

Science Writing

German physicist and mathematician Max Born said, “To present a scientific subject in an attractive and stimulating manner is an artistic task, similar to that of a novelist or even a dramatic writer” (Born, 1968). If Charles Darwin and Albert Einstein had not published their scientific findings, our world would be very different. Presenting your scientific findings clearly in writing is perhaps the most important aspect of your work.

Using Passive Voice

Scientific writers often write in passive voice to indicate objectivity and to put the focus on their research rather than on themselves.

Use passive voice

- When the actor of the sentence is less important than the receiver of the action as in *Scientist Scott was presented with an award by the director.*
- When you’re explaining an operation that the reader isn’t actively involved in performing
- When you’re explaining a process or procedure

Using Past vs. Present Tense

Describe results in your paper in past tense. You may have done these experiments, but your results may not yet be accepted facts. Use past tense for

- Observations
- Completed actions
- Specific conclusions
- Abstract, materials, methods, and results sections of a paper

Most of the information in an introduction comes from descriptions of previously established knowledge. Published results are generally considered facts. Use present tense for

- generalizations
- statements of general validity
- results from published papers

You can mix tenses in the same paragraph if you are writing about a completed experiment in conjunction with published established knowledge.

Darwin observed that species evolve over time.

Using Figures and Tables

If you have more than two data points, consider adding a figure or a table.

- Use figures when relationships or trends are more important than actual numbers
- Use tables for precise numbers
- Cite each table and figure in the text of the paper
- Do not remove data points to make trends look better
- Use an easy-to-read format

Writing a Briefing Note

Decision makers use briefing notes to get quick and effective information. Briefing notes help readers get information about topics they know little about or that they may not have time to research. Your goal in a briefing note is to convey key points and considerations about an issue. Ideally, your briefing note should be

- Short (no longer than two pages)
- Concise
- Clear
- Reliable
- Readable

Your briefing note should include these sections:

- Short statement no longer than two lines about the issue and why it matters to the reader.
- Background statement with details the reader needs in order to understand what follows, including a short history or other pertinent information.
- Current status of the situation including those involved right now.
- Key considerations the reader needs to make an informed decision. Try to be as unbiased as possible. Substantiate your statements with evidence and double check your facts.
- Observations about key considerations and what they mean.
- Conclusion and/or recommendation about what you want the reader to infer from your briefing note.
- Attach additional details in an appendix.



Writing a Poster Presentation

Scientific posters allow you to rapidly convey your ideas and your findings through a visual representation that includes both text and graphics. Often, poster presentations are more effective than platform presentations because readers see the poster as an engaging advertisement for your work.

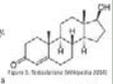
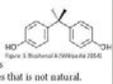
Design the poster around your research question, concentrating on the main points in each section. Use visuals to illustrate your work. Your poster should include:

- Title (no longer than two lines)
- Abstract (50-100 words)
- Introduction/Hypothesis (200 words)
- Materials and Methods (200 words)
- Results (largest section)
- Conclusions (bulleted lists work best)
- References and Acknowledgements

Here are some additional tips for writing a poster presentation:

- Arrange your information in a logical sequence.
- Put the information into three or four columns.
- Put the Abstract in the upper left-hand corner.
- Put the Conclusions in the bottom right-hand corner.
- Vary the size and spacing of your information to make it appear more interesting.
- Reduce the size of information that's less important, like the References and Acknowledgements sections.
- Make sure the finished poster is about 20% text, 40% graphics, and 40% white space.
- Limit yourself to two colors (not including black and white).

Here's a sample poster presentation:

Straight Science: Sexual Preference and Endocrine Disruption		UNT	
Global Life Science Institute & University of North Texas - William Morgan			
<p>Introduction</p> <p>Endocrine disruption is one of the five highest priority research areas established by the Executive Office of the President to the Committee on Environment and Natural Resources (Kavalok, 1999). While there is extensive knowledge on endocrine disruption and its effect on sexual reproduction, current research is lacking on how endocrine disruption chemicals (EDCs) influence sexual preference.</p> <p>Hormones affect sexual differentiation while in utero, which influences sexual preference. Hormones and EDCs play a complex role in sexual orientation.</p> <ul style="list-style-type: none"> • Testosterone • Estrogen • Bisphenol A <p>Understanding endocrine disruptor chemicals and their effect on endocrine system hormones will lead to a better understanding of sexual preference.</p>	<p>Results</p> <p>Endocrine signaling while in utero has an influence on sexual development. Testosterone (Figure 1) and estrogen (Figure 2) affect sexual preference.</p> <p>Hormones:</p> <ul style="list-style-type: none"> • Testosterone - Sexual differentiation happens during two separate stages of pregnancy. In the first two months of pregnancy, the gonads sexually differentiate by a testosterone surge in men and an absence of a testosterone surge in women. During the second half of pregnancy, the brain sexually differentiates in both sexes.  <p>Figure 1: Testosterone (Kavalok, 2000)</p> <ul style="list-style-type: none"> • Estrogen - Estrogen can affect the brain's sexual differentiation during the second half of pregnancy. In addition, an increase in estrogen can increase other androgen hormones like testosterone and dopamine (Meyer, Rahlburg and Buhardt 1995). <p>Many of the harmful effects of EDCs happen during pregnancy. An embryo is most vulnerable to abnormal changes of androgen hormones. The EDC, BPA (Figure 3) acts on the endocrine system, altering sexual preference.</p> <p>Bisphenol A (BPA):</p> <ul style="list-style-type: none"> • Testosterone - BPA increases an enzyme that causes an increase in testosterone production (Zhou et al. 2008). This increased level of enzyme causes a surge of testosterone in females that is not natural.  <p>Figure 3: Bisphenol A (Zhou et al. 2008)</p>	<p>Results (continued)</p> <ul style="list-style-type: none"> • Estrogen - BPA follows the same pathways of estradiol (a steroid hormone classified under the estrogen family of hormones). BPA and estrogen compete for the same receptors. By blocking androgen receptors, it interrupts normal sexual differentiation in women (Iga 2000). <p>Endocrine disruption chemicals can easily influence the complex functions of the endocrine system. While in utero, EDCs can disrupt differentiation, signal pathways, steroid production, neurotransmitters and neurotransmitter density.</p>	<p>Conclusion</p> <p>Research on EDCs focus on their harmful effects to the endocrine system. Scientists can find ways of using EDCs to further lamark-ind in a few ways.</p> <ul style="list-style-type: none"> • EDCs in Medical Treatment • EDCs and Genetic Mutation <p>However, the most important future research need in endocrine disruption research is finding a direct correlation between EDCs and sexual preference. These findings would influence society on a global scale. It not only influences society politically but also economically and medically.</p> <p>Global Life Science Institute (GLSI) is interested in areas of scientific inquiry based on reproductive biology that fosters collaboration between academics, the government, and the scientific industry. By researching how EDCs affect sexual preference, GLSI will become the global leader in endocrine disruption research affecting reproductive biology.</p>
<p>Materials and Method</p> <p>All of the research is from peer reviewed scientific academic journals. The three search engines used are:</p> <ul style="list-style-type: none"> • Academic Search Complete • Government Documents • PubMed <p>No other search engine will be used due to the risk of potential scientific inaccuracy those articles might possess. Additional research was conducted while writing the white paper to gain a better understanding of the complex mechanisms of the endocrine system and how it was affected by endocrine disrupting chemicals.</p>	<p>Acknowledgments</p> <p>Dr. Dusan Huggert Ms. Heather Huggert Global Life Science Institute University of North Texas</p>		



Writing an IMRad Lab Report

Lab reports are written in third person in the past tense and follow the IMRaD (Introduction/Methods/Results/and Discussion) format. Your lab report should include the following sections:

Title page

Write an informative title that reflects your report's content. The title should be specific and contain ten words or fewer.

Abstract

The abstract is a summary of the main ideas of your report. It helps your reader decide whether or not to read the rest of the report. This abstract should be one paragraph that's around five to eight sentences long. You'll want to include

- Context of your experiment
- Brief explanation of methods used
- Brief statement of results
- Brief statement of significance of the results

Introduction

- Background information
- Outline of the scientific purpose of the experiment
- Hypothesis—state this towards the end of the introduction

Methods

- Bulleted list of materials needed
- Numbered step-by-step instructions for the experiment (make sure to break the steps up into small chunks of no more than 10-12 steps)
- Include enough details so that anyone could duplicate the experiment

Results

- Summarize your data in a table, chart, or graph
- Label the chart and provide explanations
- Write about trends and major findings

Discussion

- Interpret significance of the results
- Explain how results relate to the hypothesis
- Address any changes or modifications made to the experiment
- Account for significant sources of error in the results if necessary
- Draw a conclusion and relate it to your original hypothesis
- Discuss future work that could provide answers to questions prompted by your results



Writing a White Paper

White papers help readers make decisions by informing them about complex topics. Originally, white papers were a type of government report, but they have become standard in science and business. In a white paper, you argue a specific position or propose a solution to a problem.

White papers are typically short; they usually run about 5-12 pages. They include the following sections:

- Summary
- Background
- State of the Science
- Future Research Needs

Start with an Informative Title

Most people look at the title of an article to decide whether or not to read it. Make your title short and specific. Often, the best titles contain a colon, like

She's Fallen and She Can't Get Up: Women Runners and Patella Tendonitis

Summary

Think of the summary as the “sales pitch” for your white paper. Use key points from other sections to help the reader understand what they’ll learn in the rest of the white paper. Keep the summary to one page, using bulleted lists where necessary.

Background

The background contains general knowledge, including a brief history of your topic. Think of the background section as helping your reader get “up to speed” on your topic.

State of the Science

In this section, describe what’s been done scientifically about your topic. Provide details and data, including supporting evidence from research you’ve found in peer reviewed journals.

Future Research Needs

This section is a “call to action” about what needs to be done. Limit yourself to the top two or three future research needs. Explain what should be done first, as well as why this one approach is the best option.



Writing a Standard Operating Procedure (SOP)

A Standard Operating Procedure or SOP contains a list of directions or steps to perform a task. SOPs

- Ensure tasks are performed the same way each time they are undertaken
- Facilitate consistent conformance to particular standards
- Help companies or organizations comply with government regulations
- Should be kept in a secure place with working copies available
- Should be reviewed every two years

As you write your SOP

- Use a concise step-by-step format
- Present your information simply
- Use a flow chart to illustrate the process you describe
- Use active voice and present tense
- Use commands to ensure an implied but not stated “you”
- Include enough detail for new workers

In general, SOPs include

- Title page that identifies the procedure or activity
- SOP identification number
- Date of issue or revision
- Name of the agency to which the SOP applies
- Scope of application that describes the procedure or process
- Applicable government regulations
- Limits to the use of the procedure
- Prerequisites to performing the task
- List of equipment and supplies needed
- Training requirements
- Cautionary notes or special considerations
- Procedure itself in sequential order with numbered steps
- Quality control measures
- References

Works Cited

Born, Max. (1968). *My Life and My Views*. New York: Scribner.

Huggett, Heather. (2014). Writing in the Sciences Course Materials. Unpublished manuscript. Department of Technical Communication, University of North Texas. Denton, Texas.

Morgan, William. (2014). “Straight Science: Sexual Preference and Endocrine Disruption.” Unpublished Poster Presentation. Global Life Science Institute and University of North Texas. Denton, Texas.