EXPERIMENTS IN RESEARCH

PRESENTED BY

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What is an experiment?

Taking action and observing consequences of that action

<table>
<thead>
<tr>
<th>EXPERIMENTS</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Controlled observation possible</td>
<td>- Controlled observation not possible</td>
</tr>
<tr>
<td>- Conditions can be manipulated</td>
<td>- Conditions controlled by nature</td>
</tr>
<tr>
<td>- Inferences are valid</td>
<td>- Alternative explanations cannot be ruled out</td>
</tr>
<tr>
<td>- Reactive nature</td>
<td>- Ss not always aware of study</td>
</tr>
<tr>
<td>- Universality of findings</td>
<td>- Ss mostly representative of group</td>
</tr>
<tr>
<td>- Experimenter bias</td>
<td></td>
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</tbody>
</table>

Special Nature of Experiments:

It is the only research method by which the causal relationship between variables can be determined.
Elements of an experiment

1. Independent variables
   - In the control of the experimenter
   - Can be systematically altered
   - The treatment is the independent variable.
   - Limit to one or two for determining causal relationships.

The Degree of imagery is the independent variable in this experiment

2. Dependant variable
   - That which is studied in the experiment.
   - When the independent variables are manipulated, the variable that we presume it will affect is called the dependent variable.

The Number of words of each type recalled after exposure to them is the dependent variable
3. Extraneous variables

- Variables other than independent variables that might affect the outcome of an experiment.
- These are major sources of error.
- Must be either eliminated or their effect controlled
- Cause confounding of the experiment.

Here, the extraneous variables would include familiarity of words, word length, ability of subjects, fatigue, distraction in the setting, etc.

4. Value

- Is designated as the amount or level of the variable.
- The value of the independent variable is controlled within a certain predetermined scale
- The value of the dependant variable is observed

Here, the independent variable could take one of two values: high imagery or low imagery
5. **Treatment condition**  
The level or value of the independent variable

The treatment condition would be the different difficulty levels of the words the subject is exposed to.

6. **Subject group or experimental group**  
   - Participants exposed to the treatment condition  
   - The type and composition of your subject group can affect the results

7. **Control group**

   - Similar to an experiment group, but is deliberately setup to be influenced by all of the variables affecting the experiment group –EXCEPT the independent variable.  
   - Source of reference for the experiment results.  
   - Allowance needs to be made for the *placebo effect*

Where subject performance is measured before and after treatment, the experiment group serves as it’s own control group.
HOW MANY SQUARES?
TYPES OF EXPERIMENTS

Laboratory
- Created setting
- Experimenter controls the extraneous variables
- Application is easy
- Valid references
- Researcher is in control

Natural
- Natural setting
- All variables
- Extraneous variables cannot be controlled
- Application is more difficult than laboratory experiment
- Alternative explanation can be made
- Initiation of events/selection of people not controlled by the experimenters

Field
- Natural setting
- All variables
- Application is more difficult than laboratory experiment
- Researcher manipulates the independent variables
HOW TO DO AN EXPERIMENT

Selecting the topic

Clearly explain what you’re doing and why you’re doing it.

Framing of Hypothesis

- Defines the relationship between variables.
- Should be a testable proposition.
- Positive and null hypotheses.
- After framing the hypothesis, the decision to perform an experiment can be made, and its type fixed.

Operational Definitions

- All concepts must be operationally defined (i.e. define the way they are measured).
- Ensuring that the experiment is repeatable by someone else following the same procedures and methods does this.
Internal validity

An experiment is internally valid to the extent that it shows a cause-effect relationship between the independent and dependent variables.

Composition of subject groups

- Subjects have specific characteristics either learned or inherent.
- Comparing groups with unequal distribution characteristics causes bias.
- Two basic ways a subject group can be put together:
  - Matching groups: similar levels of subject characteristics create each treatment group.
  - Random assignment: Subjects are randomly assigned to treatment groups.
How being experimented upon affects the behavior of subjects

*reactive arrangements*- when behavior is affected by prior perception

- S wants to “put his best foot forward”
- S is anxious about the impression he makes
- S is faithful and follows the instructions religiously, without trying to second guess or outsmart E
- S resists the attempts of E to study him
- S turns hostile or apathetic or even fails to show up
- S behaves in his own interests.
Use of subject groups:

a) All participants are presented with a mixed list of words

<table>
<thead>
<tr>
<th>Subject groups</th>
<th>Treatment condition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>All subjects</td>
<td>Mixed list of high &amp; low imagery words</td>
<td>No. of high &amp; low imagery words recalled correctly.</td>
</tr>
</tbody>
</table>

b) Participants are divided into groups and each group is assigned a different treatment

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<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>High imagery word list</td>
<td>No. of high imagery words recalled correctly.</td>
</tr>
<tr>
<td>Group 2</td>
<td>Low imagery word list</td>
<td>No. of low imagery words recalled correctly.</td>
</tr>
</tbody>
</table>

c) Both groups receive the same lists of words, but in different order. This is known as Counterbalancing.

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<th>Treatment condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>First list - high imagery words followed by recall</td>
</tr>
<tr>
<td></td>
<td>Second list - low imagery words followed by recall</td>
</tr>
<tr>
<td></td>
<td>(reverse of above)</td>
</tr>
<tr>
<td>Group 2</td>
<td>No. of high imagery words recalled correctly.</td>
</tr>
</tbody>
</table>
Setting qualities

- Keep all laboratory/field conditions as similar as possible for all subjects
- Run all subjects about the same time of day
- Keep all equipment clean and check them periodically
- Run a pretest with new equipment in order to verify accuracy

Guarding against experimenter bias

*Experimenter characteristics* that tend to bias social/qualitative experiments

- Experimenter’s sex
- Experimenter’s religion
- Experimenter’s race
- Experimenter’s “warmth”
- Experimenter’s likeability
- Experimenter’s acquaintance
**Experimenter Expectation:**
- Unconscious behavior signals from the experimenter
- The experimenter may tend to interpret responses to suit his interpretations.

**Experimenter Involvement:**
- Might develop a bias for or against particular subjects
- May get sidetracked and even change the objectives of the experiment
Possible solutions to experimenter bias:

- Train experimenters in order to reduce extraneous influences
- Use the same experimenter for all subjects
- If more than one experimenter is involved, have each run an equal number of subjects in each treatment condition or
- Randomly assign experimenters to subjects
- Use blind/double blind studies

External validity: Universality of an experiment:

- The approximate truth of conclusions the involve generalizations.
- Artificiality of the experimental setting
ETHICS IN RESEARCH

Obligations of Experimenters/Rights of Subjects
1. Informed consent
   - Given
   - Not given
2. Subject should be allowed to withdraw at anytime
3. Protection of subject from harm
   - Deception
   - Psychological injury
   - Jeopardized dignity
4. Confidentiality of results
5. Feedback/debriefing

APA Guidelines on Ethical Conduct

Principles
• Competence
• Integrity
• Professional and Scientific Responsibility
• Respect for People’s Rights and Dignity
• Concern for others welfare
• Social Responsibility
Ethical Standards

1. Using simple language provide information beforehand and debriefing later
2. Do not engage in harassment, sexual or otherwise
3. Conflict of interest
4. No remuneration from patients/clients
5. Documentation to ensure accountability
6. Financial agreements to be reached as early as feasible
7. Interpreting assessment results
8. Make known foreseeable uses of information obtained
9. Permission for electronic recording
10. Confidentiality
11. Consent from Ss
12. Approval from host institution
13. No Inducements
14. No Deception
15. No Fabrication of results
16. Correction of errors
17. Cited works
Animals in Experiments

1. Clear scientific purpose
2. Sufficient potential significance to justify use of animals
3. Non animal alternatives/ minimum number of animals
4. Humane procedures
5. Conform to regulations
6. Constant monitoring for health problems
7. Competent staff
8. Enrich environment of lab animals
9. Acquire Ss lawfully and humanely
10. Minimize undue stress, discomfort (anesthesia, euthanasia)
11. Post-op care, multiple surgeries
12. Release back to wild/ disposal
13. Endangered species
PILOT TESTING
• Essential study before the actual experiment is carried out
• Usually carried out in small groups, and if repeated, it is not carried out for the same people
• Pilot study is made for last minute check ups
• In case of problems, they are corrected and carried out again, before the actual test
• Preliminary run saves time, effort

RUNNING THE EXPERIMENT
• The actual test of the experiment can run smoothly, after the success of the pilot study.
• All considerations apply to the experiment
• Thank participants
• Answer any question of doubts, explain purpose and use of the data, send out the results

CHECKING FOR VALIDITY-POST TESTING
• Composed of independent variables, which are re-measured
• Difference attributed to the influence of the independent variable
• If carried out the second time, the response will be different.
CONCLUSION

Given a number of controllable variables the experiment in behavioral research is limited. Conditions in the laboratory may differ from the outside world, and people will behave differently. Behavioral issues are not suitable for experimentation for ethical reasons or for cost.