Scientific Writing

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16 Nov 2017

Overview

Today's Goals

- Learn some guidelines for how to write a paper
- Ideas for how to apply those to the class project
- Generalize these to help write in other forms

Review to Read

- This is a summary from:
- Mensh & Kording. 2017.

How does this apply to 490S?

- For each slide/segment we'll (try to) ask:
- What can we take from this for the project?

How does this apply to life?

- What kinds of writing will you be doing?
- For each slide/segment we'll (try to) ask:
- What can we take from this for writing?

General Principles

- Focus on the Central Contribution
- Write for Humans Who Don't Know Your Work
- Context-Content-Conclusion
- Logical Flow - Parallelism

Focus on the Central Contribution

- Measure success by the reader's comprehension and memory of the paper
- Can they repeat the main tenet back to you?
- Focus on this main tenet and build an argument around it
- Emphasize this tenet in the title

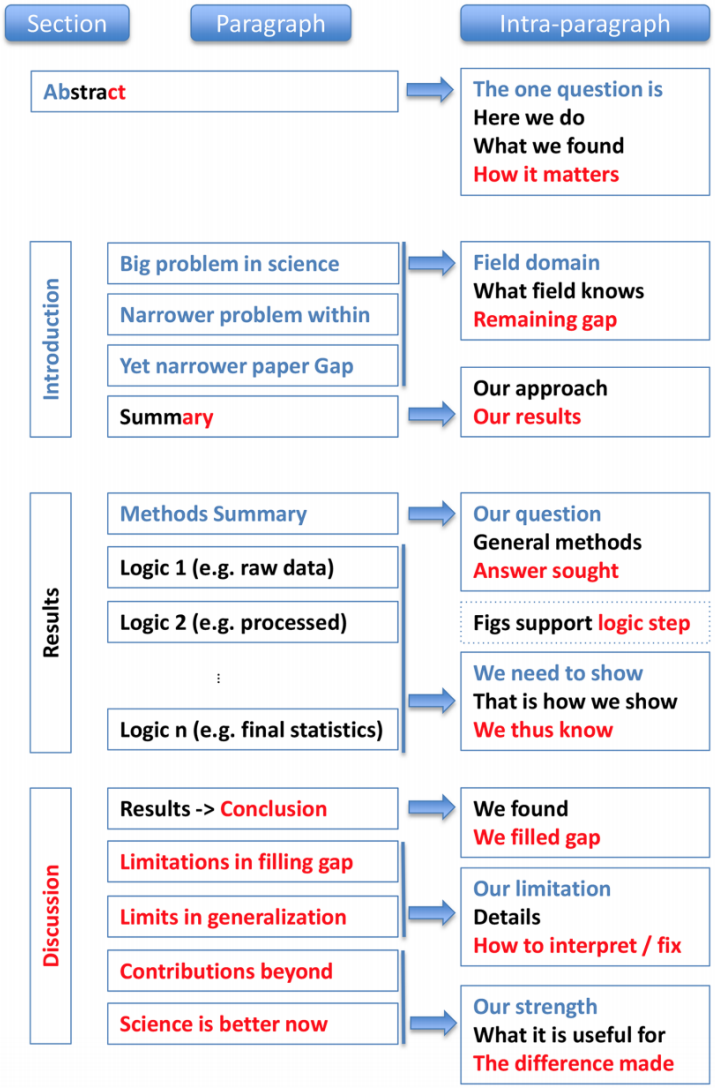
Write for Humans Who Don't Know Your Work

- Very hard to analyze your own work as an outsider
- Think like a designer - each sentence should have a purpose
- People are easily distracted - tie points back to your main tenet
- Leaving loose points lying around will distract readers from the point

Context-Content-Conclusion

- The beginning should set up the Context
- The middle should provide the Content
- The end should lead readers to your Conclusion
- Works best for research papers... how could other forms of writing differ?

C-C-C Flowchart



Logical Flow - Avoid Zigzag

- Avoid “Zig-zagging” - bringing up topics and boucing to and fro
- The main tenet should be revisted often
- Other ideas and topics should be brought up to support the argument, then wrapped up

Logical Flow - Parallelism

- Parallelism - communicate similar messages similarly, don't be afraid to repeat words or phrasing
- "The gene patheway X shows higher expression in treated samples, providing support that this molecular machinery is integral to the cell's response to A"
- "The gene patheway Y shows lower expression in treated samples, providing support that this molecular machinery is not integral to the cell's response to A"
- It may not seem poetic, but the repetition is helpful for the reader

Logical Flow - Parallelism

- Changing words can be confusing
- “The gene patheway X shows higher expression in treated samples, providing support that this molecular machinery is integral to the cell’s response to A”
- “The gene patheway Y measures lower expression in treated samples, lending support to the theory that this molecular machinery is not important to the cell’s response to A”

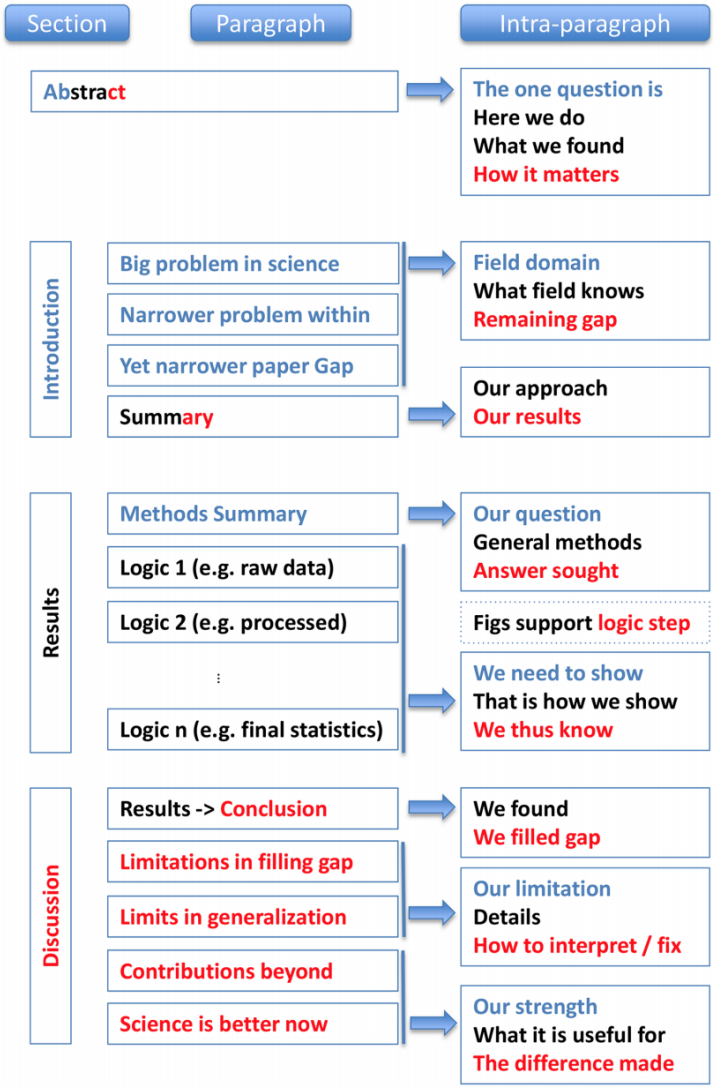
Paper Components

- Abstract = Complete Story
- Communicate Why It Matters in Intro
- Connect Results with Logical Flow
- Discuss How You Filled the Gap

Abstract = Complete Story

- Many people only read the abstract, so make it good
- Question
- What we did
- What we found
- It matters because

C-C-C Flowchart



Communicate Why It Matters in Intro

- Start broad (cliched, yes)
- Narrow while filling in current knowledge
- End with own study and results

Connect Results with Logical Flow

- Each result is important to the overall tenet/idea
- Present each result in turn, with an brief intro sentence describing why it is crucial to the overall point
- “To confirm that our sequencing was of good quality...”
- “To verfiy that the sequenced reads were of the correct genome...”
- “We tested the effect of condition on the cells...”

Discuss How You Filled the Gap

- Describe the gap that was filled
- Mention limits to your finding
- Propose next steps to take down this scientific pathway

Process Tips

- Put Time/Effort Where It Matters
- Get (and Implement) Feedback

Put Time/Effort Where It Matters

- Title
- Abstract
- Figures
- Overall outline
- How does this differ in other writing assignments?

Get (and Implement) Feedback

- Writing is iterative optimization problem
- Re-read and re-edit many times
- Implementing changes can consist of scrapping a lot of what is there (not always just small edits)
- Important to take feedback from uninformed and informed readers

The End