Pre-lecture Notes II.6 – Other Threats to Internal Validity

Let's start with a summary of what we've covered so far with regard to internal validity.

The first issue (both in terms of when it came up and when you should think about it) is the choice of a method for creating the various conditions of the experiment – i.e., the choice of a manipulation. You really, really need a manipulation that creates one and only one difference between the conditions. If your manipulation creates other differences at the same time, then you won't know which of the differences was responsible for causing any observed difference in the data. You won't have much if any internal validity.

The second issue is the choice of a design type. At this point, you need to think about statistical conclusion and construct validity, as well as internal validity, because there is almost always a trade-off between stats-con validity and the other two. In general, within-subject designs have better stats-con validity (because differences between subjects cancel out, instead of adding "noise" to the data), but having every subject participate in all of the conditions creates some other problems, some of which can be seen as coming from confounds and some of which come from an increase in reactivity.

Next, once you have selected a type of design, you need to deal with the major, design-specific threat to internal validity. For between-subject designs, you need to make sure that the groups were the same, on average, before they were put into the two different conditions. This is usually done using pseudo-random assignment, but you can add some extra tricks (such as including covariates) if you're worried that pseudo-random assignment might fail. For within-subject designs, you need to counter-balance the order of conditions, preferably using a balanced Latin square, instead of the more-popular plain Latin square; if you're worried that even this won't work, then you can check for a problem during the analysis and deal with it then.

Now you're (finally) ready to run the experiment and analyze the results. This is when some additional problems can pop up. These will be covered in lecture, but most of them come down to the same general thing:

> Experimenter Bias – *when the beliefs and/or expectations of the experimenter (consciously or unconsciously) end up altering the results (from an experiment or study)*

In general, because the experimenter usually knows what results are desired or expected, the experimenter behave in a manner that causes the subjects to produce the desired or expected results. We are not accusing the experimenters of being unethical; the behaviors that can cause experimenter bias are usually unconscious and unintentional, but that doesn't stop it from being a problem for internal validity. To be clear: because the beliefs and/or expectations of the experimenter are different for the different conditions, causing them to behave slightly differently while running subjects in the different conditions, this is another possible confound and, therefore, another threat to internal validity.

Before lecture, try to think of some possible solutions to the problem of experimenter bias.