

# Campus Academic Resource Program

## Writing a Science Abstract

This handout will:

- Detail the necessary components in writing an abstract for a scientific report or paper.
- Identify common mistakes in abstract content and structure and how to address them.
- Provide sample abstracts for tutees to analyze, identify errors in, and make corrections.

### **Introduction**

An abstract is a brief, approximately 250-word summary paragraph that allows a reader to easily see an overview of a lab report or scientific paper. Although an abstract is presented at the beginning of a report, it needs to address the entirety of the report and must be written **after** the full report has been completed. Each section of a lab report should be reflected in an abstract, including the purpose of the investigation, a brief explanation of the methods, the results, and the significance of the findings. Additionally, an abstract should be capable of “standing alone” (be understandable without reading the paper), and should be able to be understood by a broad audience.

### **Structure of the Abstract**

An abstract’s organization can mirror the structure of the report itself, with each section represented with one to two sentences. Typically, this structure is as follows:

#### **What is the context of the study and what is the problem being addressed?**

The abstract should include the research question and rationale for exploring it. These topics are addressed by the Introduction or Background section of a report.

#### **What was done in the study?**

This statement can cover methods for data collection, data analysis techniques, key research procedures, etc. and should be covered by the Methods section of the paper.

#### **What were the main findings of the research?**

The findings of a paper should be discussed in the Results section. When identifying major points in the results, consider any important trends or effects that may have been represented in tables or figures.

#### **What is the significance of the results?**

The significance, implications, and interpretations of research results are found in the Discussion section.

### **Writing your Abstract**

A helpful method of approaching the abstract is to read through your completed report or paper and identify main points that address the above questions. Highlight them, and rewrite the main ideas you have highlighted to summarize related concepts and condense ideas into single sentences. Be direct and include only the most important concepts, and remember that your abstract should be

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understandable to a broad audience. If a reader wants to know specific details, they can refer to the paper. Details that are irrelevant to understanding the “big ideas” of the study should not be included in an abstract. Also keep in mind that because abstracts represent the overall concepts of your paper, they should ideally be in your own words and not require a citation. References are generally not needed in a university-level abstract. An exception to omitting references might be if the study is heavily based on or replicates previous research, and in this case a citation would be needed to reference this prior work. After you have completed your abstract, it is useful to provide a draft of your abstract for someone unfamiliar with your paper or experiment as a way of assessing how clearly you have expressed your main ideas.

### Common Abstract Mistakes

The following table identifies some common abstract errors and how to address them. Review these and then practice identifying these problems in the examples given on the following page.

<b>Problem?</b>	<b>Ask yourself....</b>
Neglecting to State the Research Purpose	What was the study seeking to discover, accomplish, or provide more information on?
Using Excessive Jargon	If you were explaining the study to a scientist in another field of study, how would you describe procedures, results, and conclusions?
Including Unnecessary Details	Are all details included in each sentence important to understand the main ideas of what the researchers did and found out?
Referencing other Literature	Have I included ideas from a source cited in my paper? If so, are these ideas crucial to the context of my own paper? Can I remove this detail if it is unnecessary, or reword it to represent my own thoughts/study procedures?
Leaving Out Key Results	If other researchers were reading your abstract, would they be able to tell specifically what your experiment or study accomplished?

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#### Abstract Examples: Compare and Contrast

Read over the following two abstract samples and identify how they are similar and different. Which do you think is more successful? What errors can you identify and improve?

#### Sample A

**1A)** This study investigated the role of mouse bone genetics. **2A)** Samples of mouse bones were analyzed to identify what genes are active in different bones. **3A)** Mice from reduced variability from genetic strains of 129/Svev, DBA/2, C3H, and C57 were purchased for use from Jackson Laboratories and housed together in groups of two to five animals per cage until testing began at 60-90 days of age. **4A)** At this time, pairings between 129/Svev with C3H and DBA/2 with C57 were formed to produce hybrids for analysis using the technique described in *Bumi, et al.* **5A)** The hybrids had a greater change in a gene that influences bone density. **6A)** Therefore, this study shows that the *T-mo* gene is necessary in determining bone density.

#### Sample B

**1B)** This study investigated relationships between the physical and genetic characteristics of bones in mice. **2B)** These physical characteristics include size, density, and the force required to break the bone, which are influenced by the activation of the marker loci of the genes associated with bone development. **3B)** Previous research has still not identified the specific genes involved in bone development however knowledge of the genetics of bone formation has key applications in medical therapies. **4B)** This study used strains of mice with reduced genetic variation. **5B)** Phenotypically extreme genetic mouse variants were paired so that mice with strong bones and mice with weak bones were crossed. **6B)** The genetic makeup of the F2 generation of offspring from that cross were then statistically analyzed using ANOVA. **7B)** We found a statistically significant increase of 68% in mean activation of the *T-mo* gene at the L-loci, indicating that this gene plays an important role in influencing bone density. **8B)** These results indicate how this gene plays a role in contributing to specific bone properties, a finding that may be useful in treating medical conditions that are related to bone strength and can inform future studies on genetic therapies.

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### Explanations for the Abstract Examples

#### Sample A

- 1) The first sentence is vague and does not tell a reader much about the study. What about the role of mouse genetics is being investigated? Why are they important and being studied?
- 2) This sentence is addressing what was done, but again, it does not convey much useful information about the key genes or bone properties the study is focused on.
- 3) This sentence is much too detailed to be in an abstract. Specific information like the housing of research animals or the names of specific genetic strains are not crucial to understanding the experiment as a whole.
- 4) This sentence also includes extraneous detail, but the information it conveys is right. This statement could be rephrased to simply describe the description of the mice being paired and why the hybrids are of interest. Additionally, references to other literature and unfamiliar techniques or jargon should not be included in an abstract.
- 5) When describing key results, it is ok to use real numbers. Saying a change occurred is too general and does not convey what the study actually found. Did numbers increase or decrease?
- 6) An experiment never definitively proves something, so be careful with making broad generalized conclusions about what the study found. Instead consider if the data supported your hypothesis, and what implications it has for adding information to the field.

#### Sample B

- 1 and 2) The abstract starts out clearly stating what the experiment was about and what the researchers were looking for. It gives a few key details about what specific factors the study is interested in, in general terms that are understandable.
- 3) This statement gives context to why this research is relevant to the field and why the information gained from the study is important.
- 4) This sentence concisely states a key component of the methods, in easily understandable terms.
- 5 and 6) These sentences continue to discuss key aspects of the study's methods of data collection and analysis. Only methods widely recognized are mentioned by name (ANOVA) and analysis is not described in depth.
- 7) This statement concisely describes key (significant) results and explains their meaning to the reader.
- 8) This statement addresses how the findings are relevant and how they can fit in with existing and future research.

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#### Works Cited

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