Independent and Dependent Variables

Introduction:

The initial step in conducting research is to articulate a testable hypothesis and draw a conclusion. Formulating a testable hypothesis is important because it denotes that the experiment can be performed from the beginning till the end. The next step is conducting proper research is to design the variables to be used in the experiment. Variables can be of two main types:

a) Independent Variables
b) Dependent Variables

Independent Variable:

Independent Variables are defined as a characteristic that we (ones who are conducting the experiment) manipulate to identify a particular factor. Independent variables are also known as factor or prediction variable. The fact about the independent variable is that the participants of the experiment do not change it. Only the researchers who are conducting the experiment are allowed to control and change it.

Multiple levels can arise in an experiment due to independent variables. Having at least two levels in an experiment is necessary. In any experiment, there must be at least one independent variable. It is advisable to have at most two independent variables in an experiment. This is because independent variables can start interacting with each other, giving rise to complex behavior. For example, if we have two independent variables, the two variables will interact with each other and produce different results than expected. Hence, if the number of independent variables is large, it gets difficult to reach the conclusion. Independent variables can be better understood by some examples.

Example 1:

Research Statement: A study to determine which is a more accurate method of pointing.
Independent Variable: Pointing Devices
Levels: Mouse, Stylus

Example 2:

Research Statement: A study to determine which age group is most familiar with pointing devices.
Independent Variable: Age group
Levels: Youth, Middle-Aged, Senior citizens

Example 3:

Research Statement: A study to determine which mode of feedback is most suitable.
Independent Variable: Feedback mode
Levels: Haptic, Tactile, Visual, Audio
### Independent Variables

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**Table 1: Interaction Effects due to Independent Variables**

### Dependent Variable:

Dependent Variables are the second type of variables that are measured using independent variables. Dependent variables answer the question: ‘What is it that we are testing?’ and ‘What is the measured response to various levels of the independent variable?’. Dependent variables are the result of the participants’ actions and can be altered as the outcome of the participants’ actions. The number of dependent variables in an experiment should be more to get stronger and concrete results. In an experiment, the number of dependent variables should be more than one. Dependent variables can be explained with the help of examples.

**Example 1:**

*Dependent Variable*: Accuracy with which participants perform the experiment  
*Measured by*: Number of tries to get to the right answer

**Example 2:**

*Dependent Variable*: Time taken by the participant to perform the experiment  
*Measured by*: Number of seconds from start of the experiment till the end

**Example 3:**

*Dependent Variable*: Level of frustration of the participants  
*Measured by*: Foot tapping