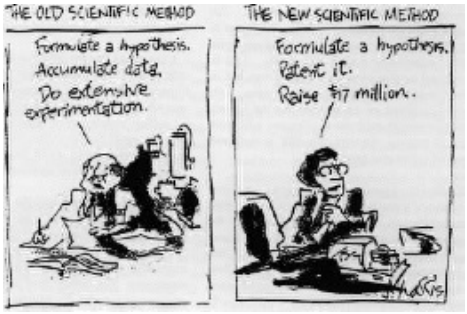
7.17: Writing Materials & Methods

Spring 2006



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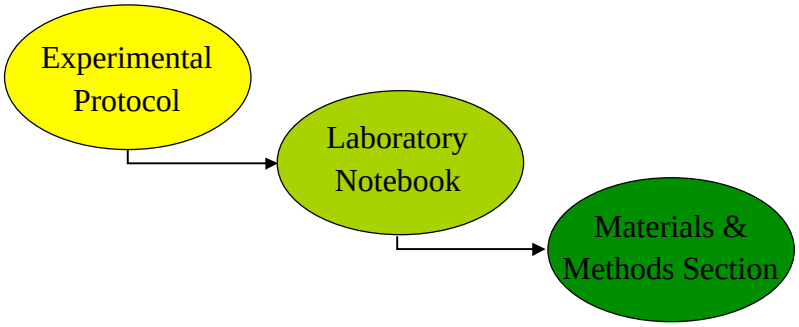
A Methods Section Exercise

1. Draw a relatively simple picture.
2. Write an account of how you drew that picture.
3. Give your written account to a partner, who will then draw based on your methods.
4. Compare your picture and your partner's rendering.

Multiple methods--both written and experimental--contribute to your final M&M section.



What are Some Goals of a Methods Section?

- Present the **experimental design.**
- Provide enough detail to allow readers to **interpret your results**.
- Give enough detail for readers to **replicate** your work.

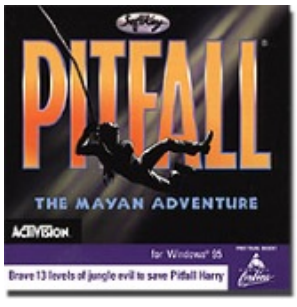
"The key to a successful Methods section is to include the right amount of detail--too much, and it begins to sound like a laboratory manual; too little, and no one can repeat what was done."
Successful Scientific Writing, 2nd ed.

According to Paradis and Zimmerman,

"The experimental [or methods] section of an article **describes the tools and processes that enabled you to meet the stated objectives of the introduction**. . . . This section will be read for at least two major reasons. First, readers will judge how skillfully you have designed the empirical process of problem solving. Second, readers may test your methodology against your results in their own laboratories. In experimental sections, clarity and accuracy are priorities."

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.



Pitfalls of a Methods Section, cont.

- Using a "dangling modifier" because of an over-reliance on passive voice:

  Watch out for the dangler!

  "After scraping the desired plate in four swipes, the bacteria were placed in 8ml of media with no antibodies."

- Failing to provide a context for the methods themselves:

  "In order to . . . , we . . . " ⇐ context for the particular method is provided.

- Writing a "Full Account" rather than a Methods section.

Full Account vs. Methods

A Full Account is . . .

- A description of every step actually used in the lab to achieve your results.
- Written in sequential or temporal order.
- Intended to tell the complete "story" of your work.

A Methods Section is . .

- A series of steps already completed and is written in <u>past tense</u>.
- Written in logical order.
- Intended for the reader to replicate the experiment.

Bad vs. Good 7.02 Genetics Methods Examples
(from KBS)

1 ml of an overnight culture of *E. coli* bacteria was inoculated into 50ml of LB or M9 media and grown at 37˚C for 4 hours in a New Brunswick Scientific water bath. At regular intervals, 1 ml of culture was removed from the flask using sterile technique (flaming tubes, flasks, and tips) and placed on ice. The OD550 was taken of each sample in a Milton Roy Spectronic 601 spectrophotometer blanked with medium alone. Additionally, a set of serial dilutions of each sample was made in saline. Diluted samples were plated on LB plates and grown overnight at 37˚C.

Generation of Bacterial Growth Curves. One ml of an overnight culture of BW140 *E. coli* bacteria was inoculated into 50ml of LB (or 4 ml of culture into 50 ml of M9 media) and grown at 37˚C for 4-2.5 hours with shaking. in a New Brunswick Scientific water bath. At regular 30 minute intervals, 1 ml of culture was removed from the flask using sterile technique (flaming tubes, flasks, and tips) and placed on ice. The OD_{550} was taken of each sample in a Milton Roy Spectronic 601 spectrophotometer blanked with medium alone. Additionally, a set of serial dilutions (10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}) of each sample was made in saline. Diluted 100 μl of the 10^{-4}, 10^{-5}, and 10^{-6} samples were plated on LB plates and grown overnight at 37˚C. Colonies were counted, and used to create two graphs on semi-log paper: OD_{550} vs. time and cfu/ml vs. time.

Materials & Methods Subheadings Example 1

Title: "Colchicine addition disrupts the nuclear localization of the HeT-A Gag protein in transfected *Drosophila melanogaster* Schneider 2 Cells"

M&M Section Headings and Opening Sentences

- **Isolation of pTF2 and pT9**: Plasmids pTF2 and pT9 were used to study the effects of colchicine on Het-A Gag localization.
- **Construction of pTF2-RFP**: A red flourescent protein (RFP) version of pTF2 was constructed for cotransfection experiments with pT9.
- **Preparation of cells for transfection**: Flask, each with 10-15x10^6 *D. melanogaster* Schneider (S2) cells, were incubated for 24 hours at 25^{o}C at a total volume of 5 mL in a complete medium consisting of the following items:
- **Transfection of cells with pTF2 and pT9**: *D. melanogaster* S2 cells were transfected via a liposome-mediated transfection.
- **Co-transfection of cells with pTF2-RFP and pT9**: The plasmids pTF2 and pT9 were cotransfected into *D. melanogaster* S2 cells with the same technique that was used in the individual transfections (see above).
- **Preparation of cells for flourescence microscopy**:

Materials & Methods Subheadings Example 2

Title: "Investigating the Role of CG7593 in HeT-A Nuclear Localization in *Drosophila melanogaster* Schneider 2 Cell"

M&M Sections

- Plasmids, Bacterial Strains, and Drosophila Cell Culture
- Gel Electrophoresis
- Polymerase Chain Reaction (PCR)
- Primers
- Restriction Enzyme Digestions
- Ligations and Transformation
- Preparation of *CG7593* dsRNA
- Construction of pPL17 EGFP Vector Containing *CG7593*
- Liposome-Mediated Transfection of Cultured Drosophila Cells
- Slide Preparation
- Viability Analysis

Materials & Methods Subheadings Example 3

Title: "Pendulin Function in HeT-A Nuclear Transport in *Drosophila* S2 Cells"

M&M Sections

- DNA Purification
- Primers
- dsRNA Production
- Pendulin:GFP Construct Production
- Schneider 2 Cell Transfection
- Slide Preparation and Microscopy
- Estimation of Cell Viability
- RT-PCR