, also **mandatory**
- A few assignments and home works will be posted via Blackboard

Professional scientific research

- Identifying interesting problems, analyzing and solving them (if only partially)
- By means of well-formulated research question
- By using respected, well known methods,
- So that the observations and results are reliable, repeatable and reliably repeatable

From questions to answers

- Start with a (partial) question
- Search for and find material
- Work on the material to make it suitable for your research
- Analyze this suitable material
- Interpret the results
- Formulate a partial answer; then iterate

Criteria for suitable questions?

- Scope or knowledge area
- What is the research about?
- What is the point of view?
- Relevance
 - Why is it worth doing this research?
 - There must be a reason!
 - Is it a theoretical relevance, or scientific, or practical, or for society?

Other criteria

- Precision
 - The question needs to be formulated precisely
 - What exactly do you want to learn from the research?
 - What kind of result should it derive?
 - Describe what you want: A literature study? A scientific paper? A prototype? Some statistical conclusions? ...
- Methodology

Methodology

- Logical reasoning: do the conclusions follow from your (experimental) hypotheses?
- Do you know what you are doing?
- Can you trust what you are doing?
- Easy to make mistakes:
 - wrong models, wrong hypotheses, wrong observations
 - systematic vs. incidental errors
 - draw conclusions outside the range of reasonable prediction

Literature

- Official
 - Strong reviewing process (reliability)
 - Books
 - Papers in scientific journals
 - Papers in proceedings of scientific conferences
- Unofficial, *grey literature*
 - Unreliable: little or no refereeing process
 - Unchecked — Wikipedia articles?
 - “Wisdom” of crowds — Google rankings?
 - Journalism
 - Bachelor’s and master’s theses
 - Workshop publications

Part 2: Research Project



FAQs

- What does it mean to do research?
- How will I ever get it all done?
- How to take notes?
- What is a bibliography?
- What are background sources?
- How do I focus my research?

Why research?

- Work in many academic and professional disciplines depends on it
- To research = to explore problem systematically
- A researcher: a careful, critical, systematic thinker who goes beyond memorizing facts
- Buying a TV requires also research

Narrowing and focusing the topic

- Search engines again
- Talk to other people
- Find out about research questions
- Develop a working hypothesis: what do you expect to find out

Steps to undergo for writing a paper ≈1 week per step

1. Select a topic, articulate starting questions, begin background research, schedule a time frame
2. Build a working bibliography
3. Read and evaluate sources, take notes on relevant sources, comment on the importance of sources
4. Start conducting research, identify gaps
5. Begin preliminary writing
6. Write the main statement that will guide the rest, sketch an outline of the paper
7. Write a draft of the paper including bibliography
8. Revise and edit, ask for feedback
9. Print and proofread the final copy

A working bibliography

- A listing of books and articles on a particular subject
- When submitting a research shows which sources you consulted
- Start creating one in the beginning, which will grow as your research progress
- Include accurately all the info

Gather background information

- Compile a list a key words
- Background reading in general reference books
- Interviewing experts
- Search the web

The research paper

- A form of written communication
- Should present information and ideas clearly and effectively

Steps for writing

- Determine your purpose in writing the paper (to describe, to explain, to argue, to persuade the reader to think)
- Consider the type of audience
- Develop the main statement expressing the central idea
- Gather your ideas and info in a preliminary list

Steps for writing (cont'd)

- Arrange materials in an order appropriate to the aims of the paper
- Make a detailed outline
- Write a preliminary draft
- Read it critically and try to improve
 - Revising, rearranging, adding/eliminating words/phrases/sentences
- Proofread the final draft

Taking notes

- After verifying the publication info for a source, the next step is to read and evaluate
- You should not assume something truthful or trustworthy just because it is in print
- When you find some reliable material you should takes notes on it
- Essential to research but probably no 2 researchers use the same method
- Careful note-taking helps you avoid the problem of **plagiarism**

3 methods for note-taking

- Summary
- Paraphrase
- Quotation (use “” here)

- Each one more detailed than previous

Plagiarism

- Using someone else's ideas or phrasing and representing those ideas or phrasing as our own, either on purpose or through carelessness, is a serious offense known as plagiarism
- From the Latin word “plagiarius” – (“kidnapper”)

Some literature

- J. Gibaldi and W. S. Achert: *The MLA Handbook for Writers of Research Papers*, 3rd edition.
- A. Hult and T. N. Huckin: *The New Century Handbook*, 2nd edition.
- Robert A. Day and Barbara Gastel: *How to Write and Publish a Scientific Paper*

Part 3: Your Proposal



Research Proposal

- Checklist
 - Abstract
 - The problem
 - Motivation
 - Theoretical scope
 - Strategy
 - Time schedule
 - References
- Note that these items do not have to match the sections

Abstract

- The most read part of the proposal
- Maybe even the most important part
- Sell your work: point out why your research is important
- Sell your work: summarize what you will be doing
- Your abstract should not be a summary of the proposal but of the research
- Should be understandable even for non-specialist

The problem

- State the problem
- Research question(s)
- Hypothesis?
- Possible sub-questions

Motivation

- Why is it important that someone does this research
- Why do **you** want to do this research
 - Maybe not applicable in all cases

Theoretical Scope

- Theoretical background
- Related works
- Definitions
- Assumptions
- Scope: What will be covered by the research and what not

Strategy

- How things are (going to be) done
- Collecting information
- Analyzing information
- Which activities will be done . . .



Time schedule; planning

- Which activities will be done when
- Which deliverables will be delivered when
- Deliverables should deal with logical sections
- *Stick to the plan!*
- . . . or explain why you changed it!



References

- List of (probably) relevant references
- Scientific literature
- Wikipedia (and many other websites) do not count as scientific!

Pro-forma proposal

- who you are; what is your title;
 - what is the (well-defined) domain of study?
 - what is (are) the algorithm(s) you will study?
 - why is it interesting? and to whom?
 - what question do you hope to answer
 - how do you plan to do it?
-
- All this should fit into 5-6 pages

Recap

- Statement of a problem
- Literature review
- Conceptual framework
- Research questions
- Methodology
- Scope of work (what exactly will be done)
- Planning

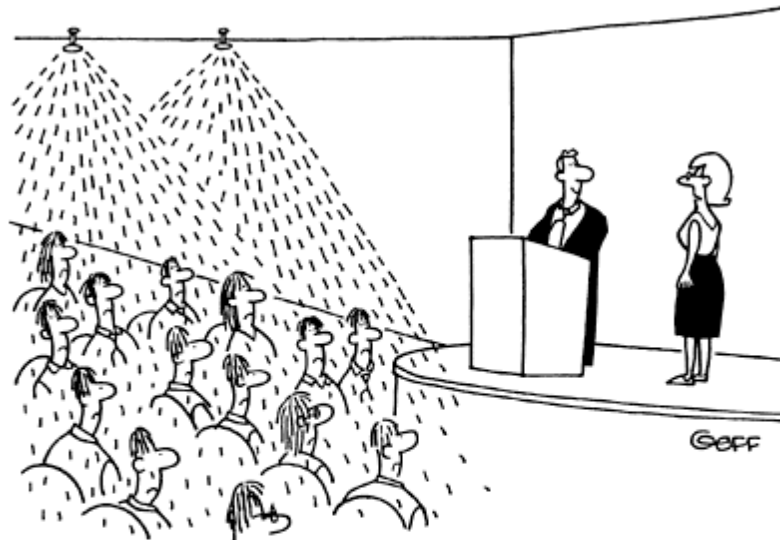
DOs and DONT's

- Write clearly
- Make it easy (and pleasure) to read
- Abstract and Introduction should be written for a non-expert
- Give it to a colleague to read
- ... and be open for (constructive) feedback



Part 4: Presenting your work

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**"You're not allowed to use
the sprinkler system to keep
your audience awake."**

Less is more

- 10 minutes is *very little time!*
- 1min/slide is hard to keep to
- don't read from your slides
- avoid fancy fonts
- avoid small writing

Less is more

- A slide full of text: read or listen
- Not more than x lines ($x = 7?$)
- Use pictures (whenever possible -> ideally on every slide)
- Text on slides is not for you but for the audience
 - If necessary use notes that appear only on your screen
- Your talk is an advertisement for your work, not a replacement!
- The take-home message of the talk: Read the paper!

Pro-forma talk

- who you are and where do you come from
- what is the (well-defined) domain of study?
- what is (are) the method(s) and application(s) you will study?
- why is it interesting? and to whom?
- what question do you hope to answer
- how do you plan to do it?

Pro-forma delivery

- the IBM way:
 - say what you are going to say
 - say it
 - say what you have said
- too hard in 10 minutes?
- don't be tempted to talk quickly; just like too much text on the slide



Preparing a talk: Recap

- Motivation: Why?
- Difference from other related work: What? How?
- Evidence that your work is valuable
- **Take-home message**



Giving a talk: Recap

- Practice, practice, practice
- Introduce yourself
- Concentrate
- Speaking: don't rush, use a pause
- Timing
- Closing

Dont's

- Laser pointers (only if you use them properly)
- Looking constantly into your screen (or the slides showed to your audience)
 - You should know your slides!
- “I’m running out of time, so I’ll just...”
 - Leaves a sloppy impression

Homework

- Listen the following lecture:

<http://www.inf.ethz.ch/personal/markusp/teaching/guides/guide-presentations.pdf>

- Prepare a 3-minute presentation for next lecture (September 25), topic – free choice, no text on slides, just pictures), no notes