

Scientific Writing:
Writing for your Career

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Writing is like exercise...

You're better off doing it every day
(or nearly so)...

Even when you don't feel like doing it.

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Writing well

Writing well is hard. It requires constant thinking...

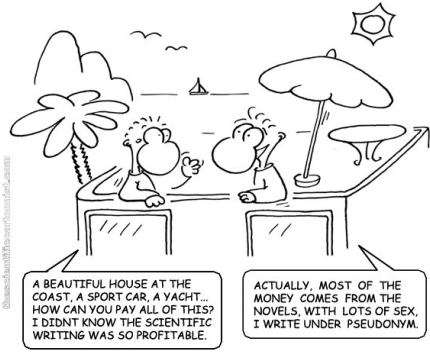
Writing is flying an airplane without instruments, almost always through
the dark storms of doubt. It is new every time.

- Tom Verducci.

The Passion of Roger Angell. *Sports Illustrated*, 7/21/2014.

3

Scientific writing...



4

Publication types have different value

First author or co-author?

Both! Even early in your career, it is good to have work on some projects where others will do the bulk of the writing

More papers in weaker journals versus fewer papers in strong journals?

The goal is always better papers in strong journals. The reality is you will have some weaker papers, too.

How many papers do you need?

Depends on your circumstances. Learn your institutions expectations. (Graduate students: Try to have a couple of papers in addition to your dissertation.)

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Increase your publication opportunities

Balance ongoing projects & manuscripts
- need both!

Review manuscripts – improve your skills
- learn what works; write more effectively/quickly

Find (and create) your “niche”

Balance first authorships & co-authorships
- Understand your role when agreeing to projects

Use “cheap” labor (and share the “wealth”)

Try not to write things that won't be published

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What merits authorship?

The ICMJE recommends that authorship be based on the following 4 criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Original version:
JAMA. 1993 May 5;269(17): 2282-6

Current version:
<http://www.icmje.org/#author>

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4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

All authors should meet all 4 criteria for authorship, and all who meet the 4 criteria should be identified as authors.

Those who do not meet all 4 criteria should be acknowledged.

An author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors.

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You may find differences of opinion about what merits authorship:

In medicine, someone who collects the data typically, expects to be involved in the manuscript

In public health, especially epidemiology, the emphasis shifts to the analysis and the "data collectors" may be left out

My preference is to give the data collectors the opportunity to contribute to all 4 criteria

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Authorship...



"You should spend the next week typing down names of all co-authors on your paper."

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Who is the first author?

Almost always, the person that wrote the bulk of the paper will be the first author

That person usually had a major role in developing the paper: Idea, design, data collection, and/or analysis

Is the analyst the first author?

Common for epidemiology; Not common for applied biostatistics

Epidemiologists must be careful not to underestimate the work involved in data collection

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Co-first authors

In some circumstances, more than one first author may be designated.

This situation implies that both authors contributed equally to the full study process

(idea → design → analysis → manuscript)

Adjacent Cell Marker Lateral Spillover Compensation and Reinforcement for Multiplexed Images

Yunhao Bai^{1,2†}, Bokai Zhu^{1,2†}, Xavier Rovira-Clave¹, Han Chen¹, Maxim Markovic¹, Chi Ngai Chan³, Tung-Hung Su^{1,4}, David R. McWhann¹, Jacob D. Estes¹, Lesat Karen^{1,5}, Gary H. Naranjo^{1,6} and Stefan Jiang^{1,7*}

preparation: SJ, YB, BZ, and GN. The co-first authorship order was determined via the best of three rounds in Super Smash Bros. Both YB and BZ contributed equally and have the right to list their name first in their CV. All authors contributed to the article and approved the submitted version.

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The senior author is last...or second

In most biomedical fields, the last author is the senior author (i.e., the head of the lab or the research project)

Often the analyst (i.e., the biostatistician) is second author

In certain social sciences, the second author is the senior investigator, and the last author contributed the least to the work

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Working with co-authors is...

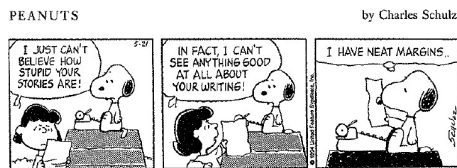
When to talk about it...

What should happen...

What to expect...

Improving the process...

Co-authors can be ...well...challenging. Be proactive and know what to expect



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Working with co-authors is...

When to talk about it...

- Early in the process
- As needed throughout
- Do **not** wait until the end, except under unusual circumstances

What should happen...

What to expect...

Improving the process...

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Working with co-authors is...

When to talk about it...

What should happen...

- co-authors should be engaged and participatory
- co-authors should provide useful feedback on content
- co-authors should provide editorial suggestions

What to expect...

Improving the process...



"Good, but not immortal."

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Working with co-authors is...

When to talk about it...

What should happen...

What to expect...

- Co-authors, esp. senior ones, often contribute less than you would like them to
- Some co-authors edit more than comment

Improving the process...



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Writing with co-authors is...

Use your co-authors – look for comments & critique

Tell them what you are looking for
- early drafts are about content

Put comments & questions in the text to guide your co-authors
- Use your co-authors' expertise; you don't have to have all the answers.

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Working with co-authors

When to talk about it...
What should happen...
What to expect...

Improving the process...
- Give deadlines
- Share early drafts, asking for content feedback only, "please don't worry about grammar and sentence structure, yet"
- Explain exactly what you are looking for →
tell your busy co-author that you want them to look at the 3rd paragraph in the discussion

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It is your paper!

If you would like to write better than everyone else, you have to want to write better than everyone else.

And you must be willing to defend what you've written against the voracious middlemen—editors, agents, publishers (co-authors!!)—whose sights may be different than yours, whose standards are not as high.

Too many writers are browbeaten into settling for less than their best.
- Zinsser

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Be the kind of co-author you would want

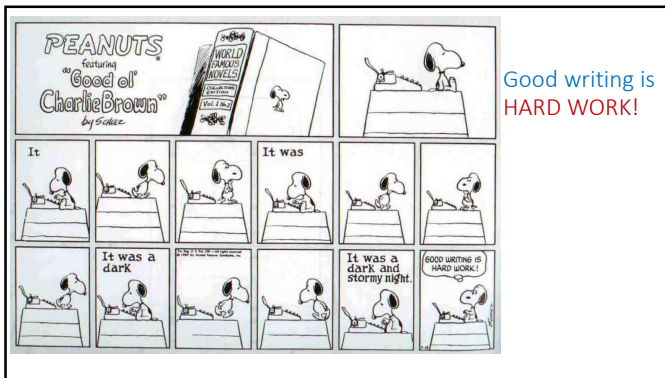
Establish your role early; identify your niche

Be timely

Ask explicitly what the lead author wants from you

Provide feedback

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Are you afraid of writing?

Writers have to jump-start themselves at the moment of performance, no less than actors and dancers and painters and musicians. Some writers sweep us along so strongly in the current of their energy...we assume that when they go to work the words just flow. Nobody thinks of the effort they made every morning to turn on the switch.

You also have to turn on the switch. Nobody is going to do it for you.

Unfortunately, an equally strong negative current—fear—is at work. Fear of writing gets planted in most Americans at an early age, usually at school, and it never entirely goes away. The blank piece of paper or the blank computer screen, waiting to be filled with our wonderful words, can freeze us into not writing any words at all, or writing words that are less than wonderful.

With each rewrite I try to force my personality onto the material. -Zinsser

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Expect to struggle



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Specious barriers to writing a lot

- #1 "I can't find time to write." aka "I write more if I could just find big blocks of time."
- #2 "I need to do a few more analyses first." aka "I need to read a few more papers first."
- #3 "To get going and write a lot, I need a new (insert – computer, desk, chair, office...)"
- #4 "I am waiting until I feel like it." aka "I write best when I am inspired to write."

Silvia PJ, How to Write a Lot. APA Life Tools. 2007

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What do I need to do to write effectively?

So, how do I increase productivity?

How can I write effectively?

*You must understand yourself and your habits.
Commit to being a good writer.
Let's see if we can help you in that process.*

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What is the most important body part for writing (and rewriting)?

YOUR BUTT

Or possibly your feet if you use a standing desk...

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Your butt.

You can't write if you don't spend time with your butt in the chair and your hands on the keyboard.

Yes, you can spend time to think away from the keyboard, but you MUST be in the chair to make it happen.

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Take steps to write successfully

- 1) Make a schedule – and stick to it. Put it in your calendar. Several hours per week – every week. Ideally, write a little every day
- 2) Commit to writing consistently
- 3) Write in places where you are comfortable and can think with minimal distraction
- 4) Give your self specific goals for a specific writing session

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Take steps to write successfully

- 5) Identify the storyline of your paper/proposal. Revisit that every time you start to write.
- 6) Use effective outlines (i.e. topic sentences or complete thoughts)
- 7) Stop when you're in a good place, so you can pick up easily the next day

Resist the urge to forge ahead because things are going well. *Stop*.

Jot a few notes. Then pick it up tomorrow.

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Make a schedule to be consistent

The most important thing for effective writing is consistency.

- It is not when, where, how

Stick to the schedule

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Write when your brain works best

Writing is challenging – find a way that works for you

- Write early,
- Write late

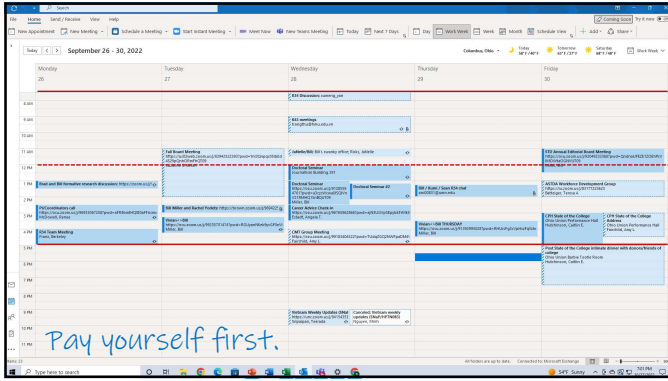
When are you most productive?

When is your brain most effective?

When can you think clearly?

That is when you write

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Write early (or late)

If you write best early (or late) – protect that time religiously.

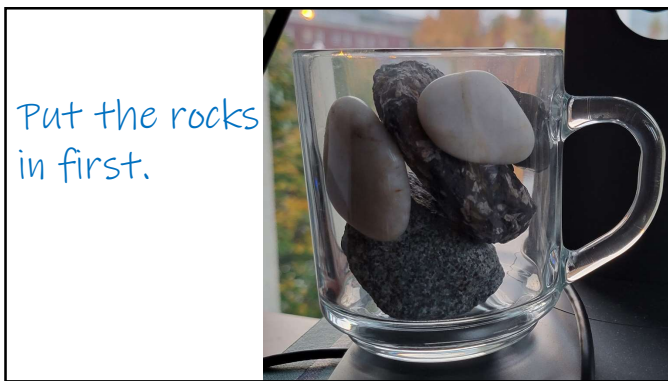
Write every day (or almost) during that time

Schedule meetings during that time sparingly, begrudgingly, and do not indicate you are available then on Doodle polls

People will try to infringe on your writing time, especially people who don't understand the writing process.

DO NOT LET THEM.

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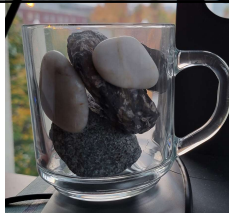
Use your prime time effectively

Writing is one of the hardest things that we do
It is cognitively demanding and susceptible to all kinds of distractions or temptations

Write when **you are at your best...**

Don't waste your **best time** with **email, meetings, coding, grading, chart reviews, or meetings** (except the occasional project brainstorm).

Oh, did I say meetings twice?



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Avoid binge writing

Remember, you can't train for a marathon by trying to run 20 miles every two weeks!

Do **NOT** get caught in the "I need extended blocks of time to write" trap

You **can** write in an hour, half an hour, or even 15 minutes

Writing **regularly** is critical, and will lead to more success than binge-writing

Writing regularly avoids **inertia** and **prolonged initiation time** of intermittent writing



<https://www.runnersworld.com/news/640455804/runner-ebert-wins-2024-boston-marathon/>

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Commit to a friend (& reward yourself)



"I wrote another five hundred words. Can I have another cookies?"

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Set session goals

Prewrite: Plan what you are going to work on for a given day

- make notes the day before as you finish
- use the first few minutes to plan

Set **goals** for the session (*consciously*)

41

Set achievable session goals

Write at least 200 words

Revise the draft I finished yesterday

Write the first 3 paragraphs of the discussion

Brainstorm and make an outline for the paper

Look at reviewers' comments. Decide which ones to address specifically. Draft initial response.

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Review your storyline...each time

Good papers and proposals *tell a story*

Identify the storyline and key messages for the reader early

Write the storyline and key points at the top of the first page

Review it every time you start to write

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Find the strategies that work for you

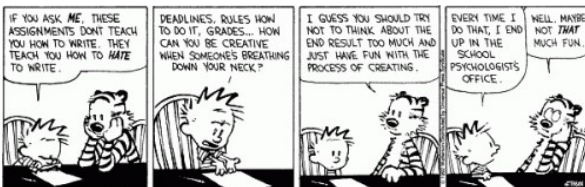
Get the big picture points down first. Try to be clear about the main story.

Vomit on the paper *or* *Understand yourself.*
Don't be afraid to try something different.

Think first, then write *BUT* do what works for *YOU!*

Scribble thoughts, ideas, keep track of them, organize them

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Find the strategies that work for you... and those that keep you out of trouble

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Use effective outlines

- Start with the "formula" of a paper
- Jot down key ideas you want to convey in each section
- Draft topic sentences for each section
- Read topic sentences, re-order to improve flow
- Skeleton outlines usually are not that helpful

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Get the major points down ahead of time

- Even if you don't use an outline, try to identify the major points you want to discuss/convey
 - keep a list or notes of key points
- It is **harder to identify missing points or concepts**, than to identify parts to remove
- Later, you **will get bogged down** in style & clarity, and miss the big picture.

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Read a printed version to get the big picture

- Periodically, read a printed version – away from your computer
- Use this version to look at the big picture.
 - Is the story coming through?
 - Have you missed key points that you wanted to make?
 - Are there distractions in the paper?
- Do not edit this version for grammar or style**, beyond a few notes here and there

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Trying to achieve perfection is paralyzing

Many writers worry about every sentence as they are writing them.

They often don't move on to the next sentence until it's perfectly good.

Or they don't even start until it is perfect in their mind.

Perfection paralysis → low productivity

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Overcome perfection paralysis

Rewriting is the essence of writing. Embrace revision.

- know from the start that you'll be revisiting it again.

Draft conversationally – like you are telling your mother or another intelligent person.

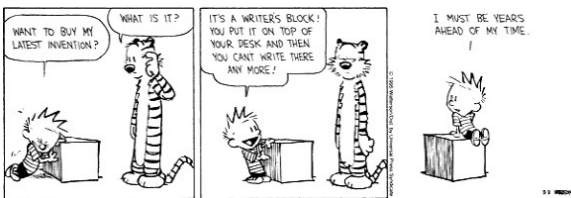
- content & clarity first, then formality

Become a journalist → you have a deadline!

Understand where the need for perfection is coming from (see writer's block & procrastination)

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Writer's block



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Writer's block is often due to fear...

What are you afraid of?

The writer stops writing when they believe the idea is fraudulent...

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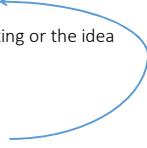
Writer's block is often driven by a common cycle of fear

Your start to believe your idea/work isn't good enough ←

You think that people will think poorly of you if the writing or the idea isn't good enough

You fear that you aren't going to succeed

Which takes you back to not being good enough



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Forgive yourself to overcome writer's block

When you stay stuck, you often feel humiliated—for not having written

Forgive yourself...and get back to writing!!!

Call a friend, take a walk, cry, whatever you need at that moment that will help you move past it.

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JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1974, 7, 497 NUMBER 3 (FALL 1974)

**THE UNSUCCESSFUL SELF-TREATMENT OF
A CASE OF "WRITER'S BLOCK"**
DENNIS UPPER
VETERANS ADMINISTRATION HOSPITAL, BOSTON, MASSACHUSETTS

COMMENTS BY REVIEWER A

I have studied this manuscript very carefully with lemon juice and X-rays and have not detected a single flaw in either design or writing style. I suggest it be published without revision. Clearly it is the most concise manuscript I have ever seen—yet it contains sufficient detail to allow other investigators to replicate Dr. Upper's failure. In comparison with the other manuscripts I get from you containing all that complicated detail, this one was a pleasure to examine. Surely we can find a place for this paper in the Journal—perhaps on the edge of a blank page.

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REFERENCES

*Portions of this paper were presented at the 81st Annual American Psychological Association Convention, Montreal, Canada, August 10, 1973. Reprints may be obtained from Dennis Upper, Behavior Therapist Unit, Veterans Administration Hospital, Boston, Massachusetts 02161. Received 23 October 1973. (Published without revision.)

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Getting "stuck" and "unstuck"

Writer's block is common: You may have it at the paper, section, paragraph, or sentence level

Start with the easier sections (methods, results)

- cut and paste material from protocol to get started

Move on to another part when you get stuck

- make a note, then start next paragraph
- the topic sentence outline is very helpful here

Move on to tables or figures; work on references → then come back

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Getting going... or unstuck

Define the problem & goal: Remember why you are writing whatever you're writing

- imagine the reader, and the good your paper might do

Pre-write: Plan what you're going to write, think about it, jot some notes, plan


Commit: Tell someone, a co-author, colleague, or friend, when you will finish

Write in chunks: A big project is overwhelming; a small piece is manageable

- sections, paragraphs, sentences

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Procrastination



Writing is 90% procrastination and 30% panic.

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Procrastinating? ...We all do it!

To get over it:
 Tell someone about your commitment. Commit to work for 15-20 minutes. Tell your friend you did it!
 Remind yourself again of why you're writing
 Procrastination often comes from fear → What are you afraid of?
 Observe your mind trying to get out of the commitment, trying to "run". Just observe.
 Work in short chunks. Get up. Walk. Refresh. Take a real break, not your usual procrastination activities (social media, internet, etc.)

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The Pomodoro Method (adapted) may help you

- 1) Put your butt in the chair
- 2) Set a timer for 25 minutes → write
- 3) Take a 5-minute break
- 4) Repeat x3 (four total or ~2 hours)
- 5) Take a longer break (20-30 minutes)
- 6) Return to step 2

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Take a writing walk

Clear your mind



Focus on an issue

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A way to overcome procrastination

- 1) Put your butt in the chair *You can do almost anything for 10 minutes!!!*
- 2) Use the 10-minute rule
- 3) Get away from your email, the internet, your phone
- unless you are a physician on call, you can be off the grid for 1-2 hours (trust me, the world will manage in your absence)
- 4) Write → *And I mean write anything!!!*

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One step at a time to overcome procrastination

Break the big task (That paper! That grant! That dissertation!!!) into small pieces

A paper has sections

A section has subsections and paragraphs

A paragraph has sentences

You can't sit down and write a dissertation.
You can sit down and write a sentence.

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Practice creative procrastination*

You often can't do everything.

Learn to put off low-value tasks to give you time to do the important things (aka writing)

Dare to be average (at low-value tasks)

Tracy B. Eat that Frog!

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Take a writing break to recover

Take breaks from writing a particular paper
- a few days, a week, a month

Just like with exercise, sometimes, you need time to "recover"

Recovery gives new energy and ...

New energy → new insights

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Writing is hard work →

Failure is common

You will have bad
writing days.
Expect to fail, at
least sometimes

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Writing is hard work

Writing is, for most, laborious and slow.

...writers must learn to cultivate patience...

- Strunck & White

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Writing is thinking

...the act of composition, or creation, disciplines the mind; writing is one way to go about thinking, and the practice and habit of writing not only drain the mind but supply it, too.

- Strunck & White

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Use existing text to jumpstart the paper

Writing the paper begins before the study

- Specifying the hypotheses
- Writing the background for the proposal or protocol
- Writing the methods in the proposal or protocol
- Determining the analysis plan for specific research questions

Use existing text from proposals/protocols to get started.

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Use the results to craft the story

Look carefully at the results

Identify the 1 or 2 main findings

- In most cases, these should relate to your stated hypotheses

Be sure that you know how these results fit with the existing state of knowledge

Sketch out the story: Think about how you would explain to your mom or spouse or friend (maybe even try it!)

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Convert an abstract to a paper

Accepted abstracts are usually presented as posters or oral presentations

Both can be used to develop the first draft of a paper

Poster → Cut & paste sections

Oral → Use presentation as paper outline

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Write in an efficient order

Draft methods early – even before study is complete

Make tables

Draft results

Draft introduction & discussion

Abstract - last (or first!)

- last → describe findings accurately
- first → forces writer to focus on main story

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Share your drafts early

73

Papers are a process. Be patient.

Share drafts early One of my recent major papers
 Accept criticism had **31** drafts.

Don't underestimate the number of drafts

You must be **PATIENT** with the process

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Rewriting is the essence of writing

You can select material on your screen and move it to a more appropriate spot, or, if you cannot find the right spot, you can move the material to the end of the manuscript until you decide whether to delete it.

Above all, **do not be afraid to experiment** with what you have written.

Remember, it is **no sign of weakness or defeat** that your manuscript ends up in need of **major surgery**. This is a common occurrence in all writing and among the best writers.

- Strunck & White

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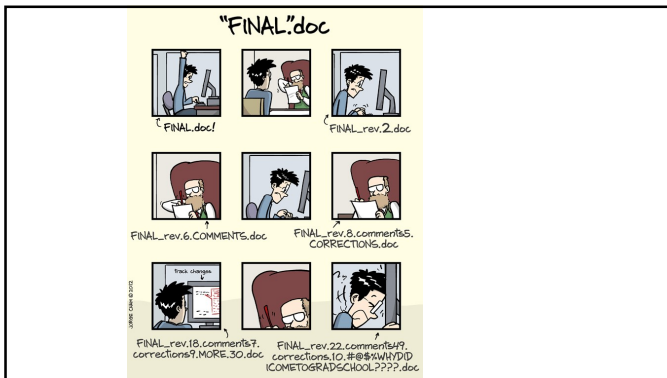
Rewriting wins the game

Learn to enjoy the tidying process. I don't like to write; I like to have written. But I love to rewrite. I especially like to cut: to press the DELETE key and see an unnecessary word or phrase or sentence vanish into the electricity.

With every refinement I feel that I'm coming nearer to where I would like to arrive, and when I finally get there, I know it was the rewriting, not the writing, that won the game.

- Zinsser

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Don't let references block your flow

- As you are writing, indicate where references need to go.
- If you know the reference, put reference or basic information in a comment
- If you don't know the reference, just put {REF} and find it later. Do not look it up in the moment.
- Use a reference program and format when you are nearly finished writing

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Peer editing, writing group

Try to identify at least one person or a small group to form a writing group

Commit to one another

Share drafts and give/receive constructive edits and feedback

Meet weekly, bi-weekly, monthly

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My ID fellowship director (& division chief) told me...

"You should **ALWAYS** be writing something."

Prioritize your writing:
what you write, when you write

Get your **BUTT** in the chair

Write regularly; don't binge

Manage your co-authors

Embrace rewriting

Get a little help from your friends

THANK YOU!

Bill Miller
bill_miller@unc.edu

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