

Guidelines for Paper Critiques

Evolution, Fall 2010

One of the major goals for this course is that you will be able to critically analyze an evolutionary study by identifying the key question(s), explicating the results, putting the results in context, critiquing the conclusions, and evaluating fundamental evolutionary hypotheses in light of the new information. No matter what you do in your career, these skills will be useful to you. For example, if you (or a family member) are diagnosed with a disease, you might want to read about recent advances in treating it. You might also want to learn about the science behind a proposed environmental policy, or a new curriculum proposed for your child's classroom.

Getting better at critically analyzing scientific studies requires practice. Because scientific papers are one of the main ways biologists communicate the results of their studies, practice involves carefully reading primary literature that reports the results of original research. Therefore, we will spend time this semester practicing critical reading of primary research papers, focusing on topics related to class material. Pechenik has some excellent suggestions for how to write summaries and critiques (and how to avoid plagiarism) in Chapters 3 and 7; see especially the list of questions to think about when preparing to write a summary (p. 130).

Your written critique assignment will include 3 sections. Please label each section in your paper (see example on next page for formatting).

1. Your summary (*maximum* 2 pages, double spaced) should include:
 - One (short) paragraph that identifies the central question(s) of the study, and provides brief background information about the questions' importance, and the general experimental approach.
 - Summary and analysis of each key figure or table. Briefly describe and interpret each one (the 2-step process for analyzing figures). The description may need to include some methods.
 - Brief summary of any other key results that were presented only in the text.
 - Two-sentence overall summary of the paper's conclusions—follow the format in Pechenik.
2. The critique should present *your* ideas about at least one strength or weakness of the paper. *Do not critique the writing, organization, etc.—focus on the science.* Explain your thinking—why is it a strength (or weakness)? Why is that strength (or weakness) important? To evaluate strengths or weaknesses, consider ideas or techniques we've discussed in class, as well as general principles of experimental design.
3. The question should focus on substantial biological issues—not definitions of unfamiliar words (use a dictionary instead) or clarification of methods explained in the paper. It may help to provide some context for the question. The best questions will be thought-provoking, and will spark an interesting discussion in class. See examples below.

As Pechenik notes, writing short summaries is actually harder than writing long ones! Plan accordingly. I recommend reading the papers at least 2-3 times, and then writing your summary *without the paper text in front of you*. This will help you avoid inadvertent plagiarism. If you struggle with understanding part(s) of the paper, I am happy to help you in office hours.

In class, we will discuss the papers we read. You should come to class prepared to give a short (3-5 minute) presentation of any section of your summary, or to ask your question. We will also discuss any questions you have about methods, interpretations, etc. I may call on students to summarize parts the paper, or to start discussion with a question. Part of your participation grade for the course depends on how well you can do this when called on. **Because class discussion could influence your paper critique, you may not turn in this assignment late.**

Model paper format

Paczolt, K.A., Jones, A.G. 2010. Post-copulatory sexual selection and sexual conflict in the evolution of male pregnancy. *Nature* 464: 401-404. (Note: citation format follows guidelines in Pechenik.)

Summary

Summarize the question and its context in the first paragraph. You will need to be brief to have enough space in your two pages for the other parts of the summary.

Fig. 4 shows the results of a Markov-chain model testing the effects of sex ratio and population density on male choosiness. Describe and interpret the figure here.

In Table 1, (describe and interpret information in the table).

End with a two-sentence summary of the paper.

Critique

Explicate at least one strength or weakness in this section. It's better to explain one or two ideas well than to provide a laundry list without explanations. Provide specific evidence/reasoning in your explication to help me understand your reasoning. Do not critique the writing, organization, or other similar issues—focus on the science!

Question (here I provide examples of good & poor questions for a different paper)

Good question—carefully examines data and uncovers an interesting pattern not discussed in the paper, as well as the implications of that pattern for the authors' interpretation

It looks like egg size started out smaller in some rivers. What might cause natural differences in egg size among rivers, and how would those differences affect the interpretation of their results?

Ok question—relevant & important questions, but fairly generic rather than specific to this study

What is the most important change in selection between the wild and hatchery environments? What “next step” experiment should we do to try to answer this question so that conservation is more effective?

Poor question—basic question about methods that does not demonstrate clear understanding of the important ideas in the study

Heath et al. found that egg size declined, especially in the hatcheries where conditions were easier for the salmon (e.g., no predators and lots of food). Why did they measure egg size as volume in some areas and mass in other areas?

Paper Critique Grading Rubric (25 pts)

Summary—12 points

- ___ Clear explanation of context/reason for study—why it is important or interesting. This paragraph accurately captures the central ideas underlying the study, and presents them clearly.
- ___ First paragraph summarizes experimental approach to addressing the question in one sentence.
- ___ Every data figure or table is described and interpreted.
- ___ Spends more time on more important points
- ___ Summary demonstrates understanding of concepts from course and from paper
- ___ Quality of summary—does it capture the essence of the paper and present that essence well?
- ___ In own words—see Pechenik p. 40-51 for hints on note-taking and avoiding plagiarism

Critique—10 points

- ___ Identification of one or more of the following: key strengths in approach or methods, key weaknesses in approach or methods, alternate interpretations of results, possible next steps, unanswered questions
- ___ Compelling explanation of critiques
- ___ Demonstrates understanding of concepts from course and from the paper
- ___ Quality of critiques—are they logical, well-reasoned, and focused on key issues?
- ___ Sophisticated, insightful, novel, or creative analysis

Question—1 pt

- ___ Biologically meaningful, insightful, and/or creative question likely to foster interesting discussion

Overall quality of writing, content, & mechanics—2 points

- ___ Stylistically well-written (well-organized, logical flow, topic sentences & transitions, reads well, etc.)
- ___ Professional writing (scientific language/word choice, formal tone, avoids passive voice)
- ___ Technically well-written (no grammatical/spelling errors, proper capitalization, proper sentences, etc.)
- ___ No direct quotations from paper
- ___ Double-spaced, 1 inch margins, 12-point font, indented paragraphs with no spaces between paragraphs
- ___ Full citation appears as title to critique; sections labeled
- ___ Does not exceed length limits