

What are we trying to accomplish in writing? Communication of ideas.

- It's **not a step-by-step write-up** of everything you did. Not everything is interesting, not everything is useful.
- It's also **not a comprehensive list of everything you know**.
- **A paper is a story**. It should motivate your work, set it in the context of the field, describe your specific findings, and interpret them in the big picture that motivated the work. All these parts should fit together to reinforce each other.
- **Get out of the weeds**. This is where being hyper-focused on details or on a methodical step-by-step approach is working against you. Instead of focusing on details, think about the overall story.
- **Get away** from the lab, or the computer, or the archive, or your office. **Conceptualize** what you want to say and **distill the important pieces** from the overall mess of what you've done.

OK, so you've done a lot of research, now its time to write it up, how do you get started?

- To get the big picture, **go back to the original motivation. Someone was convinced** why the project is important!
 - thesis proposal, funding proposal
 - maybe a talk you gave or a review article you read
- **Be careful, though, with words of others.**
 - Avoid plagiarism!
 - Synthesize and connect – this is *your* perspective you are giving.
- **Storyboarding:** write important points individually on index cards, put figures on index cards. Shuffle them around until they make sense. A paper isn't trying describe what you did in a time-linear fashion, its supposed to **connect things logically.**
- **Make those logical connections:** If there's an important point your making with your results, make sure you set it up in the introduction. Conversely, no need to write a lot into the introduction on a topic you can't say much about with your results. Storyboarding helps you see this.
- **Don't do this at the computer!** Distracting!

Figures

The point of a paper is to explain, educate, convince. Visuals are extremely important, **good figures are an essential part of writing.**

- Don't just say it, show it.
- Use them in your story boarding. (For me, I often build the story around them.)
- **Work hard on your figures.** Make sure they are readable and “clean”. Don't make them too busy. Annotate them when necessary. Make sure they are important.
- Color, font, labels, axes, all important.
- Time you spend on your figures is time writing. Because writing is really about communication.
- **Explain your figures** (fig cap and in text)

DONT WORRY ABOUT PERFECTION. JUST WRITE!

- Beware the intimidation of the blank page.
- **Write crappy stuff.** Just get ideas down. Don't worry about grammar, spelling, citations. Build ideas and connections. At this stage, a good bit of **what you write will get thrown out**, so dont make it perfect. You are organizing your story.
- **Write the easy stuff first.** Don't write in a linear fashion. Introductions are hard! And often you find at the end, you may be making different points than you thought.
- Techniques are often the easy stuff, so **write along the way.**
 - Will help you remember
 - You may end up throwing a lot of that out, so what?
- **Revisions are where it's at.** I will write/revise 4-5 times before showing a paper to collaborators, then revise at least a couple times more after their comments.
 - Don't expect to just reel off a final paper.
 - But also dont be afraid to give people a draft.
 - Revision is a good time to make sure the connections you storyboarded are in place.

Final suggestions

Equations are not explanations. Do not write an equation in place of an explanation!

Read. Read. Read.

- Gives you a sense for the standards and style in your field
- A lot of crappy writing out there. When writing confuses you, ask yourself **why** is the writing confusing.
- Good examples exist. Classic papers are classic for a reason. Read them and ask yourself how are they well-written?
- Same with figures. Watch for good ones while you read, and emulate them. Watch for bad ones and avoid those errors!