

PART TWO

Chapter 6

Causal Research Design and Experimentation



Chapter Objectives

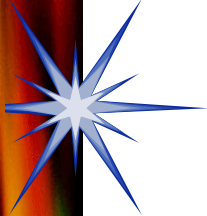
After reading this chapter, you should be able to:

- ➔ **Explain the concept of causality as defined in marketing research.**
- ➔ **Define and differentiate the two types of validity: internal and external.**
- ➔ **Discuss the various extraneous variables that can affect the validity of results obtained through experimentation and explain how the researcher can control extraneous variables.**
- ➔ **Compare and contrast the use of laboratory vs field experimentation and experimental vs non-experimental designs in marketing research.**
- ➔ **Describe test marketing and its various forms.**
- ➔ **Understand why the internal and external validity of field experiments conducted overseas is generally lower in Australia.**



Concept of Causality

- ➔ Causality may be thought of as understanding a phenomenon in terms of **conditional statements** of the form **"if x, then y"**



Some simple examples

If:

- We increase the temperature on the thermostat
- We increase advertising expenditure
- We reduce price

Then:

- The room will get warmer
- Sales may increase
- Sales may increase



Scientific meaning of Causality

- ➔ **Marketing effects are caused by multiple variables**
- ➔ **The relationship between cause and effect tends to be probabilistic**
- ➔ **Causality can never be proved**



Conditions for Causality

Concomitant Variation

- ➔ Extent to which a **cause (x)** and an **effect (y)** occur together or vary together in the way predicted by the hypothesis under consideration.
- ➔ Association or relationship between variables
eg. level of education “causes” people to play golf??

Watch out for spurious correlation



Conditions for Causality cont.

Time Order of Occurrence of Variables

- ➔ Causing events (x) must occur either **before** or **simultaneously** with the effect (y); can not occur afterwards

eg. If we increase **promotional expenditure**, **sales** may increase (not the other way around)

- ➔ An event in a relationship could be both a cause and effect

eg. *Which is the **cause**?*

Store loyalty or owning a store credit card.



Conditions for Causality cont.

Absence of other Probabilistic Causal Factors

- ➔ The variable being investigated should be the **only possible** casual explanation
- ➔ Difficult to rule out all other casual factors

If all the evidence is strong and consistent, it may be reasonable to conclude that there is a causal relationship



Definition

Experiment

➔ manipulating an **independent variable** to see how it affects the **dependent variable** while also controlling the effect of additional **extraneous variables**



Examples of...

Independent variables

- ➔ level of advertising expenditure, types of ads, displays, price changes

Dependent variables

- ➔ sales, market share, level of customer satisfaction

Extraneous variables

- ➔ store location, competition, questionnaire used, respondents



Validity in Experimentation

Internal Validity

- ➔ Extent to which the research design accurately identifies causal relationships
- ➔ The researcher can rule out rival explanations **[other variables]** for the observed results and conclusions about the relationship

External Validity

- ➔ Extent to which the cause-and-effect relationships found in the experiment can be generalised



Extraneous Variables

History

- ➔ Specific events that are **external to the experiment** but occur at the same time as the experiment
- ➔ These events may affect the dependent variable.
[**economic downturn, competitors' price reductions**]

O_1 X_1 O_2

If there is no difference between O_1 and O_2 , we may conclude that X_1 (treatment) was ineffective. However, consider if the effects might have been compounded by history.



Extraneous Variables cont.

Maturation

➔ Changes in the **test units** over time

[changes in the people who are part of the experiment, changes to stores (change in layout, décor, traffic)]



Extraneous Variables cont.

Test Effects

- ➔ The effect on the experiment of taking a measure on the dependent variable before and after the presentation of the treatment

[The actual act of 'testing' may **contaminate** the results of the experiment]



Extraneous Variables cont.

Instrumentation

- ➔ **Changes in the measuring instrument, observers or scores**

[Changing the questionnaire, observers, or scores during the course of the experiment may contaminate the results of the experiment]

Statistical Regression

- ➔ When test units with extreme scores move closer to the average during the course of the experiment

[Respondents' opinions move to the average because they are **part of the experiment**, rather than as a result to the treatment]



Extraneous Variables cont.

Selection Bias

- ➔ Improper **assignment of test units** to treatment conditions
[**sampling error**]



Extraneous Variables cont.

Mortality

➔ **Loss of test units** while the experiment is in progress

[respondents selected no longer wish to participate]



Controlling Extraneous Variables

Randomisation

- **Randomly** assigning test units to experimental groups by using random numbers

Matching

- Comparing test units on a **set of key background variables** before assigning them to the treatment

Statistical Control

- Measuring the extraneous variables and adjusting for their effects through **statistical analysis**

Design Control

- Use of experiments **designed** to control specific extraneous variables

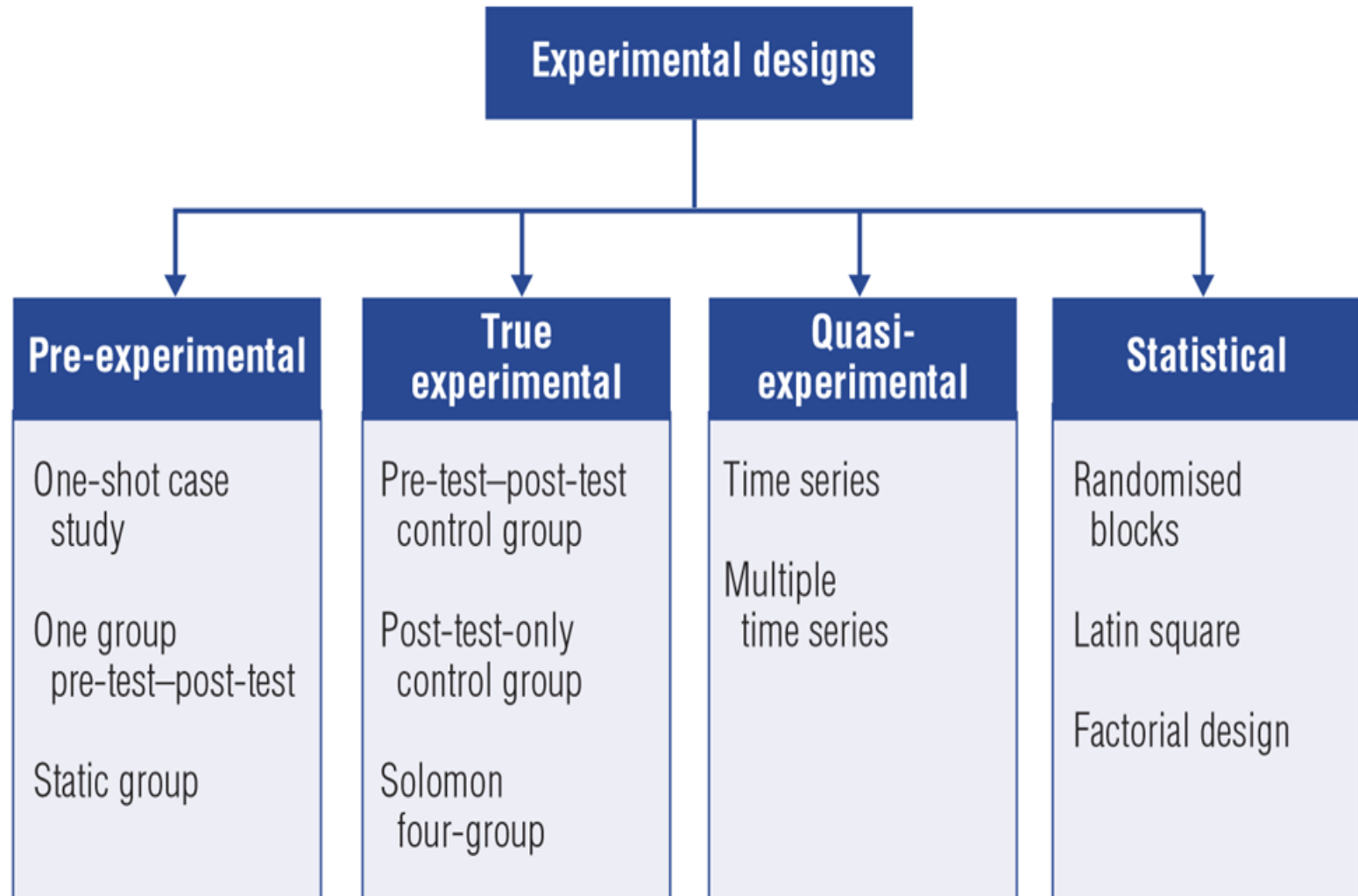


Case: Beauty is in the eye of the beholder

- ➔ Scientists have found a link between **drinking alcohol** and **perceptions of beauty**
- ➔ **80 students** were shown colour photographs of 120 male and female students and were asked to rate the aesthetic properties on a 7-point scale from **high unattractive** to **highly attractive**
- ➔ Half the students had drunk up to four units of **alcohol**, the other half had **no alcohol**.
- ➔ The students who had consumed alcohol rated the people in the photographs as **more attractive** than the student who did not consume alcohol.

Source: <http://www.theage.com.au/articles/2002/09/091031115991721.html>

A Classification of Experimental Design (Figure 6.1)





Laboratory versus Field Experiments

Laboratory

- ➔ The independent variable is manipulated and measures of the dependent variable are taken in a **contrived, artificial setting** for the purpose of **controlling** the many possible **extraneous variables** that may affect the dependent variable

Field

- ➔ Independent variables are manipulated and measures of the dependent variable are made on test units in their **natural setting**



Table 6.3 Laboratory versus Field Experiments

Factor	Laboratory	Field
Environment	Artificial	Realistic
Control	High	Low
Reactive error	High	Low
Demand artefacts	High	Low
Internal validity	High	Low
External validity	Low	High
Time	Short	Long
Number of units	Small	Large
Ease of implementation	High	Low
Cost	Low	High



Limitations of Experimentation

- ➔ Time
- ➔ Cost
- ➔ Administration



Test Marketing

- ➔ An application of a controlled experiment, done in limited but carefully selected parts of the marketplace called test markets.

Classifications

- ➔ Standard market test
- ➔ Controlled test market
- ➔ Simulated test market



Test Marketing cont.

Criteria for the selection of test markets

- Be large enough to produce meaningful projections (ie.at least 2% of the potential actual population).
- Be representative:
 - demographically
 - with respect to product consumption behavior
 - with respect to media usage
 - with respect to competition
- Be relatively isolated in terms of media and physical distribution.
- Have normal historical development in the product class
- Have marketing research and auditing services available
- Not be over-tested