7.02 SciComm Meeting 3: Illustrations

SciComm Agenda--Meeting 3

1. Oral presentations on "The Science of Scientific Writing"
2. Choosing best first lines from LTP Introductions
3. LTP Intro tips and guidelines
4. Article critique guidelines and examples
5. Peer feedback on LTP Methods
   - Respond to the person who posted his/her LTP Methods AFTER yours.
   - Response should be as an attached file.

Some Comments on Introductions

- The importance of first lines
- Snafus:
  - A "naked" this: "The reason for this is that . . ." or "This allows . . ."
  - "Data is" should be "Data are. . ."
  - "There is a [noun] called . . .":
    - *From*: There is a method for measuring achievement that is known as testing.
    - *To*: A method for measuring achievement is known as testing.
- Essentials:
  - Establish context, provide justification, and narrow the focus.

Comments on Introductions, cont.

If you chose Studying Your Learning in 7.02/10.702 for LTP:

- *Context*: What is the story of your interest in biology? What is your background as a learner?
- *Justification*: How does 7.02 /10.702 fit into the bigger picture? What's the justification for studying your learning in 7.02/10.702? What do you hope to get out of this project and out of 7.02 /10.702 itself?
- *Focus*: What will your learning in 7.02 /10.702 look like and how will you know when it has occurred?

Comments on Introductions, cont.

If you chose Mendel or Avery for LTP:

- *Context for Mendel*: What have other scientists shown or theorized about inherited traits? Where does Mendel's work fit into that literature? What is the conversation that Mendel was trying to join?
- *Context for Avery*: What is the research background for what Avery attempted to do? What competing theories was Avery trying to prove or disprove?
- *Justification*: Why is this work important? What could it lead to? Why should the reader care?
- *Focus*: What is most important about this work and its methods that needs to be described in the introduction (hint for Mendel: choice of model)?

The Logistics of Revision

- You can revise the work due in order to improve your grade.
- Revision of your LTP Intro is due by the next off week, March 17 by 5 p.m.
- Email revisions to me as an attached file.

- You don't need to include first drafts--I have copies on my computer.

What's the Purpose of Illustrations?

- **Condense** large amounts of information
- **Convince** readers of your findings (by showing data quality).
- **Focus attention** on certain findings (e.g., relationship between values).
- **Simplify** complex findings.
- **Promote** thinking and discussion**.**

Illustration Caveat: The most beautiful illustration cannot hide lousy content--content is key.

What are Some Pitfalls of Figures and Legends?

Figures:

- ✓ Not mentioned in text.
- ✓ Textual data inconsistent with figures.
- ✓ Mislabeling.
- ✓ Symbols, data points, unreadable or cluttered.
- ✓ Ugliness (failure to get help from graphic designer).

Legends:

- ✓ Reiterate results section
- ✓ Written in shorthand, abbreviated form rather than whole sentences.

Choose the Most Effective Type of Illustration for a Given Goal

To accomplish this:	**Choose one of these**:
• To present exact values, raw data, or data which do not fit into any simple pattern.	• Table, list
• To summarize trends, show interactions between two or more variables, relate data to constants, or emphasize an overall pattern rather than specific measurements.	• Line graph
• To dramatize differences or draw comparisons.	• Bar graph
• To illustrate complex relationships, spatial configurations, pathways, processes, or interactions.	• Diagram
• To compare or contrast.	• Pictograph, pie chart, bar graph

Choose the Most Effective Type of Illustration (cont.)

To accomplish this:	Choose one of these:
• To show sequential processes.	**Flowchart**
• To classify information.	**Table, list, pictograph**
• To describe parts or circuits.	**Schematic**
• To describe a process, organization, or model.	**Pictograph, flowchart, block diagram.**
• To describe a change of state.	**Line graph, bar graph**
• To describe proportions.	**Pie chart, bar graph**
• To describe relationships.	**Table, line graph, block diagram**
• To describe causation.	**Flowchart, pictograph**
• To describe an entire object.	**Schematic, drawing, photograph**
• To show the vertical or horizontal hierarchy within an object, idea, or organization.	**Flowchart, drawing tree, block diagram.**

Provide context for your illustrations in the body of your paper.

- Refer explicitly to the illustration (e.g., "see Table 1," "as shown in Figure 3.")

- Tell the reader:
  - How the graphic advances, supports, clarifies, or summarizes your discussion.
  - Why it is important.
  - What it means.
  - How it supports your argument.

Creating Tables

See Figure 5.4 in Paradis, James G., and Muriel Zimmerman. *The MIT Guide to Science and Engineering Communication*. Cambridge, MA: MIT Press, 2002. ISBN: 0262661276.

Design Pitfalls

Pitfall #1: Too much white space

Design Pitfalls

Pitfall #2: Unbalanced Alignment

Useless Table #1

These data should be presented in text:

"Aeration of the growth medium was essential for the growth of S. coelicolor. At room temperature (24'C) no growth was evident in stationary cultures, whereas substantial growth (D, 78 Klett units) occurred in shaken cultures."

Useless Table #2

- This data set has a suspicious number of zeros. (Watch also for repetitive 100's when expressing percents).

- It should be presented in text:
  - *The oak seedlings grew at temperatures between 20 and 40'C; no measurable growth occurred at temperatures below 20' C or above 40'C.*

- "When a table or column can readily be put into words, do it." R.A. Day

When to Use Graphs

- Use graphs to present data in an organized way, *not to dress it up*.

  – **Don't use both** table and graph for the same data.

  – **Use line graphs** for data that show pronounced **trends**.

  – **Use bar and dot charts** to show **items** with **different values.**

A Useless Graph

This useless bar graph should be presented in text:

– *"Among the test group of 56 patients who were hospitalized for an average of 14 days, 6 acquired infections."*

Examples of Good and Bad Illustrations

7.02 SciComm
Sections B, E, F
Spring 2004

Examples of Effective Titles/Legends

Figure 1. Initial velocity vs. ONPG substrate concentration for His461. ONPG was added to β-galactosidase extracted from *E. coli* His461. The initial rates were measured using spectrophotometer A_{420} readings.

Table 1. Increase of Initial Velocity with Increase of Enzyme Concentration. As the concentration of the enzymes His461 and CSH36 are increased, the rate of A_{420} reading increases, as does the initial velocity (in nmol ONP/ml/min).

Figure 1. Optical density readings at 595nm at four known concentrations. The best-fit line is drawn to determine the protein concentration of samples with known optical densities.

Today's Out-of-Class Exercises

Due on the off week (March 17):

- Write a brief critique (2-3 pp.) of "The Science of Scientific Writing".
- Revise LTP intro.

Due next meeting (March 31):

- Create two illustrations (tables or figures or other) for your long-term project.
- Find in the published literature for one example of a good illustration and one example of a poor illustration. Print or photocopy them and drop them in NL's mailbox.
- Read the Heyman et al. paper on Lupus (and the accompanying Perspective article); students responsible for presenting will be contacted with specific roles.
- Revise your Druker et al. intro paraphrase.

Your article critiques should contain the following components:

- Assume your audience is familiar with the topic but not with this particular article; thus, you'll need to provide some brief context/summary for your analysis.

- How would you describe the construction of the article as a whole or the specific section you're focusing on?

- Is the article effective? Why or why not?

- Support your analysis with examples from the article itself.

Critique intro should introduce the article and its subject and broadcast the scope of your critique.

Example Introduction 1

Any piece of scientific writing contains at least two levels of structure. The broader level is concerned with the division of main topics into definitive sections of the paper; the narrower level involves the styling of individual sentences within paragraphs. For writers, mastery of both levels is important in order to clearly transmit ideas to readers.

> Opening sentences offer general topic and its importance

Gopen and Swan's article, "The Science of Scientific Writing," primarily addresses writing techniques of the narrower sentence level. They propose a concise number of fundamental guidelines about how to structure ideas and their corresponding words within a sentence. These guidelines are clearly articulated and then applied to several examples of scientific writing, effectively clarifying the meaning of each piece.

> The article itself is named and tied to the opening

However, "The Science of Scientific Writing" does not address the broader level of structure in scientific writing at any depth. Not surprisingly, the organization of Gopen and Swan's own article is strongest at the sentence level and weakest at the sectional level.

> Scope of the critique is offered to control what follows

Another critique introduction example:

With the growing amount of scientific research comes the growing need for clear communication. In order to effectively advance in science, researchers must clearly communicate their findings to the rest of the scientific community. Unfortunately, some scientists weave complicated tapestries with their writing, leaving even the most discerning readers lost and confused.

> Opening sentences offer general topic, its importance, and the writer's angle

In their article, "The Science of Scientific Writing," George D. Gopen and Judith A. Swan address this growing concern. By focusing on the sentence level, Gopen and Swan present seven guidelines to improve scientific

> The article itself is named and tied to the opening

writing and reader comprehension. The authors effectively discuss each guideline with its own example, using signposts to underscore important ideas, and Gopen and Swan present a clear, well-organized paper.

> Scope of the critique is offered to control what follows