

Factors and Levels

1. Waiting Room Anxiety: Does the type of lighting or music in a dentist's waiting room have any effect on the anxiety level of the patient? An experiment to study this question dealt with 3 types of music Pop, Classical, or Jazz) and three types of brightness's of the room (low, medium or high).

- How many treatments are there?
- What are the factors? What are the levels?
- Describe a possible response variable.

2. Smokers: Decades ago, when there was less agreement than there is now about the bad effects of smoking on health, a large study compared death rates of three groups of men---nonsmokers, cigarette smokers, and pipe or cigar smokers. The results are shown.

	Deaths (per 1000 men per year)
Nonsmokers	20.2
Cigarette smokers	20.5
Pipe or cigar smokers	35.5

The numbers seem to say that smoking a pipe or cigars almost doubles the death rate, from about 20 to 35 per 1000, but smoking cigarettes is pretty safe.

- Do you believe that is true? If not, can you suggest a possible explanation?
- Is this study an observational study or an experiment? Explain.
- What is the factor? What are the levels? What is the response variable?

The investigators also recorded the ages of the men in the study above, so it was possible to compare the average ages of the three groups.

	Average age (yr)
Nonsmokers	54.9
Cigarette smokers	50.5
pipe or cigar smokers	65.9

Does this information help you account for the pattern of death rates? Explain. Now what are the factors for this study?

3. GASTRIC FREEZING. At one time, a method called "gastric freezing" was used to treat people with peptic ulcers. An inflatable bladder was inserted down the esophagus and into the stomach, and then a cold liquid was pumped into the bladder. Now you can find the following notice on the Internet site of a major insurance company: *[Our company] does not cover gastric freezing (intra-gastric hypothermia) for chronic peptic ulcer disease... Gastric freezing for chronic peptic ulcer disease is a non-surgical treatment which was popular about 20 years ago but now is seldom performed. It has been abandoned due to a high complication rate, only temporary improvement experienced by patients, and a lack of effectiveness when tested by double-blind, controlled clinical trials.*

What did that "controlled clinical trial" (experiment) probably look like?

- What was the factor in this experiment?
- What was the response variable?
- What were the treatments?
- How did researchers decide which subjects received the treatments?
- Were the results statistically significant?
- Should the clinical trials been done as double-blind?
- Why would you recommend a placebo control?
- Suppose the researchers suspected that the effectiveness of the gastric freezing treatment might depend on whether a patient had recently developed the peptic ulcer or had been suffering from the condition for a long time. How might the researchers have designed the experiment?