First, A Few Things…

Thing One

When you turn in revisions of earlier work…

…Please include the original copy with my handwritten comments.

Thing Two

Methods Sections should begin with a few introductory comments to orient your reader.

A Few Other Things

- Avoid beginning sentences with numbers (see example).
- Avoid "Cart before horse" (see example)
- Avoid over structuring (see example - one or two sentence paragraphs with a subhead).
- Avoid using subheads to inform topic sentences (see example)
- Avoid late verbs (Science of Scientific Writing)

Avoid Beginning Sentences with Numbers

Avoid "Cart Before Horse"

Avoid Over Structuring

Avoid Using Subheads
to Inform Topic Sentences

Meeting 3: Illustrations:
Tables and Graphs

Name all the types of illustrations you can think of that might accompany a research paper.

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

Tell a story

Other Purposes for Illustrations

- Use illustrations to show first hand images of
  - Morphology
  - Pathological findings
  - Experimental design
  - Model
  - Apparatus

- Get your gorgeous illustration on the cover of the journal.

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.

When to Use Tables?

Use a table when repetitive data *must* be presented.

- Not for just a few determinations

- Not to report identical data

- Not to dress up your paper or oral presentation

Useless Table #1

This data should be presented in text:

"Growth medium aeration 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."

Why?

Useless Table #2

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.*

Why?

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

Useless Table #3

Beware of plus and minus signs. This table simply says:

– *"S. griseus, S. coelicolor, S. everycolor, and S. rainbowenski grew under aerobic conditions, whereas S. nocolor and S. greenicus required anaerobic conditions."*

How to Arrange Tables?

Arrange data so like
elements read:
- down (fig 7)
- not across (fig 6)

To illustrate, try adding
numbers across.

A Good Table

Table # and
Title ABOVE

Caption or
Abbreviations
BELOW

Title (Heading):
    Concise - just one sentence or clause.
    Goes ABOVE table, right after the table number.

Headings (Columnhead and Subheads):
    Clear enough to make data understandable without having to look at the text.
    Abbreviations in headings (e.g., temp) conserve space

Footnotes:
    Give just enough detail to make data understandable and do not repeat
      experimental detail.
    This is where the caption would go if there were one.

Graphs

More Graphs

When to Use Graphs?

Use graphs to present data
in an organized way…*not
to dress it up*

Don't express
the same data
in both a table and a graph

When to Use Graphs versus Tables

What are Effective Graphics?

Simple

Clean

Self explanatory

Require a **minimum of supplemental text**

Total ink = Information ink

Example

Total Ink > Information Ink

This is straight out of Excel. See anything unnecessary?

Example Improved

Example Improved Again
Total Ink = Information Ink

- **Grid lines:** Your audience is unlikely to care about the exact values at each data point, and the grid lines compete with the data's graphic pattern.
- **Legend:** Why make the reader look back and forth between lines and legend? Just label the lines - then eliminate the legend.
- **Axes:** The labeling between major tick marks is unnecessary.

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."*

A Good Graph

- Lettering large enough to withstand photographic reduction.

- Sides are boxed rather than two-sided so right-hand values are easy to estimate.

- Scribe marks point inward.

- Caption:
  - Concise title BELOW figure (not above and below)
  - Provides information pertinent to data interpretation.
  - Defines symbols

Should the illustration be understandable without reading the whole paper?

Yes

That means the caption should contain sufficient information to interpret the data, including key aspects of the methods

Provide Textual Context for Illustrations

METHODS:
Describe experimental design or apparatus, and refer to an illustration for additional details

RESULTS:
Say what the data **show** or **indicate**
Say how the illustration **supports, clarifies, or summarizes** your findings?

DISCUSSION
Why is that data **important**?
What does the data **mean**?
How does it **support your argument, theory, or hypothesis**?

What are Some Pitfalls of Tables, Graphs, and Legends?

Tables and Graphs:

> Not mentioned in text.
> Textual data inconsistent with data in tables and graphs.
> Mislabeling.
> Symbols, data points, unreadable or cluttered.
> Ugliness (failure to get help from graphic designer).

Caption:

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

Today's In-Class Exercises

Peer Review

Today's Out-of-Class Exercises

- Write a critique of the illustrations in the Lupus article by Heyman et al. published in the NEJM (posted on the 7.02 web site).

- Mock up illustrations for your long-term project. Provide appropriate captions. **Please put all illustrations at the end of your document - do not integrate with text.**

- Adjust prior sections as needed.