MIT BE
BIOLOGICAL ENGINEERING

Communication Lab

20.109 Communication Lecture: Manuscript Architecture

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Helping you communicate effectively.
be.mit.edu/communicationlab

Overview

Motivation

1. Why write a research paper?
2. Multiple audiences & publishing goals

Writing process

1. Crafting narrative
2. Guidelines for success (Results, Discussion)

Why write a research paper?

What would make you feel

…your research was ready to publish?

…it was *important* to publish?

Finished something useful
Completed a story
Found something exciting
Accomplished something first
Show impact, advance career

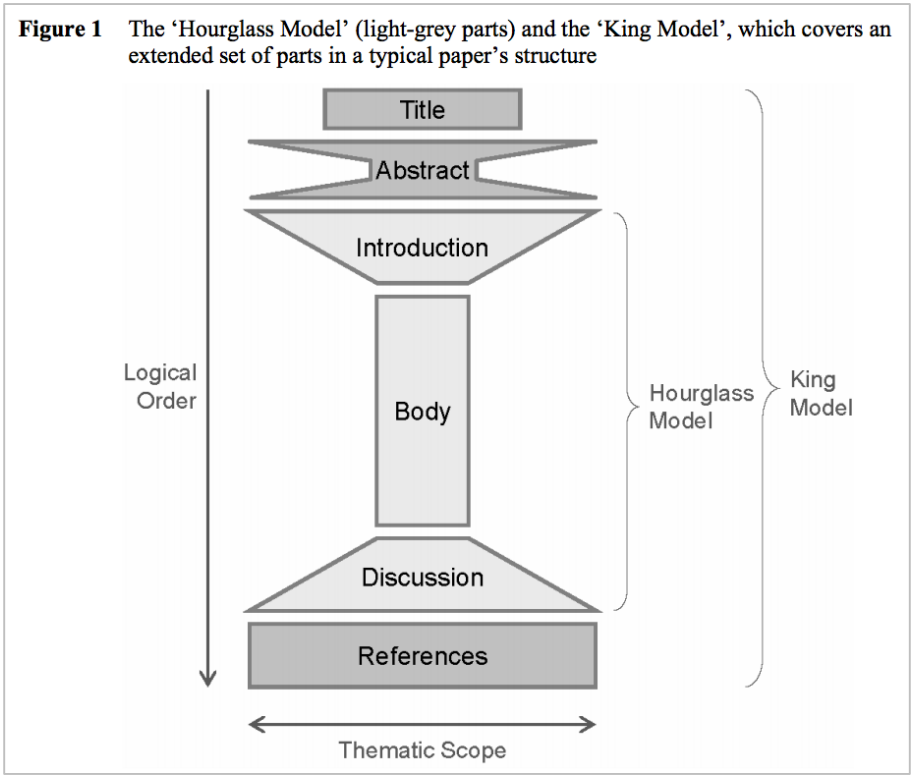
CLAIM PRIORITY + SHARE

There are no explicit models for successful papers.

If you read a paper you like, collect it!

Analyze what makes it especially clear & compelling.

Papers are often pictured as linear…



…yet are both **read** and **written** nonlinearly.

http://dbis.rwth-aachen.de/~derntl/papers/misc/

A research paper must speak to both insiders & outsiders.

Field experts

Other scientists

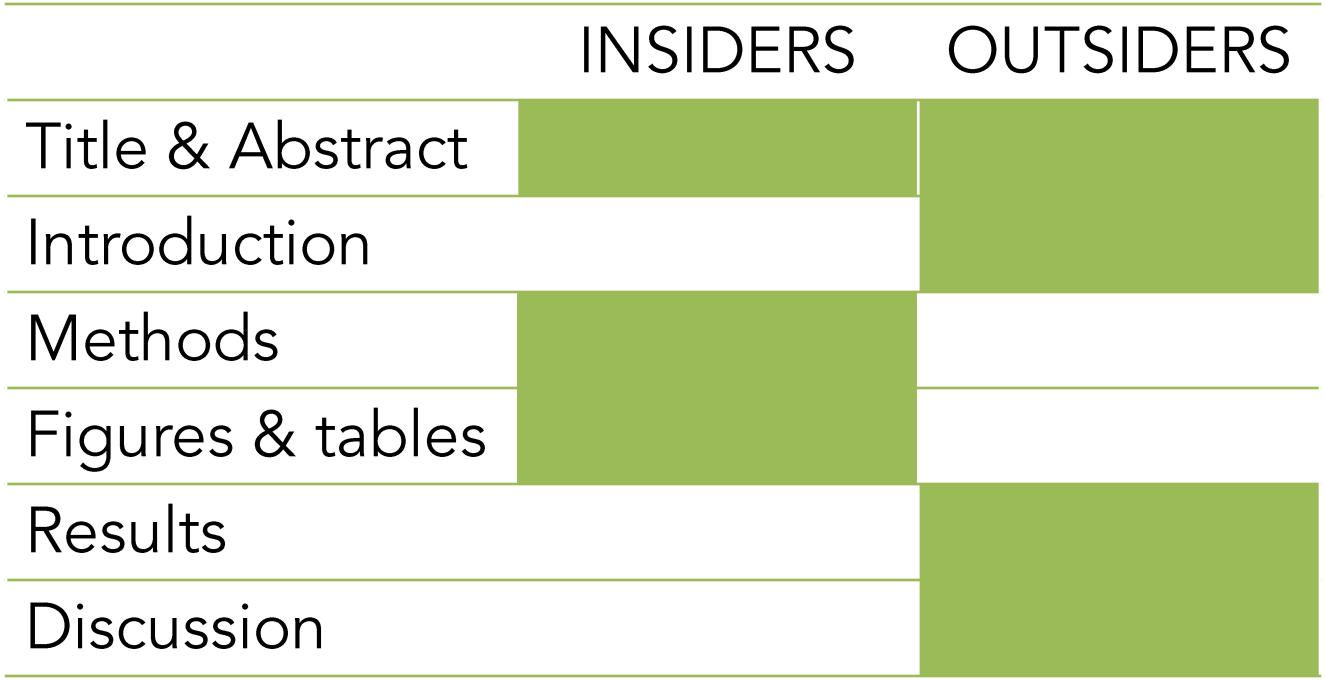
Clinicians

Public health

Policy

Education

Insiders and outsiders read different sections.



Sections serve different publishing goals.

	I	O	CLAIM PRIORITY	SHARE
Title & Abstract				
Authorship			Reflects significant contribution to work/writing	
Introduction			Shows how you fit in with prior art	Clear, accurate Compelling narrative
Methods				Complete enough for others to reproduce
Figures & tables				Truthful, accurate Self-explanatory
Results			Conclusions are justified by the data	Clear, accurate Compelling narrative
Discussion			Speculations are reasonable	"

Writing process

Papers are written out of order.

1. Authors
2. Figures, tables, legends
3. Methods
4. Results
5. Introduction
6. Discussion
7. Acknowledgments
8. References
9. Abstract and Title

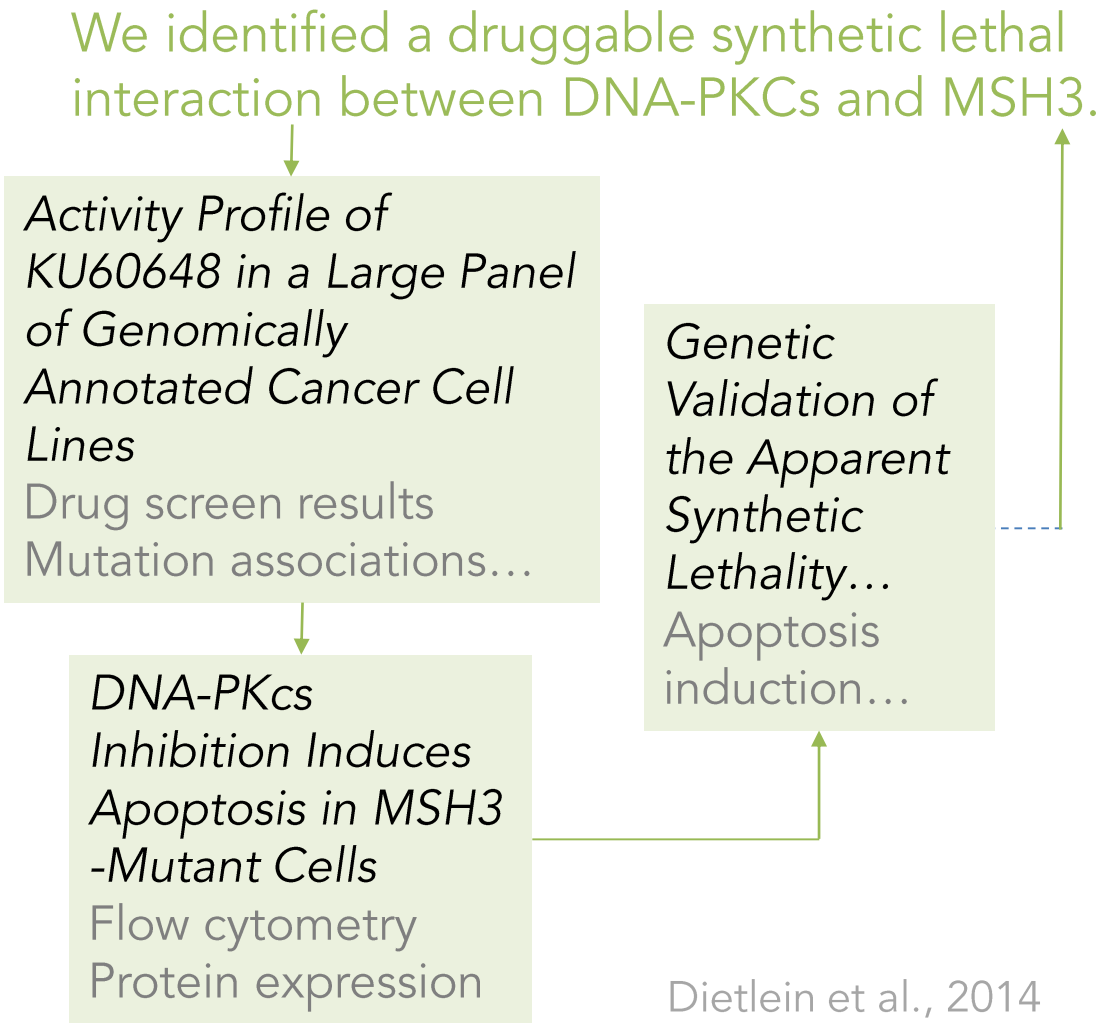
Create a narrative by linking together modular sets of data.

Take-home message

Create a narrative by linking together modular sets of data.

1. Identify take-home message.
2. Organize data into modules that each make a point.

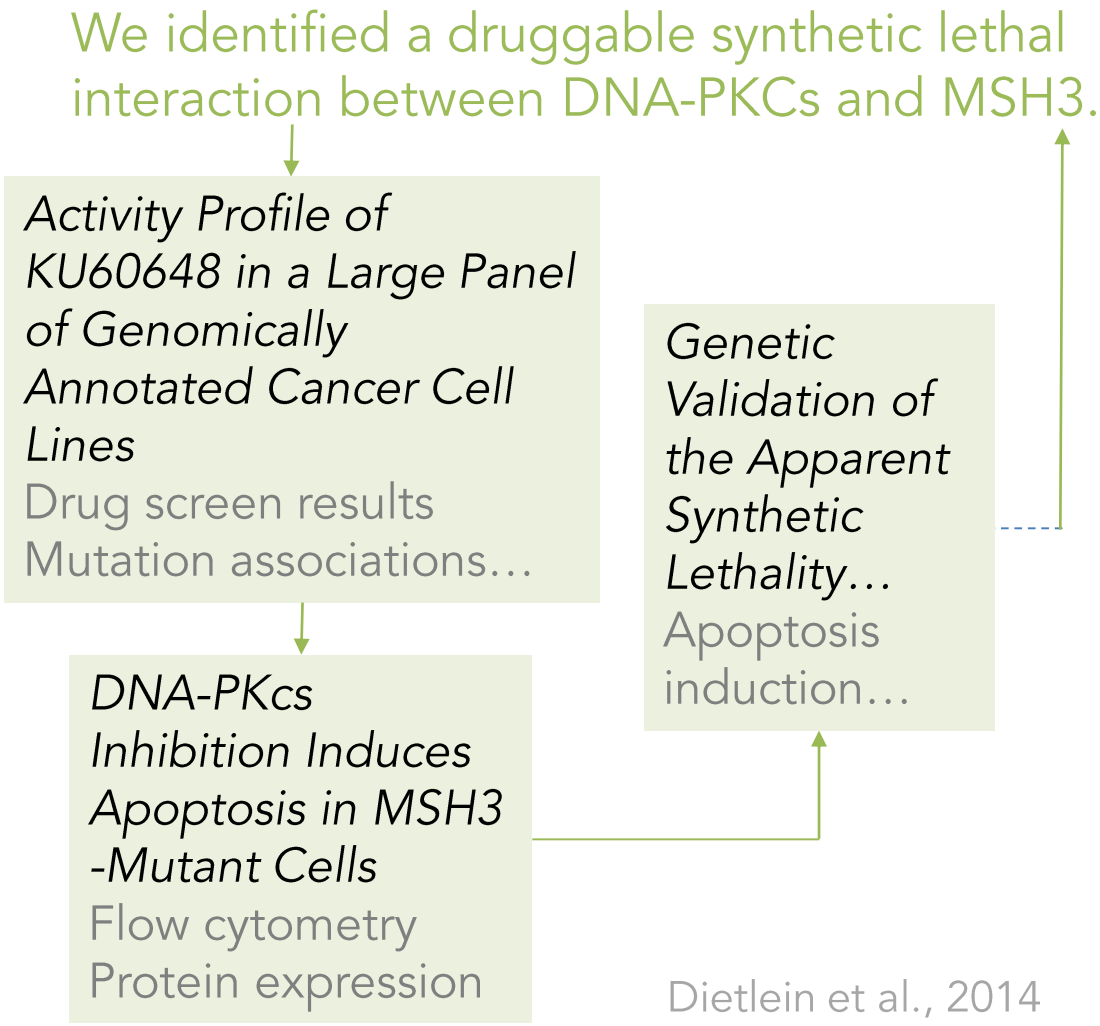
   Point=subsection title!
3. Modules lead to the take-home.



Dietlein et al., 2014

Parallelism: Put all of your content in the same order.

Data ‖ Results ‖ Discussion



Show “minimal essential data” in your paper.

- Include all data necessary to your conclusions, including controls
- Do not include irrelevant data
- **Do not exclude contradictory data**

Figures, Results, Discussion: What goes where?

	DATA + CONCLUSIONS	INTERPRETATION + SPECULATION
Figure & table captions		
Results		
Discussion		

Results are clear & objective.

CONTENT

- Overall description of methods & data: What was done? What did you learn?
- Organized into subsections with titles that state the point
- Support conclusions; build to the take-home message
- No speculation

STYLE

- Past tense
- Simple, precise language

Topic sentence = Experimental Aim + Primary Result

→ Elaborate

Transition = Why are you moving to the next experiment? Only include speculation if necessary as a transition.

Follow the Herskowitz Rules

1. The amount of time you spend describing an individual result should be proportional to the importance of that result to the paper.
2. Speculation belongs in Discussion. Allow yourself only 1 layer of speculation.
    - Don’t build a house of cards.

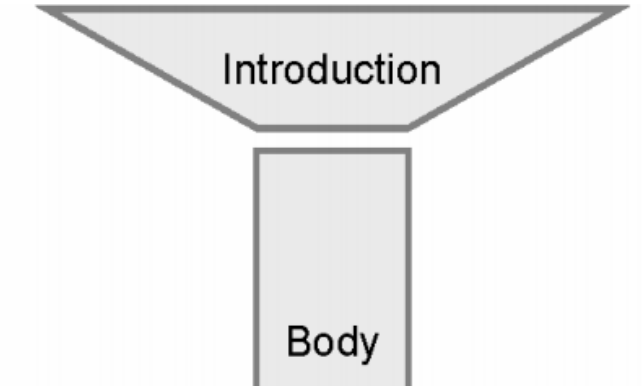
Evaluate a sample paper: Zetsche et al., 2015

In groups of 3-4:

1. Compare the results and the figures.
   - Is this organized well?
   - What do you think of the Figure titles vs the Results subheadings?
2. Assess the paragraphs within the results.
   - Do they "follow the rules" of organization (in order to x, we did y)?
   - Do they draw conclusions? Are they overly speculative?

Introduction defines the question.

- Your research taught you something
- The Introduction convinces the reader this knowledge is worth having



Discussion: a chance to say what you think instead of what you know

- **Don't** repeat the Results.
- Restate the take-home message.
  - How does this fit with other reported studies and expectations?
  - Why is this important?
  - What are the caveats?
  - What interesting questions does this raise?
  - How might this impact this/other fields?
- Avoid sweeping conclusions that are not substantiated by your or others' research.

Speculate, within reason.

- Provides context: help outsiders understand where the work is leading
- Only 1 layer (Herskowitz)
- Make all links explicit: if you think your discovery might ultimately explain Mystery X, state what Mystery X is.

Acknowledge your limitations.

"Because the Data and Safety Monitoring Board recommended to stop the trial after the intermediate analysis, it was not possible to follow all the participants as initially planned, and, as a consequence, only those participants recruited at the beginning had a full follow-up. This potential bias was taken into account by adjusting the analysis for the recruitment period; such an adjustment cannot fully account for the confounding effect associated with partial follow-up. When restricting the analysis to those participants who had a full follow-up, the intervention had an effect that was similar in size and significance, suggesting that this potential bias had a negligible impact…

Another limitation concerns the timescale of this study. Participants were followed up for a short period of time, and, therefore, this study did not explore the long-term protective effect of MC."

Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, et al. (2005) Randomized, Controlled Intervention Trial of Male Circumcision for Reduction of HIV Infection Risk: The ANRS 1265 Trial. PLoS Med 2(11): e298

Evaluate a sample paper: Zetsche et al., 2015

- What is the impact?
- Where might it lead?
- Are there any limitations mentioned?

References

- Built over the course of the paper
- Make sure you include papers that…
  - reach conflicting conclusions
  - are from your competitors
  - were published during the course of your work
  - (Reviewers will be looking)

Acknowledge others' contributions

Give proper credit for

- Ideas
- Results
- Methods
- Equipment
- Experimental Help
- Funding

…wherever is appropriate: Introduction, Results, Discussion, Acknowledgments

Titles and Abstracts

- Written last
- Read first

Paragraph structure

- One paragraph = one thought.
- 1st sentence summarizes this thought.
- Last sentence reiterates.
- Elaborate in a logical order
  - pro then con
  - most to least important evidence
  - chronological

Revising

- Set aside the paper for several days.
- Look for logical gaps and inconsistencies.
- Cut ruthlessly. Use simple, direct constructions.
- Have others read the paper and give feedback (use the Comm Fellows! be.mit.edu/communicationlab)

Any assignment questions?

- Due 5pm, Mon. Apr. 18
- 25% of course grade (full rubric on Wiki)

Title and Abstract	10%
Introduction (2-3 p.)	10%
Methods (3-4 p.)	20%
Results and Figures (4-5 p.)	50%
Discussion (2-3 p.)	10%

(Max 13 p.)