Chapter 6

MATERALS

Although the second major section of the experimental research report is often called "method", it is sometimes titled materials and method. This combined title indicates that researchers generally describe these two aspects *together* when they write up their research. That is they simultaneously describe any equipment or other materials they used with each step in their procedure. In this chapter I examine materials description in detail and learn how to integrate it with the procedural description.

INFORMATION CONVENTIONS

By materials, we mean any items used to carry out a research project. They may fall into any of the following categories:

MATERIALS
Laboratory equipment
Field equipment
Human or animal subjects
Natural substances
Fabricated materials
Surveys, questionnaires and tests
Computer models
Mathematical models

Ordering Your Information

If the materials you used are well known to researchers in your field, it is conventional to identify them only. However, if you used *specially designed* or *unconventional materials* in your experiment, it is common to write a detailed description of them in the report. In this case, you should include the following information, in the order given:

DESCRIBING SPECIALLY MATERIALS:
Three Steps

A. ***Overview***: This step consists of one or two sentences that give a general idea of the material and the purpose for which it is intended.

B. ***Description of principal parts***: Here each major part or characteristic of the material is described in logical sequence.

C. ***Functional description***: This step shows how the various features described in step B Function together.

Ordering the Description of Principal Parts – Step B

In Step B you describe the principal features of the materials used in your study. There are two main organizing plans that you can use in this step, depending on your material.

ARRANGEMENT PLANS FOR DESCRIBING PRINCIPAL PARTS OF MATERIALS (STEP B)

1. **Spatial arrangement**: Describe the features from top to bottom, front to back, left to right, from the center to outside, or in some other spatial way. This arrangement is especially useful for describing equipment consisting of various connected parts.
2. **Functional arrangement**: Describe the principal features in the order in which they function, from beginning to end. This arrangement is best is best for describing that operate in a fixed sequence.

Choose Verb Tenses – Samples and Populations

Sentences describing the subjects or materials used in a study require either the past or the present tense. Notice that the boys described in the preceding example were individuals selected to take part in the study. In other words they a sample selected by the experimenters to represent an entire population of high risk boys. When we describe the sample used in z study we commonly use the past tense.

DESCRIBING SAMPLES: Past Tense Verbs

Sample	Main verb (past)	Description
The boys	were	between the ages of 7 and 13.
The men interviewed	were	primarily from St.Louis, MO
The Subjects	were	18 Arabic – speaking students attending classes at the american classes at the American University in Cario.

However, when describing general population from which the sample subjects were selected, the present tense is normally used.

DESCRIBING POPULATIONS: Present Tense Verb

Population	Main verb (present)	Description
All students who apply for admission to the American o Cairo.	take	The Michigan Test of English Language Proficiency.
They	enter	The English Language Institute where they follow an intensive program of English Language training.

Use of Tenses with conventional and Specially Designed Materials

We have seen previously that verb tens can be determined by whether you are describing a general population or a sample selected from a population. We find a similar convention determining verb tenses when we describe other materials. If you used equipment in your study which is *standard or conventional* in your field and probably familiar to most other researchers, you should describe it using the *present tense*.

DESCRIBING CONVENTIONAL MATERIAL: Present Tense Verb

Conventional material	Main verb (present)	Description
The Auditor Test for Language Comprehension (Carrow, 1968)	permits	the assessment of oral language comprehension of English and Spanish.
A typical chemical reactor	includes	A helical, tube-in-tube heat exchanger.

On the other hand, descriptions of *specially designed* materials with which other workers in your field may not be familiar are usually written in the past tense. Common devices that you *modified* in some special way for use in your study are also sometimes described in the past.

DESCRIBING SPECIALLY DESIGNED OR MODIFIED MATERIALS:
Past Tense Verb

Modified Materials	Main verb (past)	Description
For the testing program this collector	was	protected from weather by an outer window of 0.10mm tedlar.

Using Active and Passive Voice in Describing Materials

Both active and passive voice verb constructions are used in describing experimental materials. Your decision to use active or passive voice depends partly on whether the verb is transitive or intransitive. Only transitive verbs can be used in the passive voice. (Your dictionary will tell you if a given verb is transitive or intransitive).

If the verb is transitive, follow these rules to determine which voice to use:

1- The passive voice is usually used when a human agent (the experimenter) is manipulating the materials.

HUMAN AGENT INVOLVED:
Passive Voice

EXAMPLE A: The temperature inside the chamber *was increased* from 0 to 20 °C. (The researcher increased the temperature).

EXAMPLE B: Four thermocouples *were monitored* hourly. (A researcher monitored them).

2- The active voice is usually used when no human is directly responsible for manipulating the materials–that is, when the materials operate "by themselves".

NO HUMAN AGENT INVOLVED: Active Voice

EXAMPLE C: A 2QOhp generator provided power to the piezometers.

EXAMPLE D: Control gauges monitored air pressure inside the chamber.

In examples C and D, the use of the active voice indicates that the experimenters were not directly involved in the functioning of the equipment.

3- The passive voice may be used to describe an action involving a non-human agent, but a phrase must be included to indicate the agent.

NO HUMAN AGENT INVOLVED: Passive Voice

EXAMPLE E: Power was supplied by 14 generators with capacities ranging from 90 to 300 KW.

COMMON PROBLEMS

Irrelevant detail

Unnecessary explanation of basic procedures

Remember that you are not writing a how-to guide for beginners. Your readers will be people who have a level of expertise in your field and you can assume that they are familiar with basic assessments, laboratory procedures etc, so do not explain these in detail.

For example:

"Total chlorophyll content (microgram/gram vegetable tissue) was determined spectrophotometrically by the Anderson and Boardman method (1964), as adapted by Barth et al., (1992)" (Barth et al., 1993). Notice that the authors do not explain the Anderson and Boardman method (we can assume it is known in their field of study) nor their own previous adaptation of it (because the adaptation has already been recorded in the work they published in 1992). However they do record in detail their own procedures that have not been previously recorded: "At each time interval, three replicates/treatment were taken, ground (stem and florets) with a Kitchen-Aid grinder

Model K5-A and used for determination of reduced ascorbic acid" (Barth et al., 1993). Notice that they specify the equipment used because it could affect the results.

Problem blindness

Most of us encounter some problems when collecting or generating our data. Do not ignore significant problems or pretend they did not occur. Often, recording how you overcame obstacles can form an interesting part of the methodology, and means you can also give a rationale for certain decisions, plus a realistic view of using the methods you chose.