University of Djilali Bounaama Khemis Miliana

Dep : Human & Social Sciences

Stream :Counseling& Guidance

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Level : Master1 **Prof :D.Mezaini**

Specific aims :

The key objectives are to familiarise students with:

- The different types of experimental designs: Independent measures and repeated measures.

How participants are allocated to conditions of the independent variable in experiments using an Independent measures and repeated measures.

The strengths and weaknesses of using these experimental designs.

How these weaknesses can be overcome (for example using counterbalancing in repeated measures designs).

LESSON TWO : EXPERIMENTAL DESIGN

Experimental designs: repeated measures, independent groups, matched pairs. Control: random allocation and counterbalancing.

In order to find out whether the independent variable (IV) affects the dependent variable (DV), we need something to compare it with – a comparison condition – a different level of the IV.

This leads us to three types of experimental design, each with different strengths and limitations.

Experimental design refers to the way in which participants are used in **experiments**.

By 'used' we do not mean taking them out for dinner and never calling them again, we mean how the testing of participants is *arranged* in relation to the different experimental conditions.

1.Independent groups

An **independent groups design** is when two separate groups of participants experience two different conditions of the experiment. For example:

Condition 1	*Condition 2*
Participant A	Participant B
Participant C	Participant D
Participant E	Participant F

Advantages of independent measures designs

- Participants only perform in one condition of the IV and so there are no order effects.
- Only one word list (or test) is needed for participants.
- Each participant only experiences one condition so it might stop them guessing what the study is all about and so reduce demand characteristics.

Disadvantages of independent measures designs

- Twice as many participants are needed as for a repeated measures design.
- This design does not always adequately control for participant variables. The researcher may end up with participants in one group who are all somehow 'naturally' better at the DV than the participants in the other group – more intelligent, or more suited to the condition to which they have been allocated.

One way to try to eliminate participant variables is to randomly allocate participants to conditions. Random allocation refers to allocating participants to experimental groups or conditions using random techniques.And this is done by (for example) tossing a coin for each participant, giving them a 50/50 chance of doing Condition 1 or Condition 2 first. For this design, it does not matter if there are unequal numbers of participants in each condition. Note that random allocation is very different from a random sample.

2.Repeated measures

A **repeated measures** (or related samples) **design** is where each participant takes part in *all* conditions of the IV.

• Each participant would first, for example, experience condition A (the **experimental condition**).

• Each participant would then later be tested again in condition B (the **control condition**).

Condition 1	*Condition 2*
Participant A	Same participant A
Participant B	Same participant B
Participant C	Same participant C

Following this, the two sets of data from both conditions would be compared to see if there was a difference. A **repeated measures** design at least guarantees that we are comparing 'like with like'. In contrast, an independent groups design

assesses the performance of two *different* groups of people, which might be a problem.

Advantages of repeated measures designs

- This design is best for the control of participant variables, because the same people do both conditions and their level of intelligence, motivation and many other factors remain the same throughout.
- Although much less important, it means that only half the number of participants are needed than for other designs because each participant 'scores' in both conditions.

Disadvantages of repeated measures designs

- Some experiments are impossible to do as a repeated measures design, e.g. a participant cannot be both left-handed and right-handed or both male and female.
- If a participant completes both conditions then it may be necessary to duplicate apparatus, such as word lists. But how can the lists be balanced so they are of equal difficulty? It may be better to use a different type of design A major flaw is that the design can create **order effects**. If a participant performs an activity twice, they may become tired or bored the second time (known as the **fatigue effect**) and the result is different from the first time. It might be that the second result is much better than the first because the participant knew what to expect or treated the first as a practice. This is simply known as the **practice effect**.

One way to eliminate order effects is to **counterbalance**. This is where participant 1 performs in condition 1 first and then condition 2, participant 2 performs in condition 2 and then condition 1, and so on. As a result, both practice and fatigue effects are controlled.

3.Matched pairs/groups

One major issue with repeated measures is the fact that when participants are tested

more than once, and experience all conditions of the experiment, there is an increased likelihood they will become wise to the aims of the study. To combat this, a happy medium is **matched pairs**. Here, participants are paired together on a variable or variables relevant to the experiment.

For instance, in a memory study participants might be matched on their IQ, as this might be a good indicator of their ability to recall information. The two participants with the rst and second highest IQ scores would be paired together, as would the participants with the third and fourth highest, and so on. Then one

participant from each pair would be allocated to a different condition of the experiment. This is an attempt to control for the confounding variable of **participant variables** and often necessitates the use of a pre-test if matching is to be effective.

Advantages of matched designs

- Participant variables are controlled because participants are matched across the conditions of the IV.
- There are no problems with **order effects**.

Disadvantages of matched designs

- This design is only as good as the experimenter's ability to match participants, and it is questionable whether *all* relevant variables can be matched.
- It can be difficult (and time consuming) to find and match participants.