How to write a better thesis

Dr. Sunu Wibirama

sunu@ugm.ac.id

Department of Electrical Engineering
and Information Technology
Faculty of Engineering
Universitas Gadjah Mada
INDONESIA

Modern Research Methods

How to Write a Better Thesis
Third Edition
David Evans · Paul Gruba · Justin Zobel
Springer

Sunu Wibirama

Positions

❑ 2008 – now : Lecturer in Department of Electrical Engineering
and Information Technology, UGM, Yogyakarta
❑ 2015 : Research fellow in Tampere Unit for
Computer-Human Interaction (TAUCHI),
Tampere University, Finland

Education

❑ 2014 Dr.Eng. Science and Technology Tokai University, Tokyo, Japan
❑ 2010 M.Eng Electronics Engineering KMITL, Bangkok, Thailand
❑ 2007 B.Eng. Electrical Engineering UGM, Yogyakarta, Indonesia

Interests

❖ Human-computer interaction
❖ Eye tracking applications
❖ Virtual and augmented reality technology
❖ Modern research methods, technology commercialization

http://wibirama.staff.ugm.ac.id

What is Thesis

THE ORIGIN OF THE THESES

- Thesis : an extended argument with **logical, structured, and defensible reasoning** based on **credible evidence** to support **original contribution to knowledge**

- Master thesis : 1-2 years.
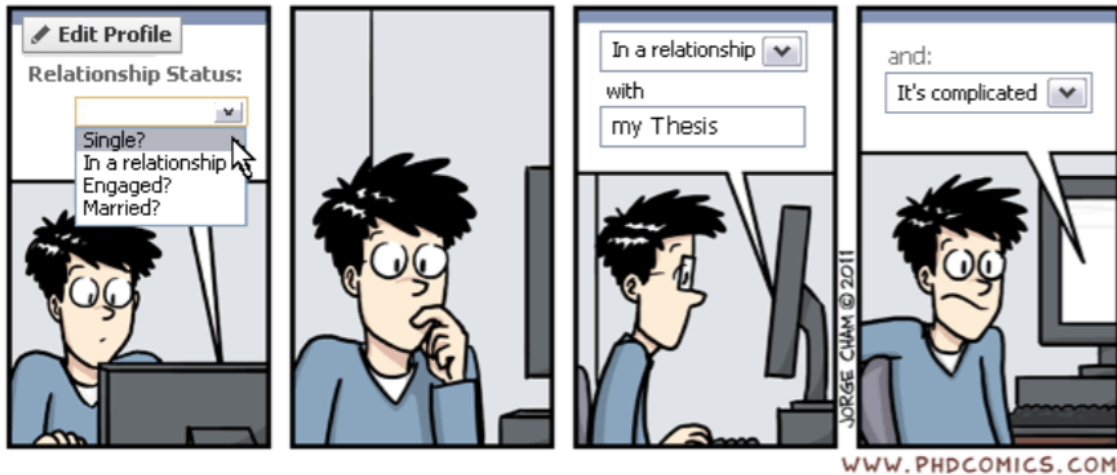 PhD thesis: 3-5 years.

Scientific Contribution in Academic Research

Border of world's knowledge

Your knowledge

Your learning progress

Expected contribution to the world's knowledge
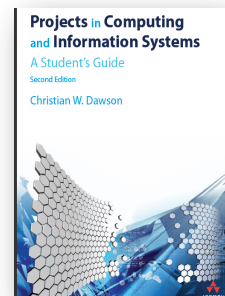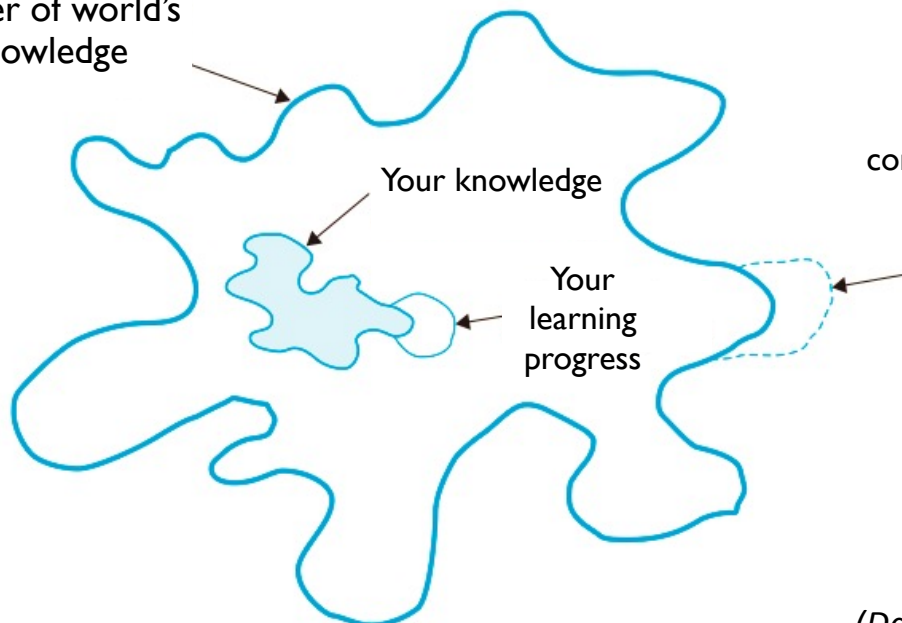
(Dawson, 2009)

Writing thesis is hard

- It is your responsibility, not your supervisor

- It takes quite long time and a lot of work

- Narration (story) is equally important to structure

- You are normally trained technically, not in scientific writing

- Procrastination, mental block, and "do first, write later" adagium

Successful Thesis?

- The thesis makes distinct **contribution to knowledge**

- The contribution is supported with **credible and verifiable evidence**

- The thesis shows that the candidate has **a thorough grasp of appropriate solution** for research problem and **awareness of their limitations**.

- The thesis shows **deep understanding, authority in candidate's field** and **broad knowledge in relevant fields**.

- The thesis shows **ability to communicate research findings** effectively in the professional arena and an international context.

Choosing your supervisor

- Research interests

- Productivity in research

- Track records matter!
  Get testimony from previous student

- Personal compatibility, working style

- Knowledge of research methodology

Choosing your topic
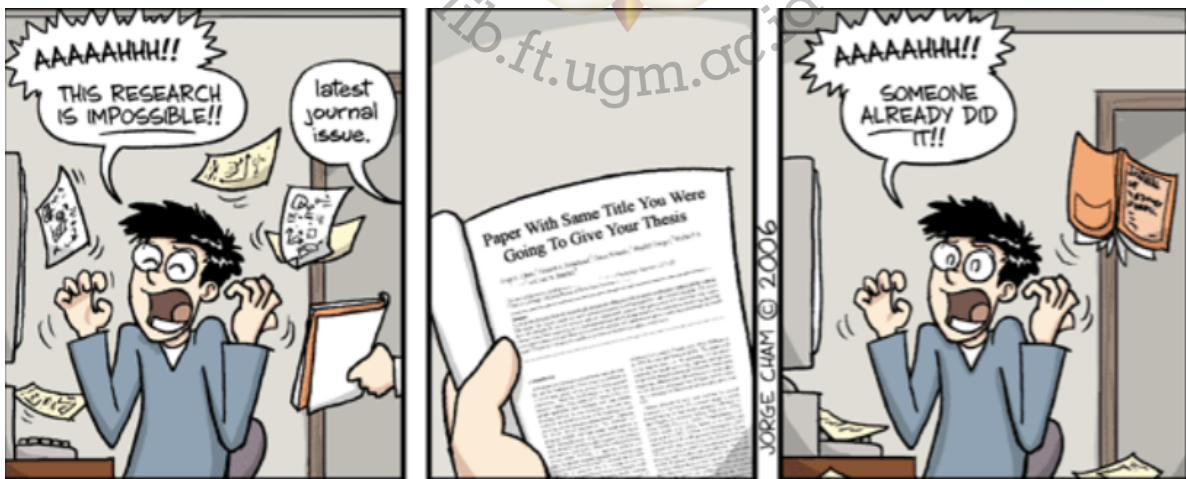
- Make sure that you like your topic.

- Ask and read background work before commiting.

- Working on something new (remember: contribution to knowledge).

- Know how to "contribute scientifically" in your field.

- Fast growing field (IT, computer science): read latest papers (less than 5 years old)

The myth of writing

Reasons for not writing

I don't have any time for writing
I can't write in my office
I'm not ambitious
My teaching comes first
I review papers regularly, but I don't write myself
I don't want to play the publications game
I'm too tired when I get home to do any writing
I resent giving up so much of my personal time
I do a lot of writing, just not for publication
No one will read it anyway
I'm probably just afraid of rejection
I don't write well

Writing thesis
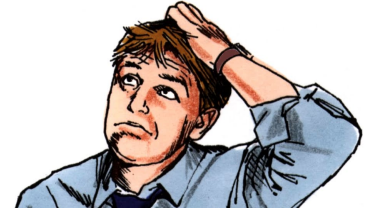
· **Reading is hard, but writing is harder**

- Use simple structure in sentences

- Start early, revise often.

- Drive reading with your writing

- Choose good and cozy environment

- Finding best performance (day or night?)

- Scheduled time

Writing process

· **Prewriting (60%)**
  - Organize and synthesize information
  - Define a take-away message
  - Outline and road map

· **Write draft (10%)**
  - Just keep writing

· **Rewrite and Revision (30%)**
  - Read out loud, cut the clutter, simple structure
  - Correct mistakes
  - Get feedback
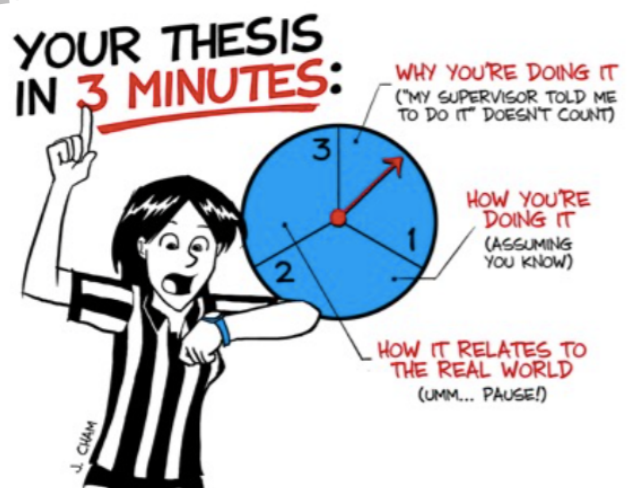
Thesis outline
and suggested writing order

- Abstract (6)

- Introduction (4/5) ⟶

  > Background
  > Research problems
  > Aim and scope
  > Contribution

- Literature Review (1) ⟶

  > Related works (research positioning)
  > Theoretical foundation (justification of selected approach)

- Proposed methods (2)

- Results and Discussion (3)

- Conclusions (4/5)

Abstract

- Completely independent of your thesis

- People read abstract to know if they will read your thesis or not

- Overview of the main story:
  - Why you are doing it (background, your goal)
  - How you are doing it (methods, key results)
  - How it relates to the real world (conclusions, implications)

YOUR THESIS IN 3 MINUTES:

WHY YOU'RE DOING IT ("MY SUPERVISOR TOLD ME TO DO IT" DOESN'T COUNT)

HOW YOU'RE DOING IT (ASSUMING YOU KNOW)

HOW IT RELATES TO THE REAL WORLD (UMM... PAUSE!)

Introduction

- Introduce / define your area in general.

- Put general issue faced by society to put your thesis in broader context

- What is known

- What is unknown (research gap)

- Your question and your goal

- How will you solve your question

- Why is your approach different and important

  - "So what" test

- Roadmap of your thesis

Research Gap

The scientific gap
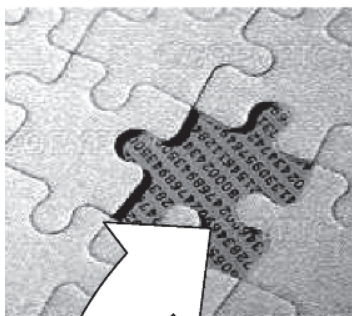
Your "plan-of-attack" -- i.e., the combined recipes from your Materials & Methods

Reference: M.J. Katz, "From research to manuscript", 2nd Edition, Springer, 2009
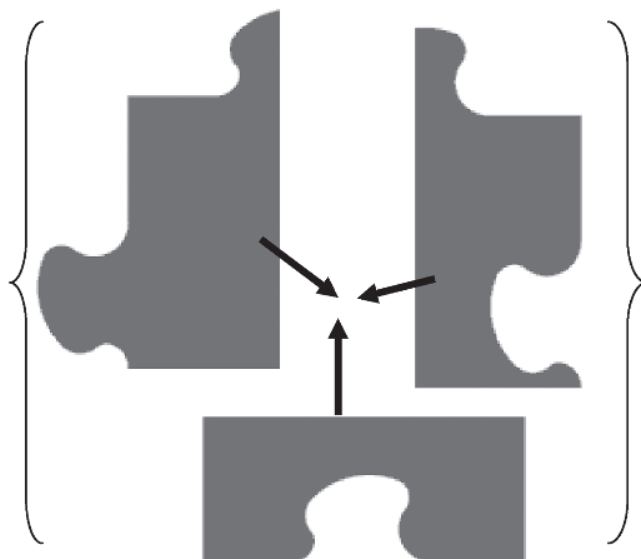
Background

- Give the big picture of your field

- Give context and introduce state-of-the-art work in your field

- Introduce the limitations of these works and why these works don't solve your problems

- Give hints on what your solution will have to address

- State your judgment of your proposed solution

- State your hypothesis (optional)

Proposed methods

- Design of proposed approach, system, algorithms, etc.
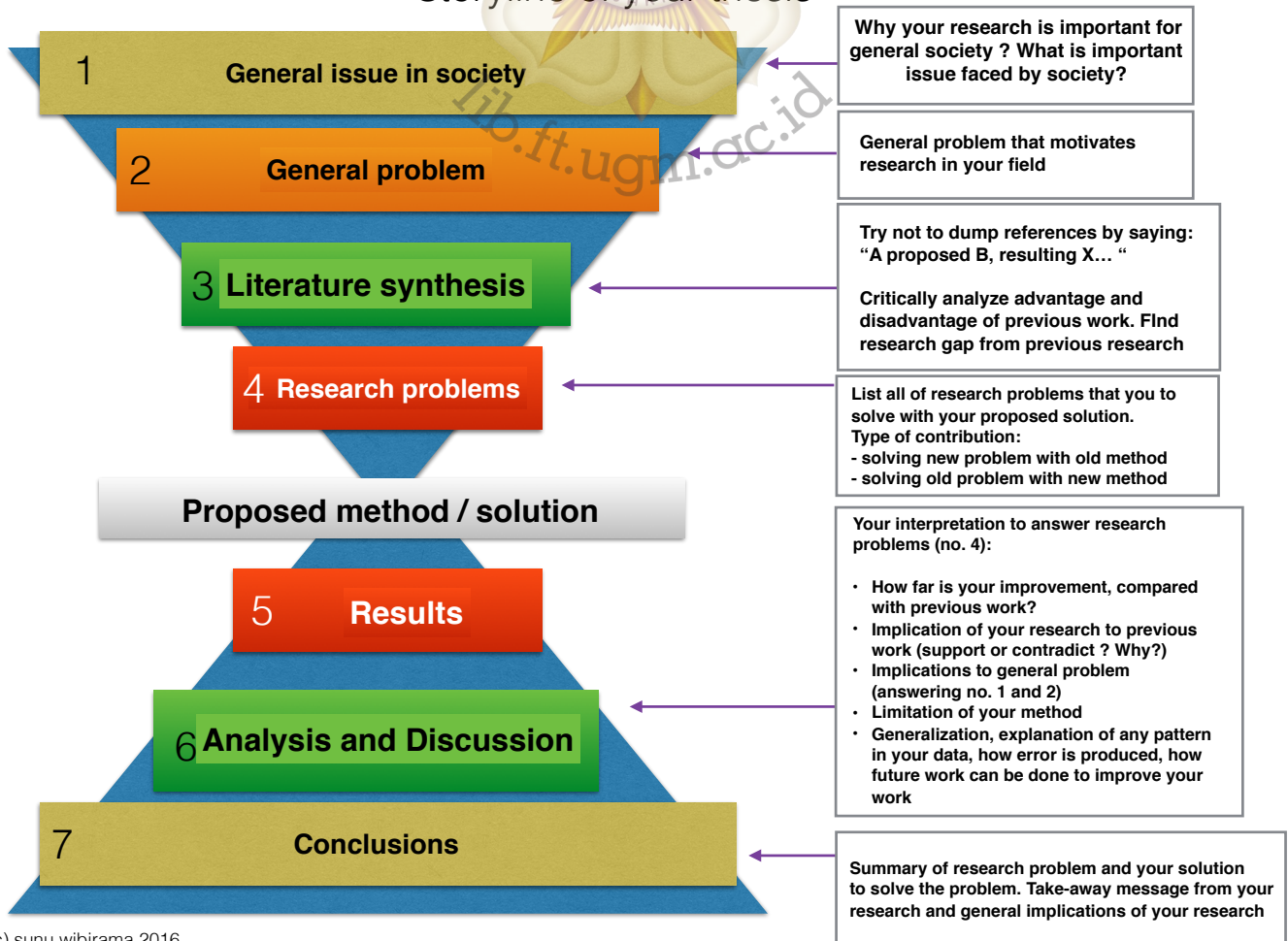
- What is the dataset and how to obtain it

- Configuration of devices

- Design of experiment

- How to evaluate your methods

Discussion

- Improvement of previous work

- Explanation of pattern from your results

- Limitations of your work (trade off)

- Implications of your results to answer your research problem and to achieve your goal

Storyline of your thesis

|	
1 General issue in society	**Why your research is important for general society ? What is important issue faced by society?**
2 General problem	**General problem that motivates research in your field**
3 Literature synthesis	**Try not to dump references by saying: "A proposed B, resulting X… "** **Critically analyze advantage and disadvantage of previous work. FInd research gap from previous research**
4 Research problems	**List all of research problems that you to solve with your proposed solution. Type of contribution:** **- solving new problem with old method** **- solving old problem with new method**
Proposed method / solution	
5 Results	**Your interpretation to answer research problems (no. 4):** • **How far is your improvement, compared with previous work?** • **Implication of your research to previous work (support or contradict ? Why?)** • **Implications to general problem (answering no. 1 and 2)** • **Limitation of your method** • **Generalization, explanation of any pattern in your data, how error is produced, how future work can be done to improve your work**
6 Analysis and Discussion	
7 Conclusions	**Summary of research problem and your solution to solve the problem. Take-away message from your research and general implications of your research**

Preparing dissemination plan

- PhD and some Master program are research degree. Publication is obligatory —> Publication milestones.

- You should break down your work to smaller "goal", each of which presents a novelty.

- Expertise of supervisor: breaking down a big topic to smaller topics. Consult your supervisor

Final Tips

- Prepare, and practice writing

- Set *realistic* goals and do your best to accomplish them

- Stay focus!

- Follow a schedule
  - Fix an amount of working hours
  - Create work habits
  - (whatever works for you)

- Eat, sleep and exercise
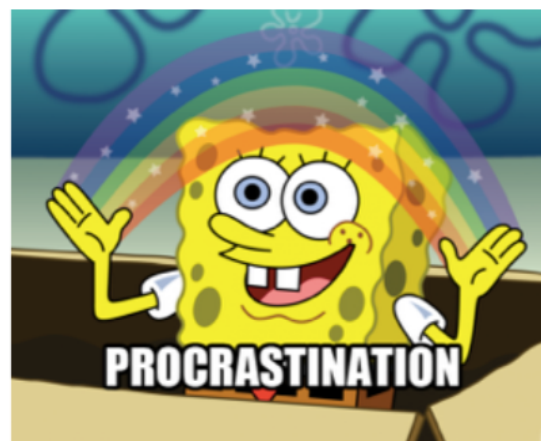
(Sofia Gomes, 2016)

Final Tips

- Stay optimist

- Don't try to make it perfect

- Follow a schedule

- Ask for feedback

{FINISHED
is better than
Perfect}

(Sofia Gomes, 2016)

If you want to become academician,
then you ~~have to~~ must love writing.
If you hate it, get over it

Help!
I Hate Writing!

"Thank you"

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