# Controls and Variables

In a scientific investigation you are usually trying to see what the effect of changing one "thing" is on another "thing". These "things" are called variables. The first one is called the manipulated variable and the second is called the responding variable. Here are a couple of definitions.

Manipulated Variable: This is the one variable that the experimenter wants to change (or vary).

Responding Variable: This is the variable that is expected to change as a result of changing the manipulated variable.

Let's use an example. Have you ever seen anyone tap a can of soda before opening it? Some people think that if you tap the can of soda (especially one that might have been shaken) before you open it, the soda will not erupt and spray all over the place. Let's imagine a Science Project that will attempt to find out if this is true. The question of this Science Project might be…

"What is the effect of *tapping* the top of a can of shaken soda on the *spraying* of the soda when it is opened?"

In our example the manipulated variable is *tapping* of the soda can.

The responding variable is the *spraying* of the soda.

In designing this investigation you would want to shake up cans of soda and then you would not tap some of the cans, other cans you might tap only five times, other cans you might tap ten times and still others you might tap fifteen times, etc. When carrying out this investigation, though, you must be certain to keep some things exactly the same each time. These factors are called control factors or controls.

The controls for this investigation would be, **kind** of soda, **temperature** of sodas, method for **tapping** the can, method for **shaking** the can, method for **opening** the can, etc. What more can you think of?