Marketing Research

Chapter 11

Experimental Research

Lecturer: Dr. Michaella DeLeon Castillo
Philippines

LEARNING OUTCOMES

After studying this chapter, you should be able to

1. Create an experimental, independent variable through a valid experimental manipulation of its value
2. Understand and minimize the systematic experimental error
3. Know ways of minimizing experimental demand characteristics
4. Avoid unethical experimental practices
5. Understand the advantages of a between-subjects experimental design
6. Weigh the trade-off between internal and external validity

The Nature of Experiments

- Experiment Defined
  - A research investigation in which conditions are controlled.
- Experimental Research
  - Conducting an experiment to test an hypothesis:
    - **Independent variable:** a variable with values that can be manipulated by the experimenter.
    - **Dependent variable:** a variable with values (outcomes of interest) that are influenced by the independent variable.
    - **Causal relationships:** measures of outcomes of interest showing the effect of the independent variable on the dependent variable.

Experimental Research Terms

- Subjects
  - The sampling units for an experiment, usually human respondents who provide measures based on the experimental manipulation.
- Experimental Condition
  - One of the possible levels of an experimental (independent) variable manipulation.
- Experimental Outcomes
  - The changes in the dependent variable values observed in its relationship to changes in the value of the independent variable.

Independent Variable Main Effects and Interaction

- Main Effect
  - The experimental difference in dependent variable means between the different levels of any single experimental variable.
- Interaction Effect
  - Differences in dependent variable means due to a specific combination of independent variables.

Basic Issues of Experimental Design

- Manipulation of the Independent Variable
  - Experimental treatment: the way an experimental variable is manipulated.
    - Categorical variables: described by class or quality
    - Continuous variables: described by quantity (level)
  - Experimental Group
    - A group of subjects to whom an experimental treatment is administered.
  - Control Group
    - A group of subjects to whom no experimental treatment is administered.

Experimental Design (cont'd)

- Manipulation of the Independent Variable
  - Several experimental treatment levels (different values of the independent) may be used.
  - More than one independent variable may be examined.
  - **Cell:** a specific treatment combination associated with an experimental group.
    - Computation of the number of cells in an experiment:

$$K = (T_1)(T_2)..(T_m)$$

Experimental Design (cont'd)

- Selection and Measurement of the Dependent Variable
  - Selecting dependent variables that are relevant and truly represent an outcome of interest is crucial.
  - Choosing the right dependent variable is part of the problem definition process.
    - Thorough problem definition will help the researcher select the most important dependent variable(s).
  - *Will outcomes of the dependent variable (information or insights gained) assist managers in decision making?*

Experimental Design (cont'd)

- Selection and Assignment of Test Units
  - Test units: the subjects or entities whose responses to treatment are measured or observed.
- Sample Selection And Random Sampling Errors
  - Systematic or nonsampling error
    - Subject selection, experimental design, and unrecognized extraneous variables
  - Overcoming sampling errors
    - Randomization
    - Matching
    - Repeated measures
    - Control over extraneous variables

Experimental Design (cont'd)

- Sample Selection And Random Sampling Errors
  - Experimental Confound
    - When there is an alternative explanation beyond the experimental variables for any observed differences in the dependent variable.
    - Once a potential confound is identified, the validity of the experiment is severely questioned.
    - Sources:
      - Sampling error
      - Systematic error
      - Later-identified extraneous variables
    - Careful experimental design can reduce the likelihood of confounds.

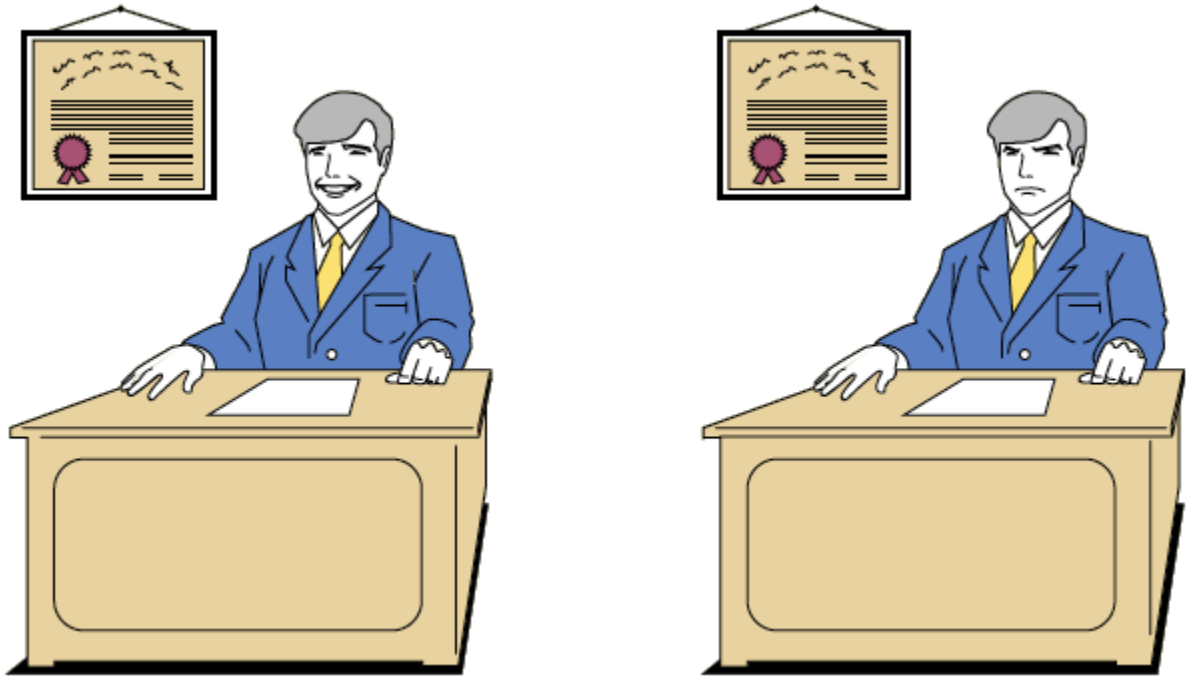
Demand Characteristics

- Demand Characteristic
  - An experimental design element or procedure that unintentionally provides subjects with hints about the research hypothesis.
- Demand Effect
  - Occurs when demand characteristics actually affect the dependent variable.
- Hawthorne Effect
  - People will perform differently from normal when they know they are experimental subjects.

Demand Characteristics (cont'd)

- Experimenter Bias (Guinea Pig Effect)
  - The influence of the presence, actions, or comments of an experimenter on subjects' behavior.
- Hawthorne Effect
  - People will perform differently from normal when they know they are experimental subjects.
- Reducing Demand Characteristics
  1. Use an experimental disguise.
  2. Isolate experimental subjects.
  3. Use a "blind" experimental administrator.
  4. Administer only one treatment level to each subject.

EXHIBIT 11.4 By Smiling or Looking Solemn, Experimenters Can Modify Subjects' Behavior



Reducing Demand Characteristics

- Experimental Disguise
  - Placebo
    - An experimental deception involving a false treatment.
  - Placebo effect
    - The effect in a dependent variable associated with the psychological impact that goes along with knowledge of some treatment being administered.
- Isolate Experimental Subjects
- Administer One experimental Condition
  - When subjects know more than one experimental treatment condition, they are more likely to guess the experimental hypothesis.

Establishing Control

- Constancy of Conditions
  - Subjects in all experimental groups are exposed to identical conditions except for the differing experimental treatments.
- Counterbalancing
  - Attempts to eliminate the confounding effects of order of presentation by varying the order of presentation (exposure) of treatments to subject groups.

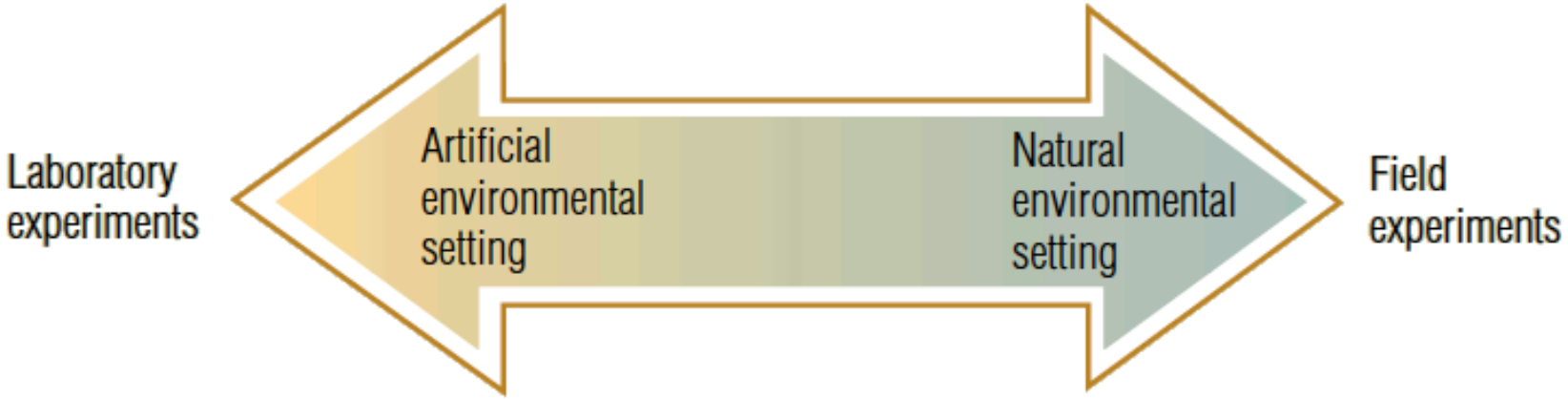
Ethical Issues in Experimentation

- Debriefing experimental subjects
  - Communicating the purpose of the experiment
  - Explaining the researcher's hypotheses about the nature of consumer behavior
- Attempts to interfere with a competitor's test-marketing efforts
  - Such acts as changing prices or increasing advertising to influence (confound) competitors' test-marketing results are ethically questionable.

Fundamental Questions in Experimentation

- Laboratory Experiment
  - A situation in which the researcher has more complete control over the research setting and extraneous variables.
- Field Experiments
  - Research projects involving experimental manipulations that are implemented in a natural environment.

EXHIBIT 11.5 The Artificiality of Laboratory versus Field Experiments

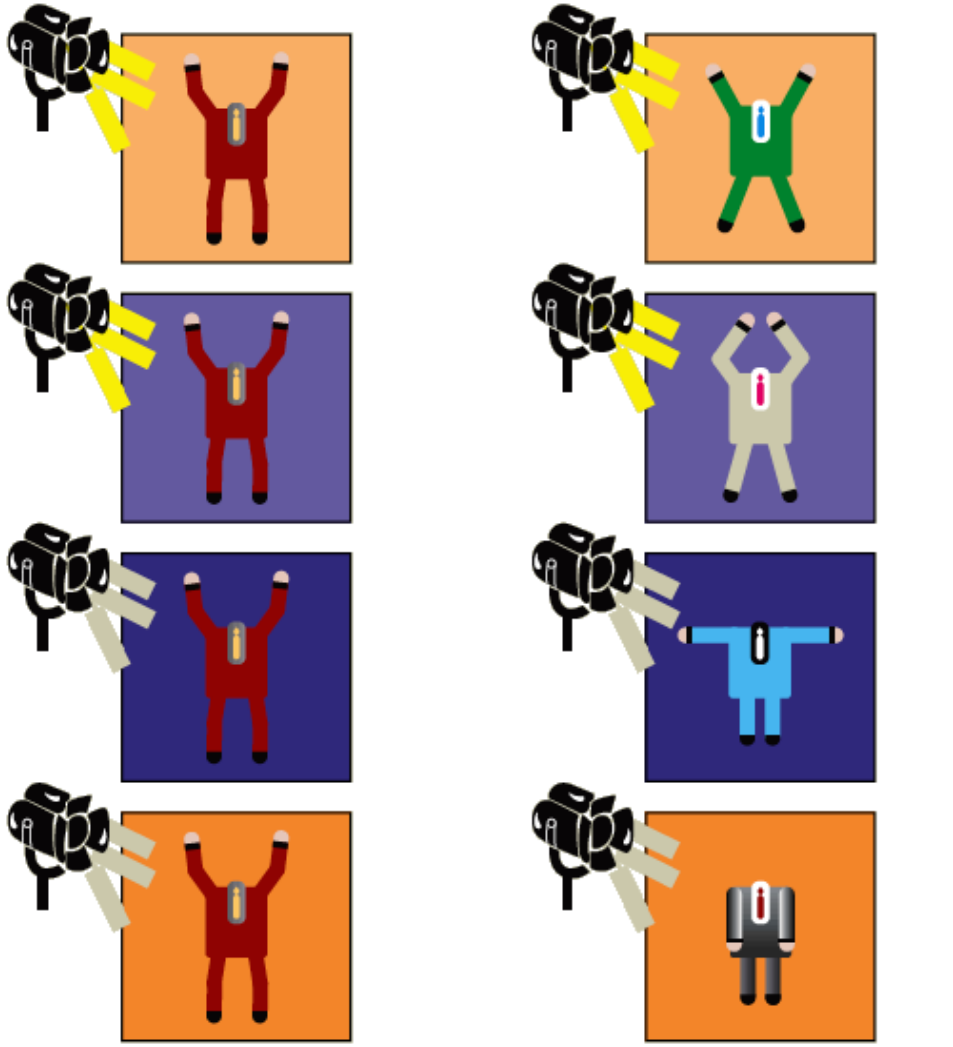


Fundamental Questions… (cont'd)

- Within- versus Between-Subjects Designs
  - Within-subjects design
    - Involves repeated measures because with each treatment the same subject is measured.
  - Between-subjects design
    - Each subject receives only one treatment combination.
    - Between-subjects designs are usually advantageous although they are usually more costly.
    - The validity of between-subjects designs is usually higher.

EXHIBIT 11.6

Within- and Between-Subjects Designs



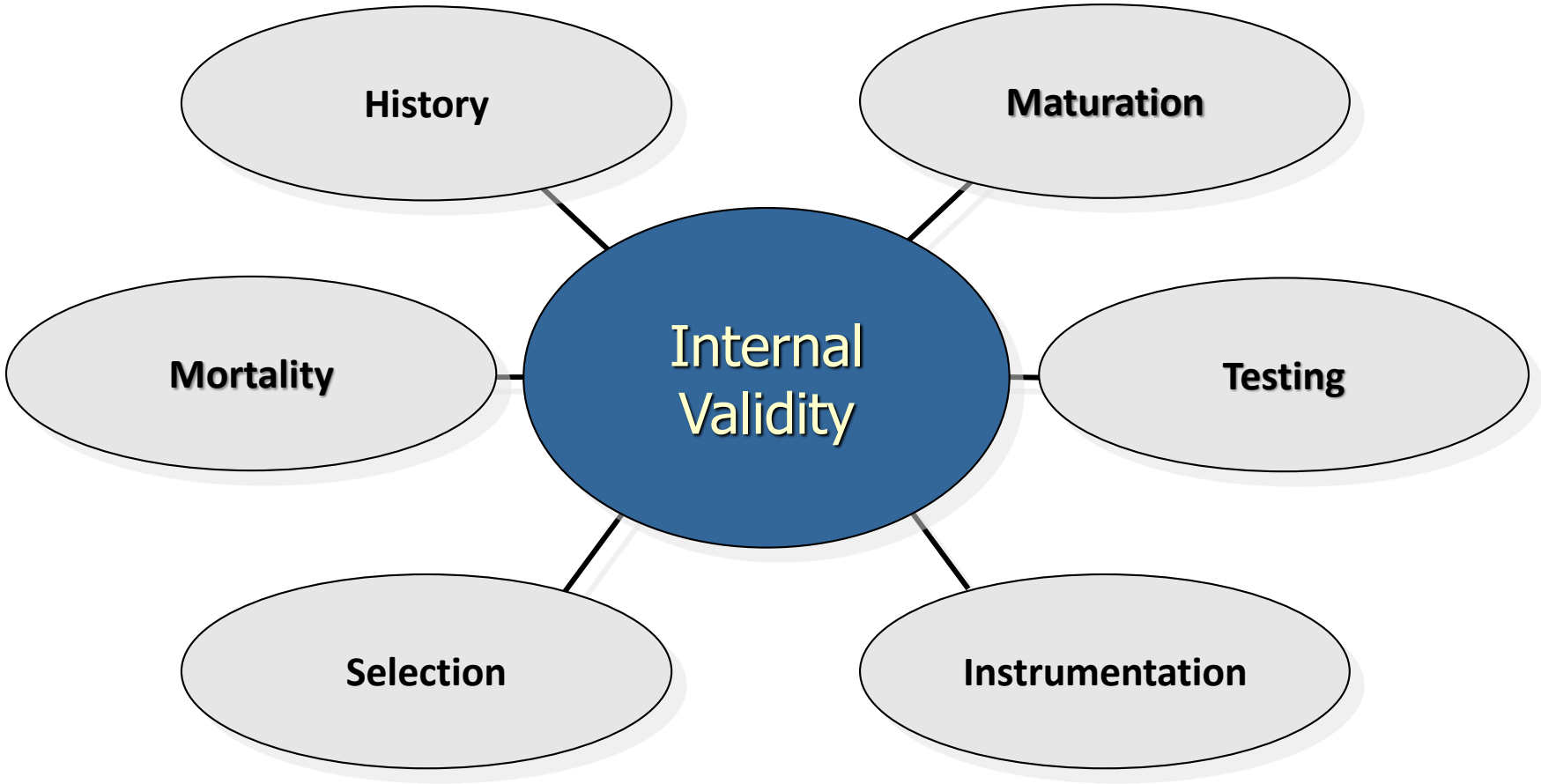
Within-Subjects — same subject is measured after being exposed to each color-lighting combination.

Between-Subjects — each subject is measured only once after being exposed to only one color-lighting combination.

Issues of Experimental Validity

- Internal Validity
  - The extent that an experimental variable is truly responsible for any variance in the dependent variable.
    - Did the experiment answer the question of causal effect?
    - Did the manipulation do what it was supposed (predicted) to do?
- Manipulation Checks
  - A validity test of an experimental manipulation to make sure that the manipulation does produce differences in the independent variable.

Extraneous Variables Affecting Internal Validity



Effects of Extraneous Variables on Validity

- History Effect
  - Occurs when some change other than the experimental treatment occurs during the course of an experiment that affects the dependent variable.
- Cohort Effect
  - A change in the dependent variable that occurs because members of one experimental group experienced different historical situations than members of other experimental groups.

Effects of Extraneous Variables… (cont'd)

- Maturation Effects
  - Effects that are a function of time and the naturally occurring events that coincide with growth and experience.
- Testing effects
  - A nuisance effect occurring when the initial measurement or test alerts or primes subjects in a way that affects their response to the experimental treatments.

Effects of Extraneous Variables… (cont'd)

- Instrumentation Effect
  - A change in the wording of questions, a change in interviewers, or a change in other procedures causes a change in the dependent variable.
- Selection
  - The selection effect is a sample bias that results from differential selection of respondents for the comparison groups, or a sample selection error.
- Mortality Effect (Sample Attrition)
  - Occurs when some subjects withdraw from the experiment before it is completed.

Extraneous Variables

Extraneous Variable	Example
History Uncontrollable events occurring in the environment between before and after measurements	A major employer closes its plant in test market area.
Maturation Changes in subjects during the course of the experiment	Subjects become tired during the experiment.
Testing A before measure that alerts or sensitizes subject to the nature of experiment or second measure.	A questionnaire about the traditional role of women triggers enhanced awareness of females in an experiment.

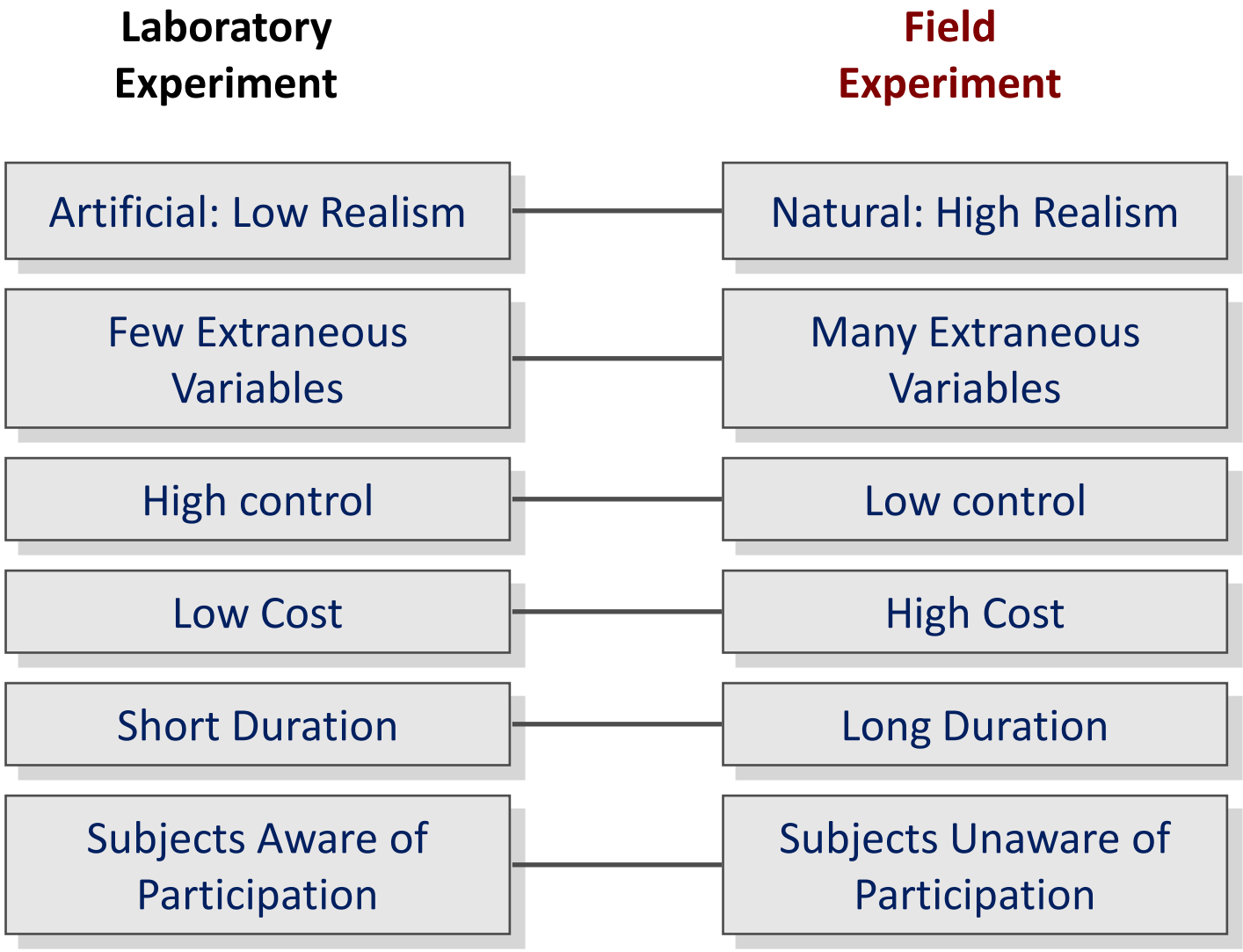
Extraneous Variables (cont'd)

Extraneous Variable	Example
Instrument – Changes in instrument result in response bias	New questions about women are interpreted differently from earlier questions.
Selection Sample selection error because of differential selection comparison groups	Control group and experimental group is self-selected group based on preference for soft drinks
Mortality Sample attrition; some subjects withdraw from experiment	Subjects in one group of a hair dying study marry rich widows and move to Florida

Issues of Experimental Validity (cont'd)

- External Validity
  - The accuracy with which experimental results can be generalized beyond the experimental subjects.
    - Student surrogates: Atypical?
- Trade-Offs Between Internal and External Validity
  - Artificial laboratory experiments usually are high in internal validity, while naturalistic field experiments generally have less internal validity, but greater external validity.

Laboratory versus Field Experiments



Classification of Experimental Designs

- Basic Experimental Design
  - An experimental design in which only one variable is manipulated.
- Diagramming Experimental Designs: Symbols

X = *exposure of a group to an experimental treatment*

O = *observation or measurement of the dependent variable; if more than one observation or measurement is taken, subscripts (that is, O_1, O_2, etc.) indicate temporal order*

$\boxed{R}$ = *random assignment of test units; $\boxed{R}$ symbolizes that individuals selected as subjects for the experiment are randomly assigned to the experimental groups*

Examples of Quasi-Experimental Designs

- Quasi-experimental Designs
  - Experimental designs that do not involve random allocation of subjects to treatment combinations.
- One Shot Design (After Only): X O_1
- One Group Pretest–Posttest: O_1 X O_2
- Static Group Design: Experimental X O_1
  Control O_2

Alternative Experimental Designs

- Pretest–Posttest Control Group Design (Before–After with Control)
  - Experimental **R O_1 X O_2**
  - Control **R O_3 X O_4**
- Posttest Only Control Group (After-Only with Control)
  - Experimental **R X O_1**
  - Control **R O_2**

Compromise Designs

- Solomon Four Group Design
  - Experimental 1 **R** O_1 **X** O_2
  - Control 1 **R** O_3 O_4
  - Experimental 2 **R** **X** O_5
  - Control 2 **R** **X** O_6

EXHIBIT 11.7 Product Preference Measure in an Experiment

We are going to give away a series of prizes. If you are selected as one of the winners, which brand from each of the groups listed below would you truly want to win?

Special arrangements will be made for any product for which bulk, or one-time, delivery is not appropriate.

Indicate your answers by filling in the box like this: ■

Do not "X," check, or circle the boxes please.

Cookies

(A 3-month supply, pick ONE.)

NABISCO OREO	☐	(1)
NABISCO OREO DOUBLE STUFF	☐	(2)
NABISCO NUTTER BUTTER	☐	(3)
NABISCO VANILLA CREMES	☐	(4)
HYDROX CHOCOLATE	☐	(5)
HYDROX DOUBLES	☐	(6)
NABISCO COOKIE BREAK	☐	(7)
NABISCO CHIPS AHOY	☐	(8)
KEEBLER E.L. FUDGE	☐	(9)
KEEBLER FUDGE CREMES	☐	(10)
KEEBLER FRENCH VANILLA CREMES	☐	(11)

Allergy Relief Products

(A year's supply, pick ONE.)

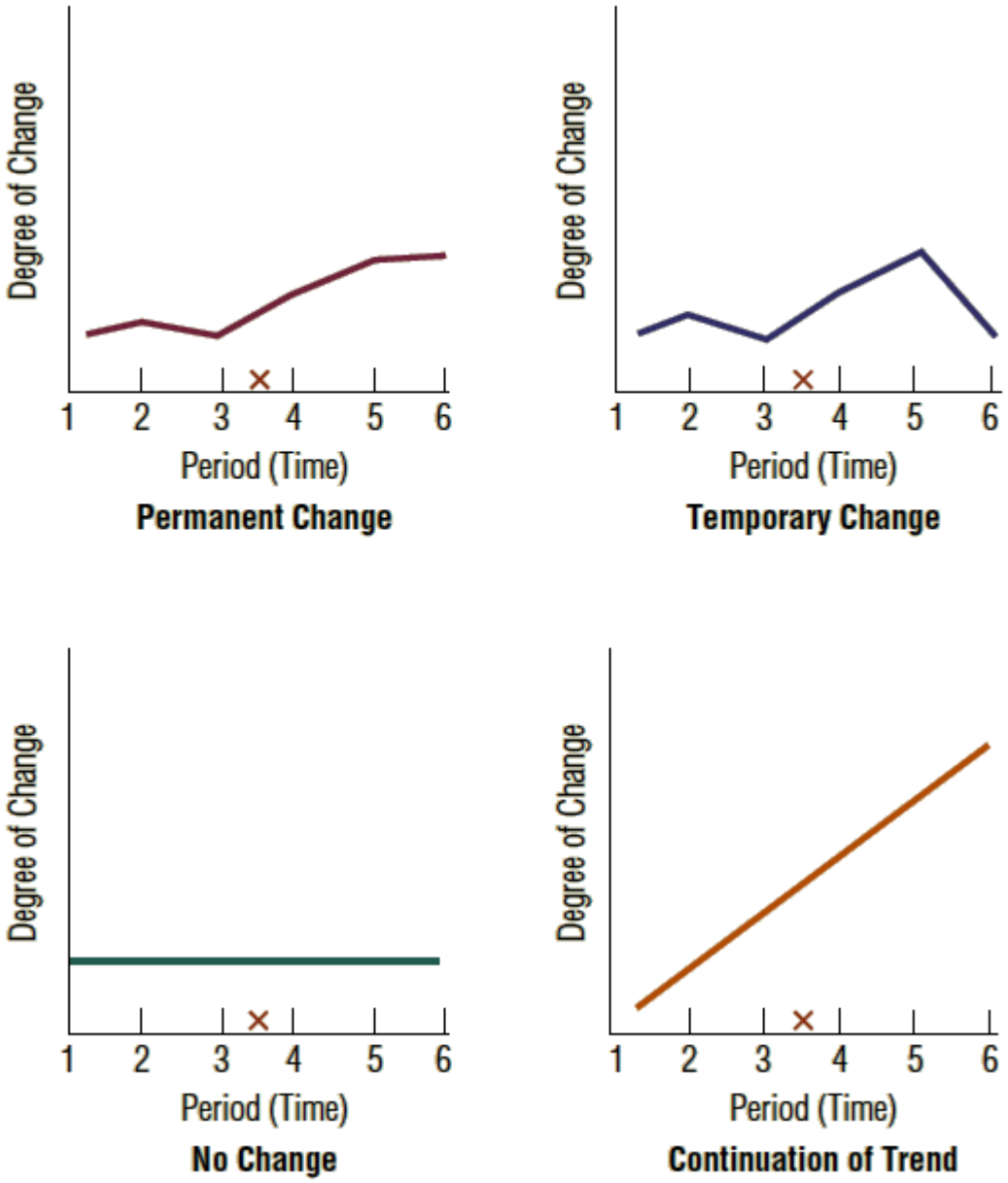
ALLEREST	☐	(1)
BENADRYL	☐	(2)
CONTAC	☐	(3)
TAVIST–D	☐	(4)
DRISTAN	☐	(5)
SUDAFED	☐	(6)
CHLOR–TRIMETON	☐	(7)

Internal Validity Problems

	One-Shot Design	One-Group Pretest-Posttest	Static-Group Design	Pretest-Posttest Control	Solomon Four-Group Design
History	weak	weak	controlled	controlled	controlled
Maturation	weak	weak	concern	controlled	controlled
Testing	not relevant	weak	controlled	controlled	controlled
Instrumentation	not relevant	weak	controlled	controlled	controlled
Selection	weak	controlled	weak	controlled	controlled
Mortality	weak	controlled	weak	controlled	controlled

EXHIBIT 11.8

Selected Time Series Outcomes



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Key Terms and Concepts

- subjects
- experimental condition
- main effect
- interaction effect
- experimental treatment
- experimental group
- control group
- cell
- Test units
- sample selection error
- Systematic (or non-sampling error)
- Randomization
- repeated measures
- confound
- demand characteristic
- demand effect
- Hawthorne effect
- placebo
- placebo effect
- constancy of conditions
- Counterbalancing
- laboratory experiment
- tachistoscope

Key Terms and Concepts (cont'd)

- Field experiments
- Within-subjects designs
- Between-subjects designs
- Internal validity
- manipulation check
- history effect
- cohort effect
- Maturation effects
- Testing effects
- instrumentation effect
- mortality effect (or sample attrition)
- external validity
- basic experimental design
- Quasi-experimental designs
- time series design

REFERENCES

- Zikmund, W.G., & Babin, B.J. (2016) Exploring Marketing Research 11th Editon. Cengage Learning. USA. ISBN: 978-1-305-26380-2
- Zikmund, W.G., & Babin, B.J. (2009) Exploring Marketing Research 10th Editon. Thomson South-Western. USA. Student Edition: ISBN 978-0324593761
- Zikmund, W.G., & Babin, B.J. (2007) Exploring Marketing Research 9th Editon. Thomson South-Western. USA. Student Edition: ISBN 0-324-32088-4 Instructor's Edition: ISBN 0-324-31751-4
- Roberto, Ned. (2016) User-Friendly Marketing Research 4th Edition. Rex Bookstore. Manila Philippines
- Palad, R.L. & Serrano, A. C., (2016) Marketing Research. Rex Bookstore. Manila, Philippines

Online Sources

- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=d4ff30e8-f98a-4f3f-bd5b-f075a911f29a%40sessionmgr103&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=147580065&db=bsh
- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=49ba053e-e93d-4286-8360-13f87e70b43c%40pdc-v-sessmgr01&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=147580056&db=bsh
- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=e05f5c7c-2db0-4d4c-aa1f-000c88ddaafd%40sessionmgr103&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=149363305&db=bsh
- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=c751dddd-f5c5-480c-8da9-18ca71d7ba36%40pdc-v-sessmgr03&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=144332956&db=hjh
- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=55b9faa9-2d8e-4137-9e72-757d6cf5cde3%40sessionmgr103&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=145199548&db=bsh
- https://www.hotjar.com/blog/market-research/
- https://www.entrepreneur.com/encyclopedia/market-research
- https://open.lib.umn.edu/principlesmarketing/chapter/10-2-steps-in-the-marketing-research-process/
- https://www.oberlo.com.ph/ecommerce-wiki/market-research
- https://managementhelp.org/marketing/market-research.htm
- https://www.infoentrepreneurs.org/en/introduction-to-market-research/
- https://www.thehartford.com/business-insurance/strategy/market-research/business-market-research
- https://www.bdc.ca/en/articles-tools/blog/5-ways-improve-business-market-research
- https://www.qualtrics.com/blog/market-research-v-marketing-research/
- http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=cf7adc4f-b69f-4c1-89c2-fa25a52e4384%40sessionmgr103&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=150622370&db=bsh

Thank you