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Forest Laboratory Report

Writing Tips and Tricks

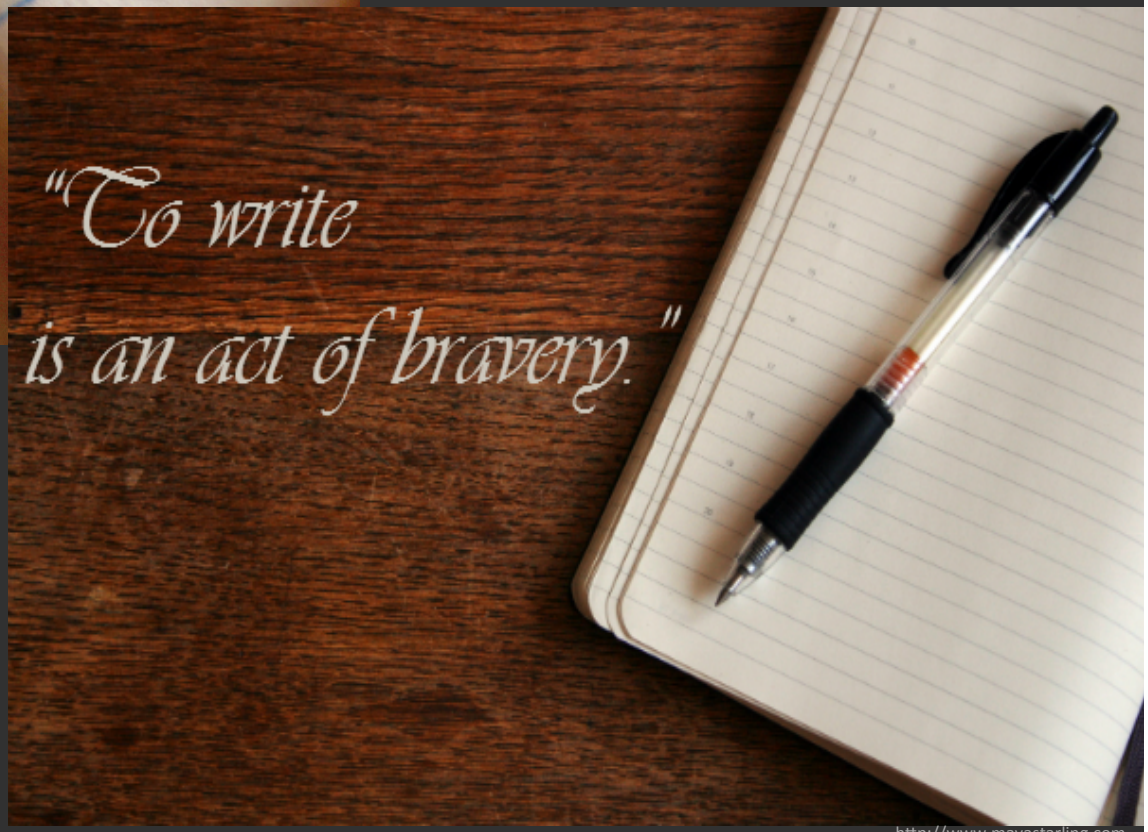
Biol366

Stuart R. Borrett

https://rantzz.files.wordpress.com/

Communicate

Inform



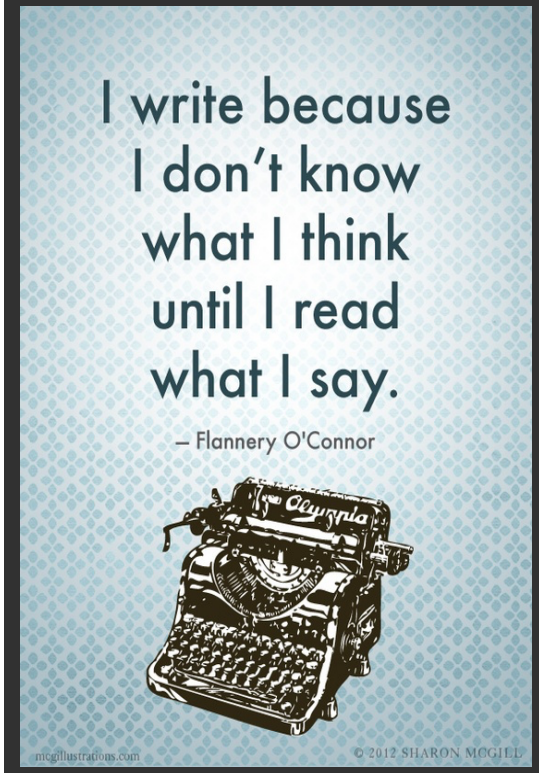
http://www.mayastarling.com

Entertain

Persuade

We write to think, not think to write

@ Flickr



Corollaries

1. Clear writing is *evidence* of clear thinking

2. Scholars should be writing often

Scholarship

a prolonged conversation, a dialogue

epSos .de @ Flickr

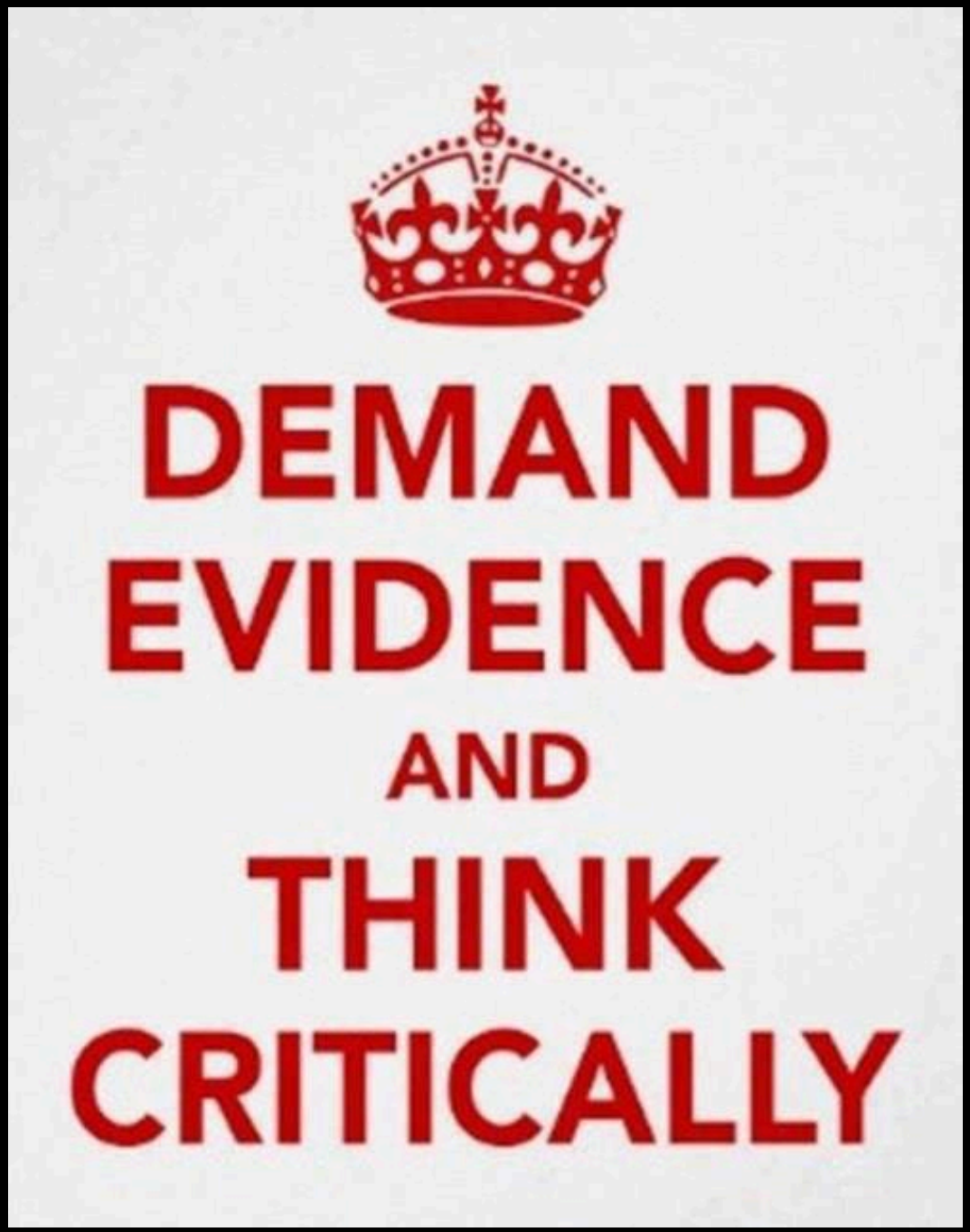
you have a seat at the table

Elliot Brown @ Flickr

What will you say?

How will you reach them?

Write!



FB 2013

Long Report Outline

- Title
- Abstract
- Introduction
- Materials and Methods
- Results
- Discussion
- Acknowledgments
- Tables
- Figures

For detailed descriptions, see the **Laboratory Report Instructions**

Report Evaluation

Evaluation Rubric – posted on class website

http://people.uncw.edu/borretts/courses/biol366/BMB_LabReport_Rubric_366Long.xlsx

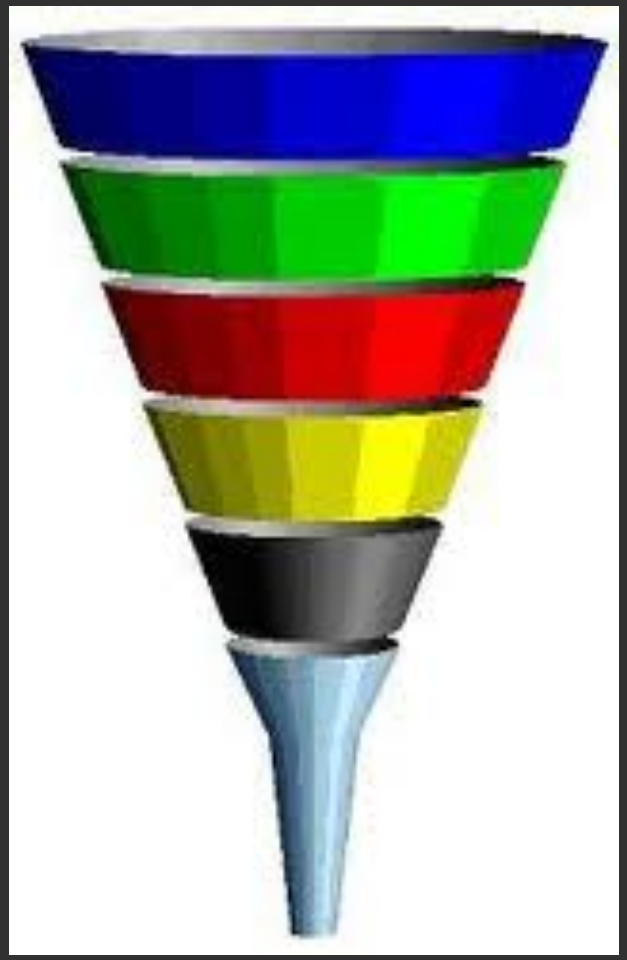
Biology and Marine Biology Lab Report Rubric Content	Exemplary (5)	Satisfactory (3)	Needs Improvement (1)	Weighting (%)	Draft		Final	
					Raw Score	Weighted Score	Raw Score	Weighted Score
Title								
Title, name, course, instructor, semester	Contains title, name, date, course, instructor, semester; Title is a clear and concise statement that describes the topic of the paper very well.	Missing one of the following (course, instructor, semester) except title or name; Title is too long and provides too much information that is not concise or descriptive of the topic.	Missing more than two of the following (course, instructor, semester), or the title, or the name; Title is lacking altogether.	2		0		0
Abstract								
~200-250 word summary of your paper including the purpose, hypotheses, design, and major findings	Abstract is a compelling summary of the main points of the research and sections of the paper. Hypotheses are clearly stated along with primary results. Significance of the research is apparent.	Abstract states hypotheses, rational, and major results.	Abstract lacks one or more elements or is missing all together.	3		0		0
Introduction								
Explanation of topic	Presents a concise lead-in to the report by explaining what the topic of the report is; Defines any broad topic / title topic terms; Provides the reader with a background of the report.	Provides some background to the topic, but not enough to fully understand the topic, or is not concise.	Little or no background information is provided.	3		0		0
Review of previous work	Relevant literature is reviewed and appropriately cited; Depth and breadth of review is thorough; Bearing of the work reviewed to the present study is apparent.	Some relevant literature is reviewed but lacks either breadth or depth in coverage; Papers are appropriately cited.	Few if any references are included; Papers are not properly cited.	3		0		0
Objective Statement / Hypotheses	The objectives of the research are presented and both null and alternate hypotheses are testable and clearly stated. The scientific rational for each hypothesis is clear.	Some but not all hypotheses are present but not clear; scientific motivation is clear for hypotheses stated.	No hypotheses are stated or their scientific rationale is unclear.	4		0		0
Methods								
Describe how the study was conducted; written in the past tense	Presents easy-to-follow methods for different part of the laboratory which are logical and adequately detailed; data analysis methods stated; statistical p-value to be used is stated.	Most of the steps are understandable; some lack detail or are confusing. Data analysis not adequately described.	Presentation of methods is not sequential, is missing many steps are missing or are confusing.	10		0		0
Results								
Presentation of your data, written in past	Clear and concise report of the data that	Results reported are accurate, but either not	Results are inaccurate, misstated or	10		0		0

Tells you exactly how the report will be evaluated – no secrets

Introduction

Q: What does your audience need to know to understand the work you are reporting?

Funnel your reader into your work



Broad Introduction to Topic

Significance?

Literature Review
put work in context

Your specific objectives, hypotheses, and questions

On average 3-6 paragraphs

Methods

- Maintain the same order of ideas
  - The order of your methods should mirror the order of your hypotheses.
  - Your presentation of your results should also be in the same order
- Description of methods is not a bulleted recipe (we did x first, we did y first). Instead it's a *narrative* of what you did and why.
- Need a section/paragraph that describes your data analysis.
  - What statistics did you use to address which hypotheses – and WHY.
- Not just describing what you did, but trying to persuade the reader that your experimental design is appropriate/ sufficient.
- Often ~3 paragraphs (one for each hypothesis and one for data analysis).

Methods Examples

Poor: **Methods**

The collection of data for this study began by entering the Longleaf Pine forest in the rear portion of UNCW's campus. This section of forest was divided into three sections, forest A, B and C. Each section was separated by service roads as shown in Figure 1. When entering forest A, we took 50 paces off the path and away from the edge of the forest. This was to avoid any edge-effect on our data. We then gently spun a team member around in a circle while his eyes were closed in order to disorientate him. ….

Better: **Methods**

We estimated the abundance of Longleaf pine trees in two forest patches on the UNCW campus. To accomplish this, we counted the adult Longleaf pine trees in 20 5m x 5m quadrats in two forest patches (A and B, see Figure 1). We used the Frisbee method (Borrett, personal communication) with three throws to haphazardly select the sampling locations, after initially walking 10 m into the forest patch so as to avoid the likely forest edge effects. …

Consider:

- Level of detail of description
- Use of Topic sentence
- Use of and reference to Fig. 1 (map)
- Narrative
- Information density
- Word choice precision, conciseness

Methods Examples

Better: **Methods**

We estimated the abundance of Longleaf Pine trees in two different forest patches (Forest B and C, see figure 1). To do that, we counted adult trees that were chest height or taller in 20 5m x 5m quadrats in each of the two forests. After walking 30 paces into the forests, we used the Frisbee method (Borrett, 2016), which included three throws, to make the samples haphazardly selected. After the Frisbee landed on each third toss, we walked 5 paces in the direction the arrow was pointing and then took our sample. The materials necessary in order to conduct this experiment were a Frisbee and two measuring tapes.

To analyze the abundance of the Longleaf Pines found in Forest B and Forest C we performed a Chi Squared test. This test allowed us to compare the observed number of Longleaf Pines to the expected number of trees in each forest. It then helped us to reject or accept our null hypothesis about the abundance of Longleaf Pines in each forest.

Data Analysis: Think Statistics

Welch t-test → Are two means really different?

Continuous variables
Samples can have different variances
Assumes data have normal distribution

Shapiro-Wilk → Are my data normally distributed?

Chi-Square → Are my counts different?

What methods did you use and why?

Reporting Results

There is a fine line between results and discussion

Results – summary of data

Discussion –why the results may have occurred & significance.

Examples

Poor: The χ^2 value for the Longleaf pine population dispersion was 106.39.

Better: Our data suggested that the Longleaf pine population had a clumped dispersion pattern (d.f. 59, χ^2 = 106.39).

Poor: The mean values were 6.97 and 3.15. The standard deviations were 3.1 and 2.5

Better: Light intensity was on average greater in Forest A (6.96 Lux ± 3.1 SD) than in Forest B (3.15 Lux ± 2.5 SD).

See page lab manual and report guidelines for more detail.

Discussion

1. Don't repeat your results; explain them. What ecological mechanisms might explain your results?
2. What is the significance of your results?
3. How do they compare to values previously reported in the *literature*?

4. Critically evaluate your science. Are your results accurate representations of the forest patches you studied? What would you differently next time?
5. Please address the management question.

If your job were to report to a land management advising council about how best to manage this forest, what would you recommend to them based on your results? Why?

References & Citations

Why use a citation?

Your report needs at least **5 primary literature** references

Most often in introduction and discussion.

Citation Examples

Earley (2004) notes that longleaf pine forests used to burn every three to eight years.

Historically, pine forests used to burn every three to eight years (Earley 2004).

References Examples

Example of a Journal Article

Borrett, S. R. and O. O. Osidele. 2007. Environ indicator sensitivity to flux uncertainty in a phosphorus model of Lake Sidney Lanier, USA. Ecological Modelling **200**:371-383.

Example of a Book

Earley, L. S. 2004. Looking for longleaf: the fall and rise of an American forest. University of North Carolina Press, Chapel Hill, NC.

Jørgensen, S. E. and G. Bendoricchio. 2001. Fundamentals of Ecological Modelling. 3rd ed. Elsevier, New York.

If an article is published in a journal, you don't need the web address and access date if you find it online.

Examples of citation use

The following text is quoted from from Borrett (2013).

Note the topic sentence

> Ecologists have applied the centrality concept in several ways. For example, landscape ecologists have used centrality to assess the connectivity of habitat patches, how this connectivity effects organism movement, and how habitat loss changes the connectivity (Baranyi et al., 2011; Bodin and Saura, 2010; Estrada and Bodin, 2008). Community and ecosystem ecologists have developed and used centrality measures to study how organisms influence each other in transaction networks (Allesina and Pascual, 2009; Fann and Borrett, 2012; Jordán et al., 2003). Jordán et al. (2006) argue that mesoscale measures, between local and global centralities, are most useful for ecosystem studies because the impact of indirect effects tend to decay rapidly as they radiate through the system. Recent work used centrality indicators to determine important species in communities of mutualists (Martín González et al., 2010; Sazima et al., 2010). Collectively, this work shows how a range of centrality indicators can be useful for addressing ecological questions.

These references provide examples/evidence to support the previous statement

Note – not just one. This helps prevent plagiarism

Here, a specific idea from the source is being used to make a larger point

Citations/References are the sources of "recent work" being described

Borrett, S.R. 2013. Throughflow centrality is a global indicator of the functional importance of species in ecosystems. Ecological Indicators 32:182-196.

Figures & Tables

1. What is the **main point** of each figure and table you are including? What does it add to the paper?
   - If you don't know, don't include it.
2. Figures need figure legends (below).
3. Tables need table titles (above)
4. All figures and tables need to be numbered and cited in the text.

Usually emphasize the most important points

corollaries How to read a paper? → start with the figures and tables
How to study for a test → start with the textbook figures and tables

Parting Thought

Science writing is *very* structured.

It might help to think of it more like structured poetry such as

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You need to follow the expected **rules** and **constraints**.

This does not eliminate the ability to be creative or compelling, but it does require you to learn the structure.