

## Scientific Research Proposals

### The Purpose of Research Proposals

Research proposals are formal papers that propose a specific research question, and an experiment or study to answer it. They are usually divided into two main parts; the first part is very similar to an introduction section of a scientific paper, and the second is a less detailed version of a methods section. The purpose of the first part of the research proposal is to provide enough background information that the reader understands what the scope of the proposed work is, how it relates to other work in the field, and why the proposed research question is important.

The second part should provide enough detail that the reader understands how the proposed research will be accomplished, so that the reader can critically assess the advantages and disadvantages of the particular approach that is suggested. The research proposal should convince a reader that its writer is competent, knowledgeable in the field, and has proposed an adequate and sound experiment or study. For example, if a scientist is applying for grant funding, or applying to present research at a conference, the scientist's research proposal must convince readers that the scientist's question is worth answering.

### Introduction

The first part of a research proposal should contain an explanation of the context and background of the research question, a literature review, the hypothesis, and any objectives to be met by the proposed experiment or study.

Just like an introduction in a scientific paper, the introduction should start with a broad overview of the topic and narrow down to the scope of the proposed research. The introduction should be clear and concise, but it should include enough background information that a scientist who is unfamiliar with the field can understand the research problem and question. As the introduction narrows, there is a literature review, which is a discussion of the literature closely related to the research question. Here, it should become clear how the research question fits in and contributes to existing knowledge.

Once the research question has been explained in the context of the literature, introduce the hypothesis and objectives for the proposed experiment or study. The hypothesis is a prediction of what the main conclusion will be, and objectives are the goals which will be accomplished through the experiment or study. The introduction must include the importance of the research question and why it should be answered.

### Methodology

The methodology section does not contain as much detail as it would in a formal scientific paper, because some details are too specific and not necessarily relevant to a proposal. Proposals tend to focus on the big picture of the project: what is the main goal for each part of the project

and what experiment or approach will be used to accomplish it? However, details should be included if they are necessary to convince a reader that the methodology is sound.

For example:

Do include the positive and negative controls.

Do not include step by step protocols.

Just like a methods section in a scientific paper, each part of this section will start with a summary of what part of the objectives is being accomplished with a particular approach. Then, a brief description of the approaches and techniques are given.

For example:

To determine the levels of lacZ expression in yeast, quantitative PCR will be performed.

### **Timeline**

Many (but not all) research proposals will include a timeline of major steps to be accomplished and the major dates they will be completed by. Important milestones could be the dates that major parts of the research will be done, the date the final scientific paper will be completed, and the date the research will be presented and defended. The timeline is another piece to help convince the reader that the project's goals are accomplishable in a set amount of time.

### **General Notes for Scientific Writing**

The same rules for writing scientific papers generally apply to scientific research proposals:

- Contractions should not be used because they are informal and less meaningful than the full phrase. Scientific writing is always formal and all about putting as much meaning into words as possible.
- First person may be okay depending on the discipline, but third person is ideal because it is easier to remain objective and helps to avoid inserting personal biases.
- Unlike scientific papers, a proposal may not be written entirely in past tense. Generally, things that have been done already should be in the past tense while things that have not should be in future tense. That way, a supervisor or committee will be able to tell what has been done for the project already, and what is left to be completed.

### **Variations in Research Proposal Format**

The sections and information contained within a research proposal can vary more than those of a scientific paper normally would. Some research proposals may have more or less detailed methodologies. Some may include a discussion of the predicted results for each part of the experiment or study if the hypothesis is true. The ASC website has examples of different proposal formats. It is usually best to consult with a professor or supervisor to ensure expectations are being met. Despite minor variations, the goal in writing any research proposal is always the same: to clearly propose a research question and a way to answer it.