Strategies for EffectiveThesis/Dissertation Writing

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Effective Thesis/Dissertation Writing

- Beginning
  - Adviser
  - Topic
- Staying on Track
  - Time Management
  - How to read a paper
  - The importance of Preliminary Work
  - Getting organized

What is the first step in doing a thesis/dissertation?

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Choosing:

What is the first step in doing a thesis/dissertation?
Choosing: Adviser

What is the first step in doing a thesis/dissertation?

Choosing: Topic

Why is the choice of one's adviser important?

- Your adviser will be a significant influence to your graduate career

- It's a long term commitment

- Establish a relationship that transforms
    - You do not start as equals: apprenticeship
    - Should end as colleagues
    - Some even continue to help or mentor beyond the thesis/dissertation

R. Lipshitz, "On Choosing a Thesis Advisor", *Notices of the American Mathematical Society*, pp. 191-193, February 2019. Available: https://www.ams.org/journals/notices/201902/rnoti-p191.pdf. [Accessed June 3, 2019].

M. Loui, "How to Choose a Thesis Advisor", February 5, 1997 (Revised January 24, 2004). [Online]. Available: https://web.eecs.umich.edu/~imarkov/advisor.html. [Accessed June 3, 2019].

Some criteria for choosing an adviser

- Has expertise in your topic of interest
    - Are you interested in X's research area?
    - Are you comfortable discussing <topic> with X?
- Actively doing research and advising
    - Advising is a different skill from research and classroom teaching
    - Has resources, project funding, contacts
    - Up-to-date

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Some criteria for choosing an adviser

- Is *X* expected to be around for the duration of your MS or PhD studies?

- How does *X* expect students to find research problems?
  - Gives first research problem?
  - Discusses open questions?
  - Expects students to find their first problems?

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How to choose an adviser

- Take a course with a potential adviser

- Read up: grant proposals, publications, etc. of your potential adviser

- Consider working with two advisers

- Meet and interview a potential adviser
  - Personal chemistry is also important!

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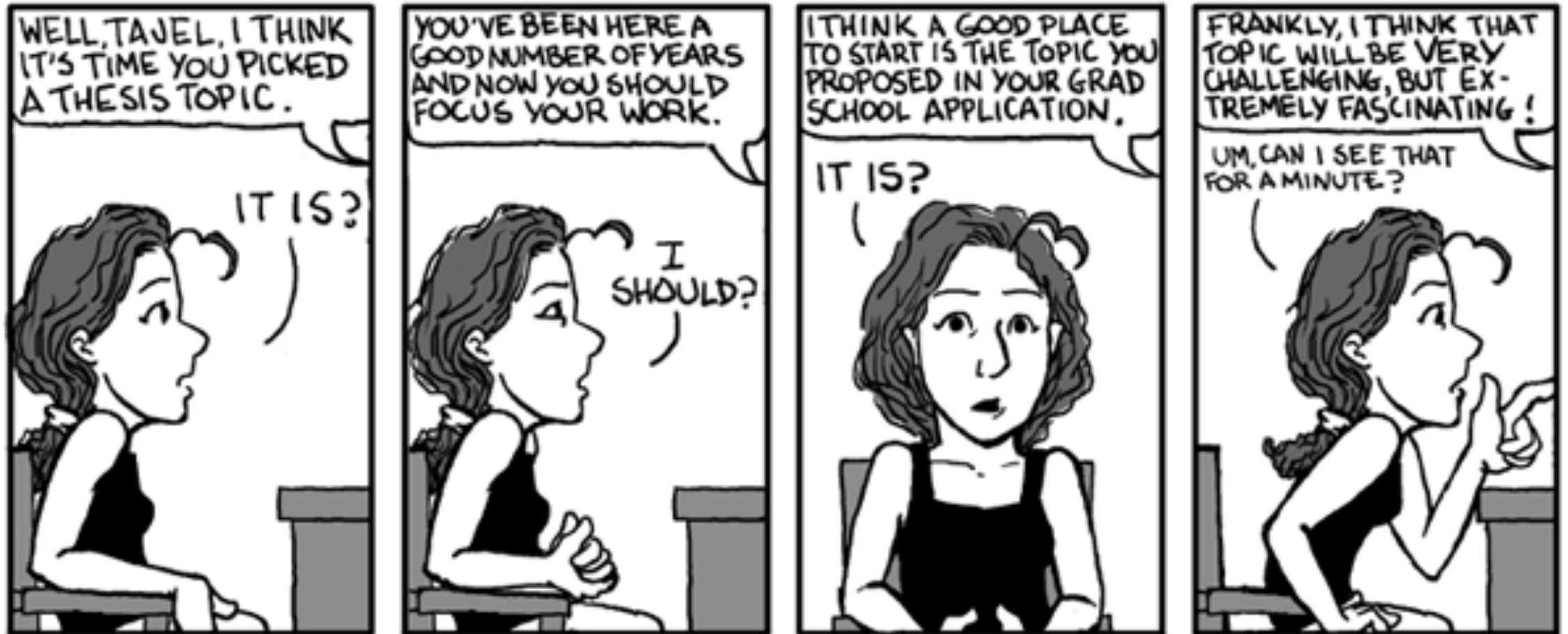
If no choices: be flexible ☺

(Psych yourself and set your expectations)

Getting along with your adviser

Remember: your adviser is on your side

- Openly communicate with your adviser
  - Inform about your strengths and weaknesses
  - Devise a detailed plan with your adviser to address shortcomings wrt thesis/dissertation work
- Meet regularly
  - NEVER, NEVER, NEVER skip a meeting
  - …especially when you encounter thesis problems
  - Report good results AND bad results
  - Clarify deliverables for next meeting
  - Bring all papers, results, etc.

Choosing a Topic

J. Cham, "Thesis topic - grad school application", *Piled Higher and Deeper*, www.phdcomics.com. [Online].

Choosing a Topic

J. Cham, "Thesis topic - Epiphany", *Piled Higher and Deeper*, www.phdcomics.com. [Online].

Choosing your topic

- Feasible with resources on hand
  - Hardware/software tools
  - Access to raw data
  - Adviser experience
  - Tech support
- Significant
  - Distinguish your contribution from existing work
  - Contribute to lab's research program
- Interesting

Tips on choosing a topic

- Join a lab or research group
  - More tech support
  - Easier to identify topics
  - Contribute to the group's progress

- Converse with peers / people in your lab
  - Day-to-day *deep, intellectual* discussions promote creativity and innovation

Staying on Track

"Full-time" grad students are not entirely full-time

- Daily errands
- Duties to family, loved ones
- Administrative overhead
- Traffic / daily commute
- Physical and mental exhaustion
- Facebook, Netflix, …

Time Management

- Detailed planning
- Risk management: Plan A, Plan B, …
- Explicit day-to-day sched

The key is not to prioritize what's on your schedule, but to schedule your priorities. — Stephen Covey

- Start with your goals, prioritize them, then focus on the most important tasks that will help you achieve your goals
- Use an Eisenhower Matrix

① **Do First**

First focus

on important tasks

to be done the same day.

② **Schedule**

Important, but

not-so-urgent stuff

should be scheduled.

③ **Delegate**

What's urgent,

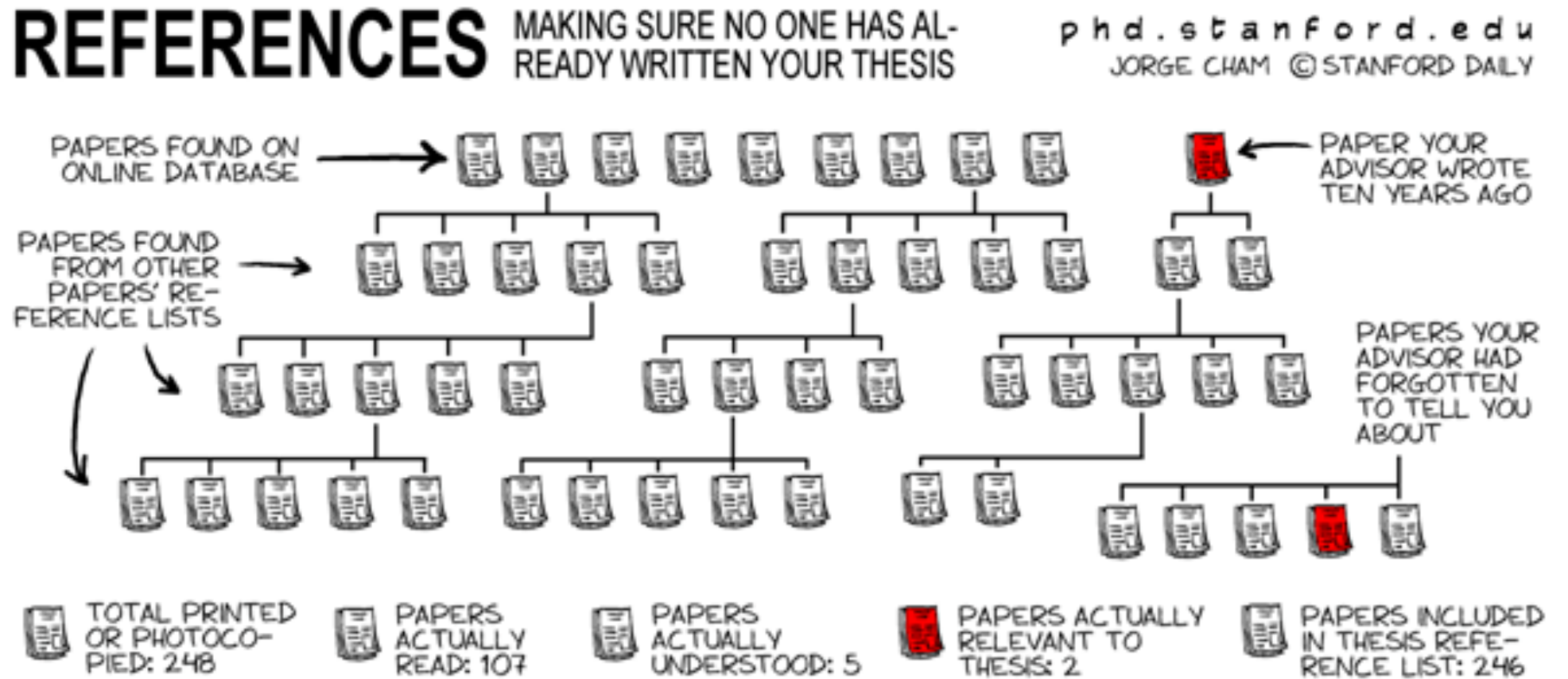but less important,

delegate to others.

④ **Don't Do**

What's neither urgent

nor important,

don't do at all.

Introducing the Eisenhower Matrix, www.eisenhower.me. [Online]. Available: https://www.eisenhower.me/eisenhower-matrix/. [Accessed June 3, 2019].

The "rock, pebbles, and sand" analogy

Image taken from: http://www.mattdouglas.com/wp-content/uploads/2014/01/jar-of-rocks.jpg

Reading papers

J. Cham, "References", *Piled Higher and Deeper*, www.phdcomics.com. [Online].

How to read a paper: Three-Pass Approach

- First pass
  - Title, abstract, introduction
  - Section and sub-section headings – *ignore everything else*
  - Conclusions
  - The Five C's:
    - Category: measurement paper? Analysis paper? Prototype?
    - Context: what is it related to? Theory?
    - Correctness: assumptions appear valid?
    - Contributions
    - Clarity

First pass is reading for breadth

- Bird's-eye view of the paper
  - What did they do?
  - Consider credibility
- How useful/relevant is it?
  - Skip, file, or go on?

Second Pass

- Look carefully at figures, diagrams
  - Are axes well labeled? Results with error bars?
- Note references
  - Which are familiar? Which are not?
- Grasp content, summarize main thrust
  - Takes roughly an hour
  - May or may not understand fully at this point

Third pass: Reading in depth

- Challenge what you read
- Examine methods
- Examine statistics
- Follow proofs / derivations
- Examine reasoning and conclusions
- How can I apply their approach to my work?

The importance of Preliminary Work

- Reading is not a substitute for 'Hello World'
  - Start playing with your tools
  - Better to learn by doing
  - Sanity-check your hypotheses early
- Start research before proposal is approved

Get Organized!

- Put order in your research tools, references, software, digital files, etc.
- Take notes when you read a paper to avoid having to re-read the entire paper later on
- Document everything
- Backup everything
- Choose your writing/research weapon of choice and master it
  - Latex, Overleaf, Lyx
  - Jabref, Zotero
  - Google Scholar

Image taken from: https://www.everydayhealth.com/healthy-living/why-marie-kondos-de-cluttering-method-life-changing/

Finally: your biggest dragon is yourself. Master yourself ☺