Handout #11: Results

The purpose of the Results section is to provide your reader with the experimental findings of your study, including a statistical analysis. Do not, at this point, attempt to explain what the data mean. Just describe the results without making judgment as to what the results may, or may not, indicate. This section of the people will be composed of graphical representations of the data with accompanying text.

1. Provide an explanation of how you prepared the data for analysis. Tell what mathematical computations and statistics you preformed on the raw data and why you used those computations/statistics (how will they help you answer your problem question?).
2. Use strong topic sentences to signal to the reader what data you will be presenting. Write in past tense.
3. What you write about will be based on the figures (graphs) and tables you choose to include. Each table and figure must have an assigned number as well as a title that clearly describes what it displays. Tables and figures are numbered independently of each other (for example, you can have both a Table 4 and a Figure 4).
4. Describe any trends or patterns seen in the data. Your written text must refer to the figures and tables by number. Tables and figures must appear in the order you refer to them in your paper. Refer to specific aspects within the table or graph.
5. Raw data should be put in an appendix that is placed after the Works Cited. Appendixes must be referred to in the paper. Number them in order as they are referred to in the paper (Appendix A, Appendix 2, etc…)
6. Address outliers, without giving possible explanations for why they happened.

How to Refer to Tables and Figures in a Research Paper

Poor Example: There were three mathematical patterns found. See figure 6.
Good Example: In all six sets of sheet music analyzed for this study, all but one showed a pattern between the speed at which the music was to be played and the number of notes. As figure 6 shows, the number of musical notes in measures to be played at *adagio* was consistently half of those to be played at *presto*. However, one musical piece, shown by the dotted line in figure 6, showed no such relationship between speed and number of notes.

Poor Example: All the algae groups grew over the course of the experiment. See figure 3.
Good Example: The algae group with the highest acidity levels grew an average of 3 cm^2 in the first week of the experiment. But as the sharp decline in figure 3 shows, the total surface area decreased, ending with only 2 cm^2 growth at the conclusion of the experiment.

Handout #12: Discussion and Conclusion

The purpose of this section is to explain the data you reported in the Results section. It can be the hardest section to write because you must interpret your results and draw conclusions.

1. Begin this section by restating the research question and declaring the degree to which the results show a relationship between the MV and RV or a difference between the groups. For example,
    - "Based on this study, MV does influence RV."
    - "Because of the limitations of this study, a connection or lack of connection between MV and RV cannot be made."
2. State whether or not the hypothesis was supported. Then list your explanations for this finding that you will be discussing in the rest of the paper. For example, "This may have occurred because A, B, C, D, E or F."
3. Use the each of the next paragraphs to address the reasons you gave. Each paragraph should address one aspect of the explanation of the results.
4. All the trends and patterns you reported in the Results section must be explained. It is appropriate to refer the reader back to tables and figures in the Results section. Answer the question, "why did that happen?"
5. Discuss limitations – aspects of the research that mat weaken the confidence level of the conclusion. For example, maybe there were variables you were not able to keep constant that may have influenced the results. Or, perhaps there were problems that occurred that limit your ability to apply the results to a more general conclusion. Or the number of trials may not have been sufficient to apply the results beyond this study. It is appropriate to say how your methods might have influenced the results.

> *Despite my efforts to control the amount and intensity of light exposure during the experiment, I was not as careful about monitoring the light for each of the specimens while collecting data each afternoon. Some specimens were out of their controlled lighting setup for longer periods of time than other specimens. The additional variable of exposure outside the light setup may have influenced the results. This is particularly true for the experimental group that was to be exposed to no light. In future experiments, time to collect data should be equivalent and monitored.*

6. Most important, connect your results back to your Introduction. Apply the results of your experiment globally to the scientific community as a whole. Explain why this study was important.

Handout #13: Abstract

The abstract is one paragraph that summarizes your entire research project. Abstracts include what was studied, how it was studies, the results and a brief analysis of those results.

Step 1 (one sentence): Describe the project's purpose

Example: The purpose of this research was to determine if increasing the number of hours of light a plant receives also increases leaf width and stem height.

Step 2 (three to five sentences): Describe the methods used.

Example: Three experimental groups and one control group were set up. Each experimental group was exposed to different levels of light—4 hours, 10 hours, and 24 hours. The control group had 12 hours of light. The quantitative measurements—leaf width and stem height—were collected every other day. Data were collected for three weeks.

Step 3 (three to five sentences): Describe the results; be sure to mention the best-performing and least-performing groups and the results of each.

Example: The plants that received 24 hours of light had the most change, with an average of 7 mm of leaf growth and 10 mm of stem growth. The plants that received 4 hours of light had the poorest average growth, with leaf size decreasing by 2 mm and stem growth of 1 mm.

Step 4 (three to five sentences): Conclusion; explain whether or not the hypothesis was supported, and give brief possible explanations for the results.

Example: The hypothesis was not supported because the plants with the least light exposure had the most growth. There may be several explanations for this...