Meeting 2: Methods

*If a man can group his ideas, then he is a writer.*

*Robert Louis Stevenson*

What are Some Approaches to Writing Scientific Papers?

- **Model** your writing after someone in your field who is **an especially good writer**.

- Consult **texts on scientific writing**.
Good MIT Resources


- [http://web.mit.edu/writing/temp2/home.htm](http://web.mit.edu/writing/temp2/home.htm)
- The Writing Center
- Stata Center
- 235-3090
- Appointment preferred but not required

Some Other Good Resources


Guide to Authors for Each Journal
  e.g. J. Bac., Materials and Methods

Experienced Scientific Writers...

Seek Feedback
peer-edit
self-edit (after a long enough delay)
expert-edit

Expect to learn by writing as well as to inform.

Revise, revise, revise, revise, revise, revise,
Consider Developing an Outline

• The Mayfield Handbook: Section 1.5.1
  • http://web.mit.edu/writing/temp2/home.htm

• Outlines reduce and order your source materials.

• And outlines force you to:
  – partition material
  – develop a point of view
  – establish the scope of your document
  – sequence your topics
  – develop a writing strategy (even if you don’t have an outline, you need a strategy).

• The same outline can be used to generate feedback, serve as a writing aid, and provide the subject headings or topic sentences for your paper.

• Work out a general plan first, and then make the outline more specific.

Three Aspects of Writing Style

Structure

Structure is revealed in:

– Headings
– Subheadings
– Topic sentences
– Transitions between paragraphs and sections
### Structure: Organization is hidden when headings occur in a long list without secondary headings

<table>
<thead>
<tr>
<th>Performance of the Solar One Receiver</th>
<th>Performance of the Solar One Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Introduction</td>
</tr>
<tr>
<td>Steady State Efficiency</td>
<td>Receiver’s Efficiency</td>
</tr>
<tr>
<td>Average Efficiency</td>
<td>Steady State Efficiency</td>
</tr>
<tr>
<td>Start-Up Time</td>
<td>Average Efficiency</td>
</tr>
<tr>
<td>Operation Time</td>
<td>Receiver’s Operation Cycle</td>
</tr>
<tr>
<td>Operation During Cloud Transients</td>
<td>Start-Up Time</td>
</tr>
<tr>
<td>Panel Mechanical Supports</td>
<td>Operation Time</td>
</tr>
<tr>
<td>Tube Leaks</td>
<td>Operation During Cloud Transients</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Receiver’s Mechanical Wear</td>
</tr>
<tr>
<td></td>
<td>Panel Mechanical Supports</td>
</tr>
<tr>
<td></td>
<td>Tube Leaks</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
</tr>
</tbody>
</table>

### Language: Needless Complexity

Language: Needless Words

- (already) existing
- At (the) present (time)
- (basic) fundamentals
- (completely) eliminate
- (continue to) remain
- (currently) being
- (currently) underway
- (empty) space
- Had done (previously)
- Introduced (a new)
- Mix (together)

- Never (before)
- None (at al)
- Now (at this time)
- Period (of time)
- (private) industry
- (separate) entities
- Start (out)
- Write (out)
- (still) persists

Language: Weak Versus Strong Verbs

- made the arrangement for • arranged
- made the decision • decided
- made the measurement of • measured
- performed the development of • developed
Language: Passive Versus Active Voice

- The voltage was displayed by the oscilloscope.
- The feedthrough was composed of a sapphire optical fiber, which was pressed against the pyrotechnic that was used to confine the charge.
- The oscilloscope displayed the voltage.
- The feedthrough contained a sapphire optical fiber, which pressed against the pyrotechnic that contained the charge.

Vigorous Writing is Concise

What’s a Methods Section?

“Experimental Section”
According to Paradis and Zimmerman

Paradis, James G., and Muriel Zimmerman.
What are Some Goals of a Methods Section?

Present the experimental design.

Provide enough detail to allow readers to interpret your results (virtual witnessing).

Give enough detail for readers to replicate your work.

What are Some Pitfalls of a Methods Section?

Providing too little or too much information.

Reiterating published methods rather than citing them.

Writing strictly in chronological order (alternatives: most important first, most fundamental first, etc.).

Methods and results don’t correspond (you have to provide methods for all the experiments you report).

Forgetting to use visual organizers that direct readers to specific aspects of the methods section, e.g., subheads (see next slide).

Writing a protocol instead of a methods section. Methods are written in narrative form in past tense.
An Example from the NEJM


NEJM Example
Methods Sections for your Long-term projects

• For the 7.02 Experience - Describe your methods of learning:
  – e.g., attending lecture, recitation, laboratory, writing prelabs, studying for exams, meeting with your lab partner, study groups, background reading, etc.

• For the Mendel Paper - Describe:
  – Plant selection
  – Growth conditions
  – Monohybrid crosses
  – Dihybrid crosses
  – Data analysis
Today’s In-Class Exercises

Please review the introduction to the Long Term Project of the student who’s name appears directly below yours on the roster.

Today’s Out-of-Class Exercises

- Read “The Science of Scientific Writing” and be prepared to discuss it at the next meeting.

- Prepare oral presentations for the Science of Scientific Writing (only some students).

- Write the Methods Section for your long-term project. Turn a hard copy into to me and post an electronic copy on the 7.02 Discussion Forum (Stellar web page).