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# Topic x Hypothesis 1

# 7

## LEARNING OUTCOMES

By the end of this topic, you should be able to:

1. Identify what is a hypothesis;
2. Describe the functions of a hypothesis;
3. Identify the characteristics of a hypothesis; and
4. Describe the types of hypothesis.

## X INTRODUCTION



*Is it true hypothetically that an egg must turn into a chicken?*

One of the most important considerations when beginning your research work and formulating the research problem is constructing the hypothesis. Generally, hypothesis provides clarity so that you can focus on a research problem. However, this is not essential for a study or research work. A researcher can conduct a valid investigation without constructing a hypothesis. However, it is always good to construct a hypothesis as it will help to narrow down your focus of research. The significance of a hypothesis lies in its ability to bring direction and specificity to your research work. To explore better, let us see an example.

Let's say you are conducting a research in the area of Web Services for business applications. Your programming impression is that interoperability and user-friendly platforms result in multiple supports using Web Services. You may want to find out why such a condition is needed in business applications. Therefore, by narrowing the choices, based on your knowledge in the field, you design a study based on your hunch and curiosity. This leads to some hypotheses made to find the cause of the condition.

## 7.1 DEFINITION OF A HYPOTHESIS

As a researcher, we never know the outcome prior to the research work but we will have certain assumptions on how the end results will be. Based on our hunch and curiosity, we will test it by collecting information that will enable us to conclude whether our assumptions are right.

Assumption based on curiosity or a hunch is a hypothesis or an idea about a situation, phenomenon or relationship that we do not know. Researchers call these factors hypotheses and they become the basis of an inquiry.

(a) **Definition by Bailey (1978)**

A hypothesis is a proposition in testable form and predicts a particular relationship between two or more variables. If a researcher thinks that a relationship exists, he should first state it as a hypothesis and then test the hypothesis in the field.

(b) **Definition by Grinnell (1988)**

Hypothesis is written in such a way that it can be proven or disproven by valid and reliable data.

From these definitions, we can see that a hypothesis is based on a tentative proposition and its validity is unknown. We will explore the functions of a hypothesis in the next section.

## 7.2 THE FUNCTIONS OF A HYPOTHESIS

A hypothesis has several functions:

- (a) Enhance the objectivity and purpose of a research work;
- (b) Provide a research with focus and tells a researcher the specific scope of a research problem to investigate;
- (c) Help a researcher in prioritising data collection, hence providing focus on the study; and
- (d) Enable the formulation of theory for a researcher to specifically conclude what is true and what is not.

Figure 7.1 shows the processes involved in testing whether a hypothesis is true or false. Testing a hypothesis is crucial to ensure the verification of the research outcome.



**Figure 7.1** :Process of hypothesis testing  
Adapted from Ranjit Kumar Research Methodology



### ACTIVITY 7.1

Identify the functions of a hypothesis in a research work.

## 7.3 CHARACTERISTICS OF HYPOTHESIS

As a researcher, you should keep in mind some important considerations when constructing a hypothesis for your research work.

- (a) **A Hypothesis must be Capable of Verification**  
In your research work, there must be methods and techniques used for data collection and analysis. Formulating a hypothesis that cannot be verified will lead to nowhere. There must be techniques to verify your hypothesis.

However, in some cases, researchers may develop new techniques to verify their hypotheses during the research process.

(b) **A Hypothesis must be Related to the Existing Body of Knowledge**

You must ensure that the hypothesis you construct emerges from an existing body of knowledge and adds to it. This is crucial in academic research methodology. This criterion can only be achieved if the hypothesis has its foundation in existing knowledge.

(c) **A Hypothesis Needs to be Precise, Simple and Specific**

To be able to develop a good hypothesis, you need to equip yourself well in the literature review of your subject area (as discussed in Topic 2). The hypothesis should be able to test one relationship at a time. For example:

**Hypothesis 1:**

**The average jitter of the broadcast mechanism in the audio distribution network is lower than that of the unicast mechanism.**

The hypothesis shows a clear and specific statement. It tells us that comparison is done between average jitter measurement between broadcast and unicast mechanisms of audio distribution in network. Such a hypothesis is easier to test.

**Hypothesis 2 :**

**Network intrusion rates vary inversely with firewall enhancement.**

Hypothesis 2 is clear but it is a lot more difficult to test. We can see three aspects here, 'network intrusion rates', 'vary inversely' and 'firewall enhancement'. To find the network intrusion rates and measure the inverse relationship of its rate is straightforward but to measure firewall enhancement is a lot more difficult. What factor corresponds to firewall enhancement? How can we measure firewall enhancement? Therefore, such a hypothesis is more difficult to test.



### SELF-CHECK 7.1

1. Describe the main characteristics of a hypothesis.
2. Identify the process of hypothesis testing.

## 7.4 TYPES OF HYPOTHESIS

Generally, there is only one type of hypothesis, that is, research hypothesis. Research hypothesis forms the basis of investigation for a researcher. However, recent conventions in the scientific field and inquiries stated that hypothesis can be classified into two main categories – research hypothesis and alternate hypothesis. Alternate hypothesis is a convention among the scientific community. The main function of an alternate hypothesis is to explicitly specify the relationship that will be considered true in case the research hypothesis proves to be wrong. We can see that in away, alternate hypothesis is the opposite of research hypothesis. As you may come across a null hypothesis, hypothesis of no differences, these are all formulated as alternate hypothesis.

Let's see an example. Suppose you want to do a research on the IT literacy pattern in a community in relation to gender differences. The following hypotheses could be constructed:

- (a) There is no significant difference in the proportion of male and female with IT literacy in the community population;
- (b) A total of 70 percent of male and 30 per cent of female in this study are IT literate;
- (c) A greater proportion of male than female are IT literate in this population; and
- (d) There are twice as many male IT educated as female IT educated in this study population.

From this example, we know that the first hypothesis indicates there is no difference between both genders and this is called a **null hypothesis**, which is also sometimes referred to as  $H_0$ . A researcher may have some fundamental knowledge about the community IT education exposure and he/she is likely to speculate on almost the exact prevalence of the scenario and outcome in a quantitative unit. Looking at the second hypothesis in the example, the proportion is 70:30 and this type of hypothesis is known as **hypothesis of point-prevalence**. The third hypothesis states that there is a difference in the proportion of male and female IT education exposure, though the extent of the

difference is not specified. In this type of hypothesis, a researcher stipulates that there will be a difference but does not specify its magnitude. This hypothesis is known as **hypothesis of difference**. The fourth hypothesis implies on the extent of the relationships in the study population as prevalence of a phenomenon in different population groups. This hypothesis is widely known as **hypothesis of association**. Table 7.1 shows the types of hypothesis.

**Table 7.1:**Types of Hypothesis

Types of Hypothesis	Details
<b>Research hypothesis</b>	<ul style="list-style-type: none"> <li>• Hypothesis of difference</li> <li>• Hypothesis of point –prevalence</li> <li>• Hypothesis of association</li> </ul>
<b>Alternate hypothesis</b>	<ul style="list-style-type: none"> <li>• Null hypothesis</li> <li>• Hypothesis of no difference</li> </ul>

(Adapted from Ranjit Kumar Research Methodology: Step by Step for Beginners,)



**SELF-CHECK 7.2**

1. What are the two main categories of hypothesis?
2. Distinguish between *research* and *alternate hypothesis*.

**SUMMARY** .....

- Hypothesis is important to help researchers focus on their research study and to provide clarity.
- A hypothesis is generally a speculative statement that needs to be verified in a research work.
- During hypothesis formulation, it is important to keep the statement simple, precise and clear, and derive it from an existing body of knowledge.
- Two types of hypothesis categories are research and alternate.
- Research hypothesis can be classified as null hypothesis, hypothesis of difference, hypothesis of association and hypothesis of point-prevalence.

## KEY TERMS

Alternate hypothesis	Hypothesis of no difference
Hypothesis	Hypothesis of point-prevalence
Hypothesis of association	Null hypothesis
Hypothesis of difference	Research hypothesis



## DISCUSSION

Select an ICT research topic in a group and construct 5 hypotheses based on research and alternate hypothesis categories.



## REFERENCES

### Books

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Grinnell, (1988). *Social work research and evaluation*. Itasca: Illinois, F. E. Peacock Publishers.

Kumar R. (2005). *Research methodology*. SAGE Publications

### Internet Resources

Trochim, W. K. (2007). *Research method tutorials* [Electronic version]

<http://www.socialresearchmethods.net/tutorial/tutorial.htm>

Vagner, K. W. (2007). *Introduction to research methods* [Electronic version]

<http://psychology.about.com/od/researchmethods/ss/expdesintro.htm>