

## **Writing A Research Article: Where to Start, Where to End?**

Although the typical research article follows a standard order...

1. Title
2. Introduction
3. Materials and Methods
4. Results
5. Discussion
6. Table and Figure Legends

... it is not advisable that the manuscript be written in that order.

Below is our approach to the order by which article writing should occur. This approach can be different for many investigators, but has worked successfully for us.

Prior to writing the first sentence:

Step #1: Assemble your data into discreet figures and tables

Step #2: Decide on preliminary order of the figures and tables

The above steps are necessary to know your results and to begin the process for ordering them into a logical storyline. Once that storyline is approximately set in your mind, then begin writing in this order:

### **1. Figure and Table Legend Titles:**

- Idea here is to use a short sentence to describe the Biological conclusion of the figure or table.
- Figure legend titles that are purely technical do not help drive a narrative.
- Once figure legend titles that are biologically relevant have been written, they can be used as organizing bullets for the next section to write...

### **2. Abstract:**

- With the organized figure legends in mind, the essential results in the Abstract can now be written in approximately the same order.
- The above will also help you to put the paper in context, thus allowing you to write a few short sentences describing the Background & Significance of the project. These are the very first sentences of the Abstract.
- The results are then described in the Abstract
- The Abstract ends with a summary statement of overall importance and/or implications for the field.
- You are then reading to move on to the most important part of the manuscript – the Title...

### **3. Title:**

- The Title is what everyone reads first and must convey the essential facts and importance of the discovery. It should be short but compelling and, importantly, it must accurately describe the results and impact of the work.
- This is why Legends and Abstract are written prior to the Title, because only then will you fully understand the main message (Title) of the work.

### **4. Results:**

- It is suggested that Results be written next because it will help you identify concepts that belong in both the Introduction and Discussion.
- This is because each description of a figure can be introduced by a short rationale/background statement that can be completely or more better explained in the Introduction, and which is concluded with a statement about impact or significance that can be similarly further or completely addressed in the Discussion.
- Thus, in writing the entirety of the Results section you will develop materials and ideas for use in the Introduction and Discussion sections.

### **5. Introduction:**

- This section is similar to the background and significance section of a grant application in which you describe the state of the field, followed by key missing aspects of the field that are addressed by the current manuscript.
- Many of the overall concepts used in this section will probably come into focus as a consequence of having written the Results section (see above).

### **6. Discussion:**

- This section is usually started by a concise summary of the major observations made in the new work.
- This is followed by how the new discovery fits in the field and helps to resolve key unanswered questions.
- This section is also used to trouble shoot your own work (better you do it, rather than the reviewer) by identifying technical shortcomings and/or alternative explanations, and perhaps controversies in the field that may not agree with your latest results.
- As above, key concepts in this section are often identified in writing the Results and can be stated here, rather than in the Results section.

### **7. Materials and Methods:**

- In principle, this section can be written at any time. But we do it last to make sure that all pertinent techniques and reagents used in the entire body of work are adequately described in this section.

# Typical Research Article Structure

