SINGLE-CASE, QUASI-EXPERIMENTAL, DEVELOPMENTAL RESEARCH

PSYC214

Chapter 11

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Single-Case Experimental Designs

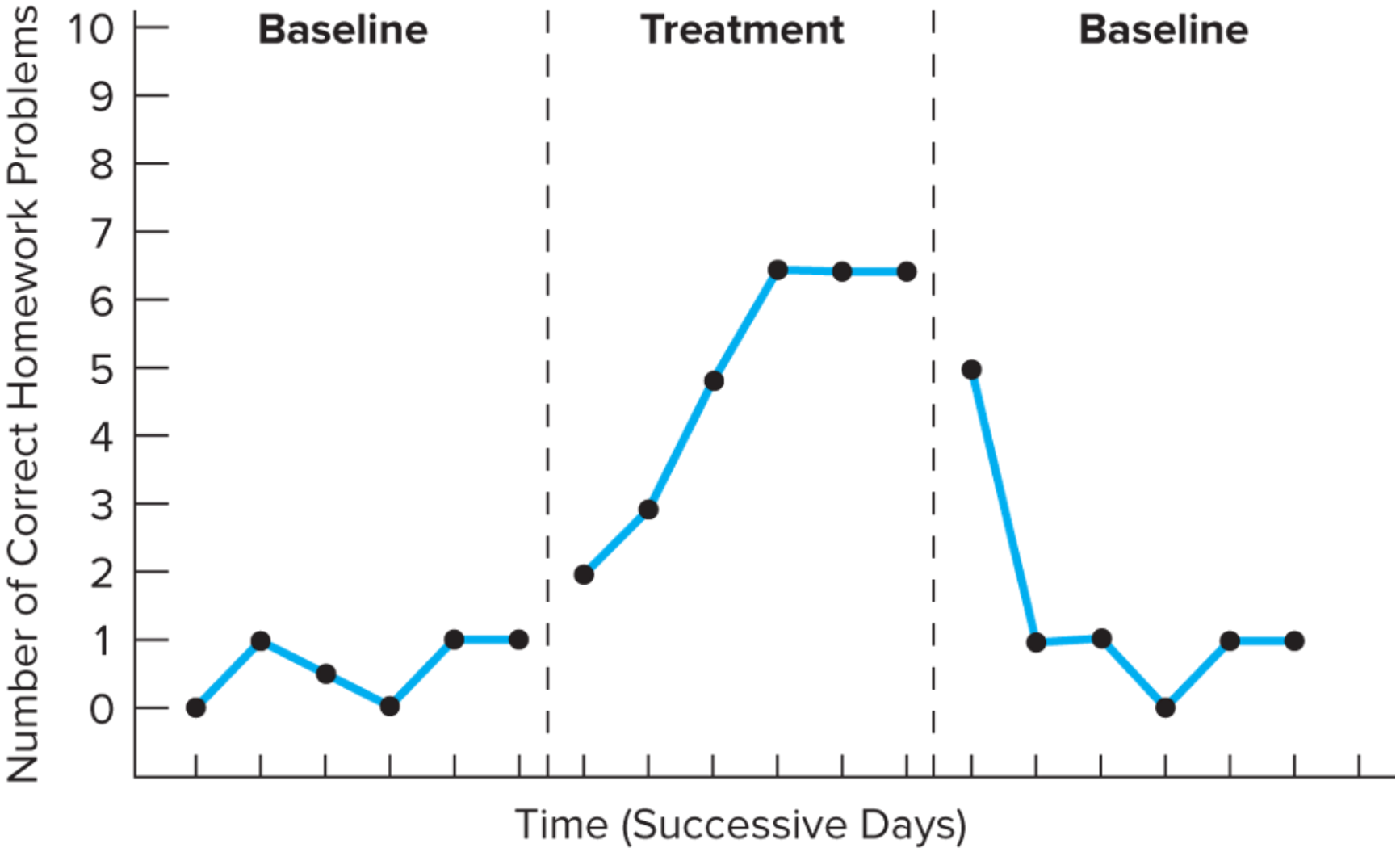
Single-case experiments help determine if an experimental manipulation has an effect on a single research participant.

The subject's behavior is measured during a **baseline** period, followed by experimental manipulation and continued measurement.

Reversal design: Further demonstrates the effectiveness of a manipulation by showing that withdrawing the manipulation ends the effect

- A-B-A design: Baseline (A) to Treatment (B) to Baseline (A)
- Can be extended to A-B-A-B or beyond

Figure 11.1 — Hypothetical Data From ABA Reversal Design



Single-Case Experimental Designs 2

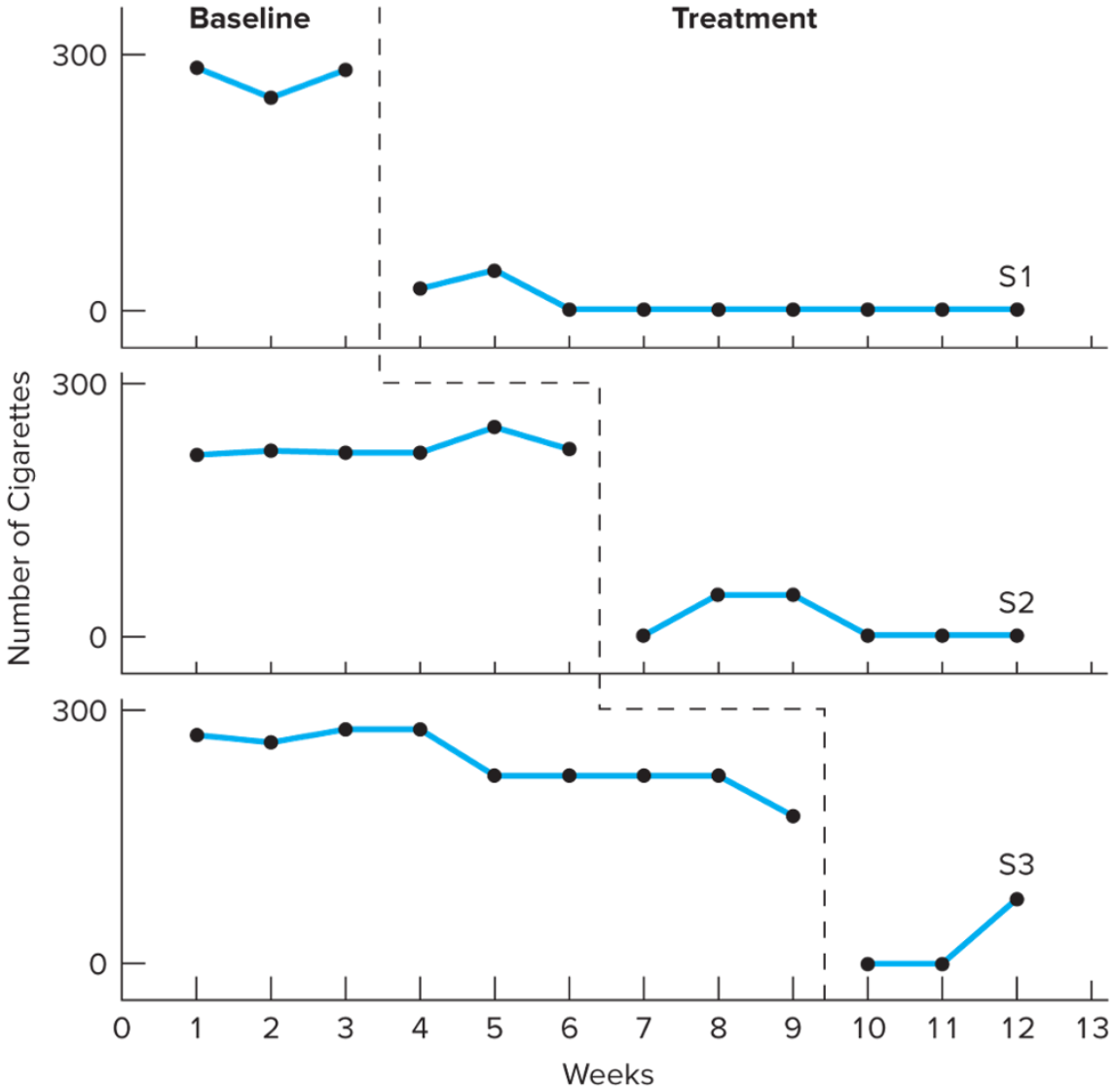
Multiple baseline designs

- Observe change under multiple circumstances
- Introduce manipulation at different points of time
- Determine if manipulation is the cause of change

Replications in single case designs

- The procedure used with a single subject can be replicated with others.
- Single-case design research often reports on the results for multiple subjects.
- Traditional single-case research presents results from each subject individually to avoid masking differences between participants.

Figure 11.2 — Hypothetical Data from Multiple Baseline Design across Three Subjects (S1, S2, and S3)



Quasi-Experimental Designs

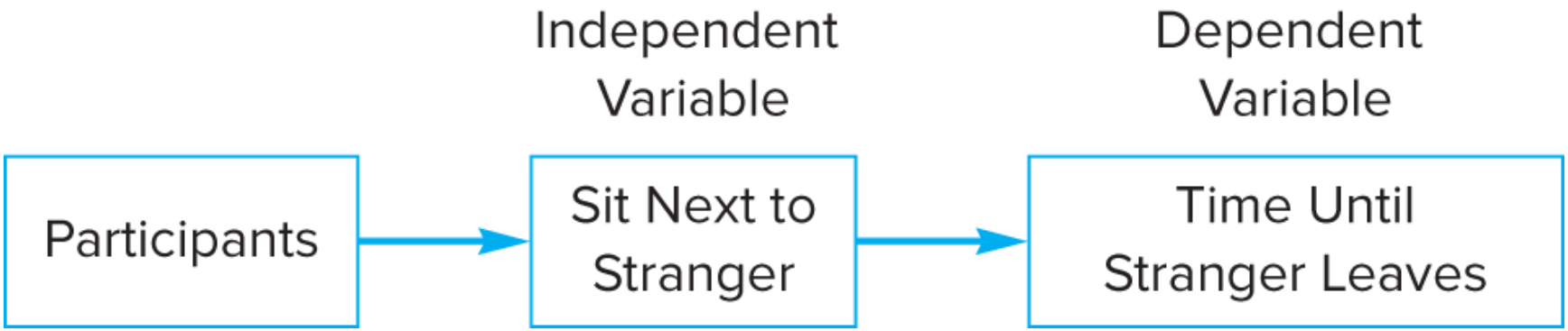
Used when control features of experimental design cannot be achieved

- Independent variable cannot be manipulated.
- Internal validity may be affected.

One-Group Posttest-Only Design

- Lacks a comparison group
- Difficult to draw a causal inference about variables

Example: One-Group Posttest-Only Design



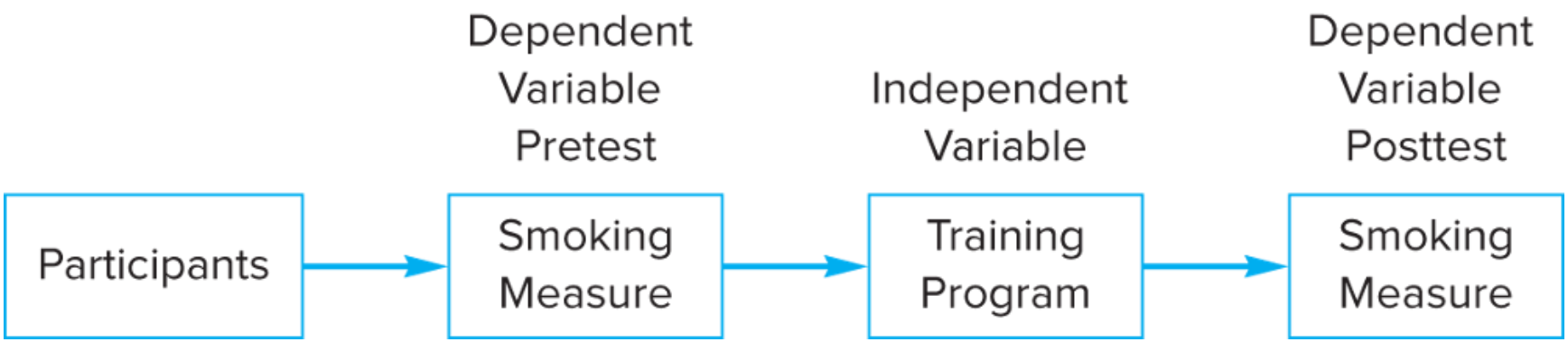
Quasi-Experimental Designs 2

A **one-group pretest-posttest design** obtains a comparison by measuring participants before and after manipulation.

Problems with one-group pretest-posttest designs

- **History effects**: Confounding event occurring at the same time as the experimental manipulation
- **Maturation effects**: Changes occurring systematically over time
- **Testing effects**: Sensitization incurred in subjects on knowing one is being tested
- **Instrument decay**: Changes in the basic characteristics of the measuring instrument over time
- **Regression toward the mean:** When subjects are selected based on unusually high or low scores on a measure only to have subsequent scores trend toward being more average

Example: One-Group Pretest-Posttest Design

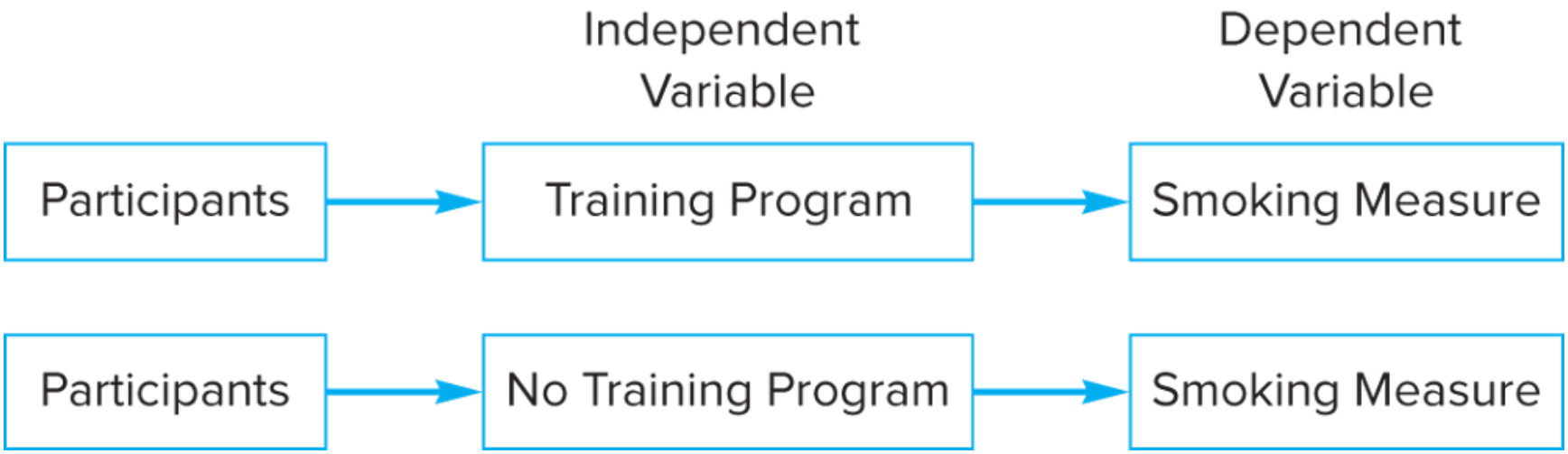


Quasi-Experimental Designs

The **nonequivalent control group design** compares an experimental group with a separate control group, but the two groups are not equivalent.

- Differences are a confounding variable, often referred to as **selection bias**

Example: Nonequivalent Control Group Design



Quasi-Experimental Designs 4

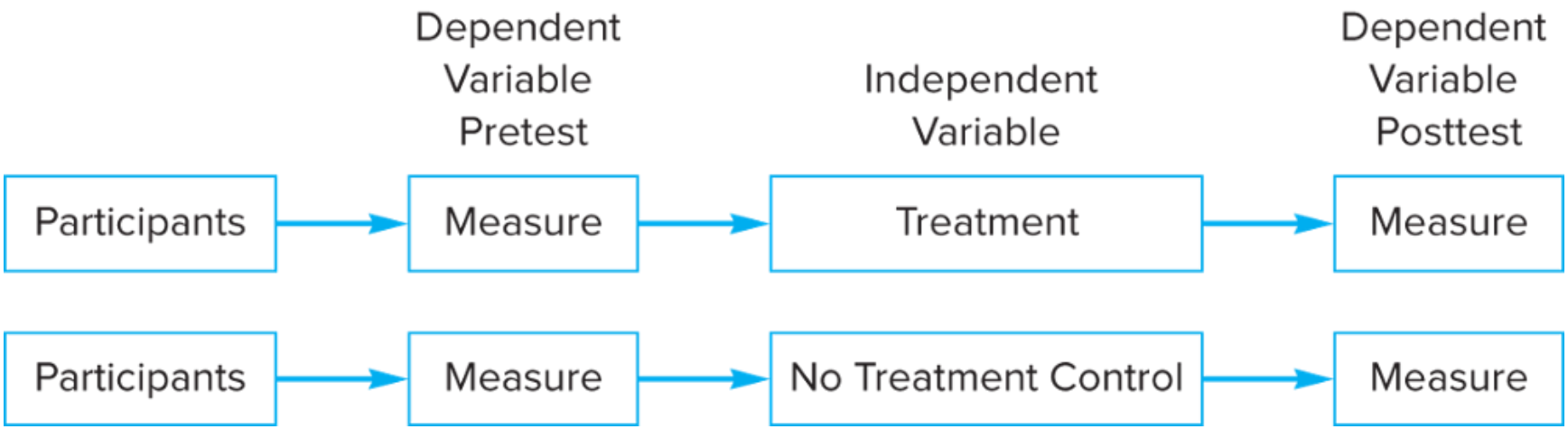
The **nonequivalent control group pretest-posttest design** compares an experimental group with a non-equivalent control group, and incorporates a pretest and posttest.

- Pretesting enables researchers to see how similar the groups were before the manipulation.
- Posttesting can show if groups experienced similar effects despite their dissimilarities.

Propensity score matching: Method of matching participants from nonequivalent groups based on their similarity across a number of measures

- Mitigates disadvantages of studying nonequivalent groups.

Example: Nonequivalent Control Group Pretest-Posttest Design



Quasi-Experimental Designs 5

Interrupted time series design

- Examines the dependent variable over an extended period of time, before and after the independent variable is implemented
- Vulnerable to interpretation problems (possible regression to the mean)

Control series design

- Improves interrupted time series design by finding an appropriate control group
- Involves finding a similar population that did not receive the manipulation being studied

Developmental Research Designs 1

Developmental psychologists use three methods to study changes in people as they age.

- **Cross-sectional method**: Persons of different ages are measured at the same point in time.
- **Longitudinal method**: A group of people are observed at different times as they age.
- **Sequential method**: The longitudinal and cross-sectional methods are used in combination.

Figure 11.5 — Three Designs for Developmental Research

Cross-Sectional Method

	Year of Birth (cohort)	Time 1: 2010
Group 1:	1955	55 years old
Group 2:	1950	60 years old
Group 3:	1945	65 years old

Longitudinal Method

	Year of Birth (cohort)	Time 1: 2010	Time 2: 2015	Time 3: 2020
Group 1:	1955	55 years old →	60 years old →	65 years old

Sequential Method

	Year of Birth (cohort)	Time 1: 2010	Time 2: 2015	Time 3: 2020
Group 1:	1955	55 years old →	60 years old →	65 years old
Group 2:	1945	65 years old →	70 years old →	75 years old

Developmental Research Designs 2

Cross-sectional method

- It is relatively cheap and allows comparisons to be made quickly.
- Researchers can only infer that any differences found are due to age.
- Any differences may actually be due to cohort effects.

Cohort: People born at about the same time, exposed to the same events in a society, and subject to similar demographic trends

Developmental Research Designs 3

Longitudinal method

- Only way to conclusively study changes in people as they age
- Controls for cohort effects
- Expensive and difficult to carry out
- Takes a long time to yield results

Sequential method

- Takes less time and effort than the longitudinal method
- Yields some results right away
- Provides some information on changes in people as they age
- Does not give information as complete as a longitudinal study can offer