

LABORATORY 4

Creating an Effective Scientific Presentation

A good scientist also must be a good communicator. All the brilliant research of a lifetime is of little use if the investigator cannot effectively explain new findings to his or her colleagues.

Anyone who has perused a scientific journal knows that these publications require authors to submit their work in a specific format so that readers know what to expect and how to find the information they seek quickly and efficiently.

Your presentation of the results of your own experiments in this laboratory should be no different. Your job is to create a streamlined, effective presentation, worthy of a scientific meeting, to present to your colleagues/classmates so that they can critique your work and help you to improve your next scientific endeavor.

Scientific papers published in journals are usually composed of a **title, abstract, introduction, methods, results, discussion** and **literature cited**. These same sections can be used in a poster session, and, with some modification, a Power Point presentation. This chapter will explain how to put together an effective PowerPoint presentation of your enzyme experiment. You have freedom to be creative, but heed the warnings in this outline if you wish to create a truly professional presentation.

You spent the last lab period designing and performing an experiment. In the intervening time until Lab #4, you and your teammates should organize and analyze your data, and get a good idea of what you would like to tell your colleagues/classmates about your results. In today's lab session, you will have approximately 90 minutes to finish putting together a PowerPoint presentation for your class. Do this as a team. One person should not be doing all the work! You may create an outline, collect and organize text, images and find good background information between Lab #3 and Lab #4, but do not create the presentation until you come to lab.

Each team will have approximately 10 minutes to give its PowerPoint presentation (your TA will gong you if you go overtime!), and then have a few minutes for questions afterwards. Every person in lab will evaluate each presentation with the scoring sheets at the end of this lab chapter, and these will be turned in to your TA.

I. Infrastructure: The Style

One of the most common errors seen in PowerPoint presentations created by the inexperienced presenter is an overuse of special effects, sounds, animations, and other distracting "gadgets." Although they may be cute, such things can become tiresome and even annoying if not used judiciously.

Don't give PowerPoint center stage. This is the biggest mistake I see speakers make. They forget that PowerPoint is a tool designed to augment their presentation, not *be* their presentation. You are the presenter. You are the focus. Not your slides. Not your props. And not your handouts. You are in the lead role and you need to retain that role. No amount of "razzle dazzle" can overcome a weak presentation. If you don't do your job, PowerPoint can't save you. It only makes a bad presentation worse.

-- Michael Hyatt,
Author of *Working Smart*

A. Background

Choose a single **background**, and stick with it. Choose a single **font** and stick with it. Choose a single **color scheme** and stick with it. Constantly changing backgrounds that have nothing to do with the show's content distract from your information.

Text and background should contrast strongly, creating a readable combination. Choose not only contrasting colors, but different *brightness* and *saturation* of those colors. Try different combinations on your roommates and teammates to get a consensus on which colors work best. Dark text on a light background is the easiest to read. Backgrounds with images or patterns usually reduce readability of text, so if you have a decorative background, make sure the pattern is only on the borders of the slide.

It's all right to modify the text format of individual slides, using bulleted lists, images, text with images, etc. But keep the infrastructure of your presentation constant so that when you have something important to say, it doesn't get lost in the "noise."

B. Text

Keep your text simple. Do not use too many words on a single screen: either of these makes it difficult for your audience to read. Use key words and simple phrases, excluding all but the most essential information. Empty space on a slide is a *good thing*: it enhances readability. Both text and images should be large enough to read, but not so large as to give the impression that you're yelling.

Don't *ever* use ALL CAPITALS. Also, do not use Title Capitalization if it's not a title.

- | | | |
|---------------|---|--------------------------|
| Wrong: | ● | LOW pH DENATURES ENZMES |
| Wrong: | ● | Low pH Denatures Enzymes |
| Right: | ● | Low pH denatures enzymes |

Limit punctuation. Use bullets and phrases that quickly convey your ideas.

C. Special Effects

Avoid using sound, flashy animations, text fly-ins, or "cute" effects. These may seem grand at first, but they get old quickly, only to become distracting and annoying. Humor is fine, but don't stray so far afield that your presentation seems more fit for an elementary school than a college classroom. Treat your colleagues with respect by creating a professional presentation that is meaningful, and not filled with trite, extraneous material.

Special effects can be informative and provide emphasis, if used properly. But use good judgment, and make sure they are related to your subject.

D. Images

Use high-quality, high-resolution images that reinforce and complement your work. Make sure your images retain their clarity when projected on a large screen.

E. Presentation Style

You probably have used Power Point before, and it's likely that you'll use it again. So take some time to familiarize yourself with its navigation. Learn to jump ahead or backwards without having to pass through every slide. Practice! In many cases, audiences will ask a presenter to return to a particular slide during the question-and-answer period. Be able to swiftly access the slides in question, and you will convey a professional, competent impression.

Limit the number of slides. A good rule of thumb is one slide per minute.

Rehearse with someone other than your teammates, and preferably someone who has not seen your presentation. Ask for honest feedback about colors, content, and overall efficacy of the presentation.

Don't read from your slides. Your slides are there for the audience, not you. You should already know what's there, and be able to speak about your slide topic without prompting from the slide itself.

Don't speak to your slides. One of the most common mistakes presenters make is to face the screen as they deliver a presentation. Not only can your audience not see your face, but they usually will not be able to hear you. Few things make as bad an impression.

Don't apologize for anything in your presentation. If a slide is hard to read or understand, *then don't use it*.

If you are not running the presentation from your own computer, download it to the projection computer's **desktop**. It will run faster than if you try to run it from a CD or external drive.

II. Presentation: The Content

At scientific meetings, research is presented in different formats, including poster sessions and presented talks. Remember that you are presenting the results of a scientific investigation, not a corporate speech, nor an entertainment. Follow the format generally used in scientific publications, with a few important modifications.

A. Title

When you eventually publish your work, it is the title of your paper that will be read by the most readers, and it is the title that often will determine whether the rest of your paper will be read at all. It should describe *specifically* the content of your paper. Under the title, list the names of all authors, as well as the institutional affiliation of each. (In case you don't know, yours is the University of Miami Biology Department)

B. Abstract

An abstract is a brief paragraph, usually found under the title of a published paper, in which the investigators give a skeletal outline of the purpose, results, and conclusions of their research. The purpose of an abstract is to allow a reader to determine, with a very quick scan, what a published paper is about, how it was done, and what was discovered. Although the abstract appears *first*, it is written *last*.

Power Point presentations in scientific meetings rarely include an abstract, though the investigators may sometimes provide one as a handout. In our class, because we wish to save precious resources, we ask that you not provide any handouts.

C. Introduction

This section should give the *specific* background of your experiment. Because everyone in the lab has performed experiments investigating the function of yeast enzymes, don't be surprised if many of your colleagues say some of the same things you do. This isn't a problem. Present the best information on your specific hypothesis and research to prepare your colleagues for what you intend to teach them. Include such things as

1. What is an enzyme, and what enzymes do yeast use to metabolize sugars?
2. What substrates did you use in this experiment?
3. What is the observation that inspired this research?

4. What other research has been done in this area (Provide references, but do not list literature cited in a slide unless you wish to include one at the very end.)
5. Why is your idea relevant and interesting?
6. What is your hypothesis?
7. What are your predictions?
8. What possible outcomes might there have been, and what would these have told you about your hypotheses?
9. What is the importance of your work to the “big picture” in our exploration of enzymes in general, and/or sugar-catabolizing enzymes in particular?

When making a statement that is not common knowledge, always cite the source of your information. Do not include any methods, data, or conclusions in this section.

D. Methods

The methods section is meant to enable an interested observer to duplicate your experiment and test whether your results are reproducible. If any of your team members has a digital camera, feel free to bring it to lab and snap pictures of your experimental set up, team members at work, and other exciting things that you can include in your presentation.

1. Describe all materials and procedures used.
2. Include reagents, temperatures, pH, molarities, etc. and all relevant information.
3. Do not repeat the same information over and over.
4. Caution! Don't get carried away with detail. It *is* important that you used a XXX Molar solution of a particular sugar, or that the temperatures of your control and treatment runs were 20°C and 50°C, respectively. It is *not* important that you used a #2 pencil to record your data in a spiral notebook on a slate table in a spacious laboratory. You get the idea.
5. Identify the statistical test(s) you will use to analyze your data
6. Do not include any data or conclusions in this section.

E. Results

Present your results as concisely as possible. If you must include tables, make sure they are readable, and are not merely massive columns of illegible numbers. If you used statistical methods, be sure to report your statistical results, including the value of your statistic (t test, Chi Square, ANOVA, or whatever you used), as well as the P value associated with that statistic at the appropriate degrees of freedom.

Figures and Tables should be simple, high resolution and easy to read. Include a legend with each Figure and Table, and be sure to label each completely and appropriately so that your audience can read the information as you describe it. The legend of a Table should be *over* the image, whereas the legend for a Figure should be *under* the image. More detailed instructions on figure and table format can be found in the Figures and Tables Appendix of your online lab manual (linked to the syllabus).

The audience should be able to figure out your data from the slides alone, even though you are also giving an oral description of the content of the slide.

Report exactly what happened in your experiment, even if it is not what you expected. You will have ample opportunity to explain deviations from the expected in the next section.

F. Discussion

This is the most important section of your presentation, and should not merely be a re-statement of your results. In your discussion, you must *analyze and explain* your results. Follow these simple guidelines.

1. Link your results to your original hypotheses.
2. Which hypotheses was/were excluded? Which was not?
3. Explain your experimental observations in specific terms. Describe what has happened in terms of molecular interaction, physics (kinetics), behavior, etc. DO NOT make statements such as: "The reaction was faster because it had a greater reaction rate." (The absurdity of this statement should be self-evident.)
4. The world will not stop turning if your results are not what you expected. More important than "accurate results" (if there is such a thing) is logical explanation of your observations.
5. Discuss possible sources of experimental error (NOT human error) and how they might have affected your results.
6. Draw overall conclusions--give summary statements.
7. Most importantly, what do your findings suggest about the next step in investigating the function of sugar metabolism in yeast (or other organisms)? What is the next set of competing hypotheses you might pose to address these new questions?

G. Acknowledgements

Modern scientific research is not done in a vacuum. Be sure to cite all sources of background information. If you would like to thank particular persons or entities for any assistance given during the design of your experiment, its execution, or the preparation of your presentation, then an acknowledgement slide at the end of the show is a nice way to show your appreciation. (Granting agencies expect this! So if mom and dad are paying your tuition, you can thank them here.)

H. Questions and Answers

Now that you have presented your work to your colleagues, it is time to receive their questions, and possibly their criticisms. Open the floor to questions, and be ready to answer. Prepare yourself by reading all text references about enzymes, and also know extra information about your specific experimental variable.

If you are in the audience, be an active participant in the question-and-answer period, as this is where flaws in experimental design can be pointed out so that future experiments will be more informative.

I. OPTIONAL: Handouts

As staunch environmentalists, we in the biology department discourage wanton waste of paper. Please provide a handout ONLY if you feel it is necessary to adequate understanding of your presentation. It is probably NOT necessary for this presentation.

In scientific meetings, a good handout can keep audience members from becoming frustrated if they can't write down what is on every slide. You don't want your colleagues to become so overwhelmed that they lose interest. A brief, appropriate handout can help your audience stay focused on the speaker. But remember a slide should be concise, not an ocean of text or table.

On the following pages you will find critique sheets for evaluating the work of your classroom colleagues. Use one sheet per presentation.

POWER POINT CRITIQUE

On a scale of 1 to 5 (circle), rate each presentation for each of the following.

Title: _____

Authors: _____

1. The presentation was well organized.
strongly disagree 1 2 3 4 5 strongly agree
2. The presentation followed a logical progression
strongly disagree 1 2 3 4 5 strongly agree
3. The speakers exhibited knowledge of content in presentation
strongly disagree 1 2 3 4 5 strongly agree
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7. The speakers used accurate, up to date resources and citations
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8. The presenters utilized technology appropriately for the presentation
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9. Figures and Tables were well designed and used effectively.
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11. The speaker appropriately involved the audience.
strongly disagree 1 2 3 4 5 strongly agree
12. Colleagues' questions were answered satisfactorily.
strongly disagree 1 2 3 4 5 strongly agree
13. The presentation met my expectations.
strongly disagree 1 2 3 4 5 strongly agree

What do you think was best about the presentation?

What changes would have made the presentation more effective?

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