Alternative Research Designs

When the usual crap just isn’t good enough.

I. Quasi-Experiments
   - naturally occurring events
   - limited pool of participants
   - When possible use true experimental designs to prevent threats to validity:
     - e.g., pre-test, post-test with a control group
     - Solomon-four groups design

II. Single Group Designs

III. Case Studies
C. The trade-off between internal and external validity

High Internal Validity
True Experiments
Quasi-Experiments
Correlational Studies
Naturalistic Observations
High External Validity

D. Quasi-Experimental Designs
(in increasing levels of internal validity)
1. Single Pretest-Posttest design:

O X O
O = Observation
X = Experimental Manipulation

Example: Quaker Oatmeal
Worst possible design
D. Quasi-Experimental Designs
(in increasing levels of internal validity)

2. Interrupted Time Series:
   Use this when you don’t have complete control over when the manipulation occurs.
   Example: boxing and homicide rates

3. Random time series
   Time of manipulation randomly determined
   Example: Diet and Cholesterol

Diet Example

Cholesterol Level

Week
D. Quasi-Experimental Designs
(in increasing levels of internal validity)

4. Nonequivalent Control Group (before-after)

Experimental: \( O_1 \times O_2 \rightarrow O_1 - O_2 \)

Control: \( O_1 O_2 \rightarrow O_1 - O_2 \)

Example: Diet and Cholesterol

Example: Nonequivalent Control Group (before-after)

Hygge, Evans, & Bullinger (2002)
Investigating cognitive abilities in children (n= 326) before and after the opening of the new Munich Airport.

Experimental Group: “children who were (old airport), or would be (new airport) exposed to aircraft noise” (p. 469).

Control Group: “matched with their respective experimental groups on the basis of sociodemographic characteristics.”

Number of errors on the reading word list in each of the groups before and after the airport opened
II. Single Group Designs

A. Reversal Designs: ABAB
   A: baseline period
   B: treatment period

1) treatments must have “local” effects
2) rules out history, maturation, testing, and instrumentation threats to validity.

Example: Kirby & Shields (1972)

Subject: 13 year old boy
Design: ABAB
   A: worksheet collected, graded, and returned the following day
   B: when student finished, he took his worksheet to the instructor who immediately graded it, and then praised his performance.

Example: Kirby & Shields (1972)
II. Single Group Designs

A. Reversal Designs (cont.)
   Modifications:
   ABAC
   AB ----

B. Multiple-Baseline Designs:
   use when the initial state cannot be recovered
   1) Choose 2 or more:
      settings, behaviors, materials . . .
   2) Insert manipulation in each setting at different times
      Example: structured lessons and contingent free time
      (Long & Williams, 1973)

(Long & Williams, 1973)

Compared the influence of structured lessons, and group contingent free time.
Participants: n = 32 African American’s enrolled in 7th grade in a metropolitan area of Tennessee
Used two classes in a multiple baseline design first math, then geography.
III. Case Studies

A. Nomothetic vs. Ideographic Research

B. Case Study as Evidence

C. Descriptive Uses of Case Studies

A. Nomothetic vs. Ideographic Research

Nomothetic research:
- **goal**: to determine general laws and principles that apply to a population in general (nomo meaning “custom” or “law”)
- **research strategy**: sample systematically from the population, combine results across individuals.
Nomothetic research

drawbacks:
1) individual differences treated as error
2) grouped data may obscure psychological processes.

Example: primary images in flashbulb memories
Question: What is your most memorable image from the 9/11 attacks?

These results suggest that people have remarkable stable memories for the events.

But, what happens if we look at individual participants consistency in reporting over time?
Consistency in primary images across a two month delay.

Consistent 22%
More Specific 15%
More General 27%
Inconsistent 33%

Clearly, grouped data can be misleading!

Ideographic Research

Study of the individual (ido – personal, distinct, individual)
Goal: to understand an individual person
Methods: case studies
Emphasis on the uniqueness of each person

Drawback: what can case studies tell us about psychological processes in “others?”

Shontz (1965, p. 236)
A chemist who wishes to study the properties of a compound or element need not concern himself with the number of samples of the substance on which his tests are run, as long as he is certain that he knows the identity of the particular material on which he is working and as long as his procedures are explicit and carefully followed. By the same token, a psychologist who wishes to study an important personality process, such as anxiety, need not concern himself greatly with the size of his sample, provided that his subject is appropriately selected and that he has procedures that enable him to recognize (that is, measure) anxiety when it occurs in the person he is investigating.

B. Case Study as Evidence

1) Confirmatory Evidence
   case study can provide confirmation of more systematic research, providing converging evidence.

Example: H.M. and the role of the hippocampus in memory.

Studies of H.M.

(Scoville & Milner, 1957; Milner et al., 1968; Corkin et al. 1997)
Henry Gustav Molaison (1926-2008)
Hit by a bicycle at age 9, he subsequently developed seizures, with frequent blackouts. In 1953, Scoville removed bilateral sections of H. M.’s hippocampus as a last ditch effort to treat his epilepsy.
Studies of H.M. (cont.)

Post surgery studies of H. M. changed the way researchers viewed memory functioning in the brain:
profound anterograde amnesia (failure to learn new information)
Example: His father died in 1967, his mother 1977, in 1986 he thought he was still living with his mother and was unsure if his father was alive (see Parkin, 1993)
However, he had intact memories of his childhood, and had knowledge of world events prior to 1953.
normal I.Q (pre-surgery 104, post-surgery 112)
normal digit span (7)
### B. Case Study as Evidence

#### 2. Disconfirmation of a General Law

**Necessary and/or Sufficient Causes**

<table>
<thead>
<tr>
<th>Nature of the theory</th>
<th>Disconfirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A sufficient cause of B</td>
<td>( A &amp; \text{not } B )</td>
</tr>
<tr>
<td>A is necessary cause of B</td>
<td>( B &amp; \text{not } A )</td>
</tr>
<tr>
<td>Contributory causes</td>
<td>cannot be disconfirmed with case studies</td>
</tr>
</tbody>
</table>

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#### Case studies and disconfirmation

**Example 1: Motor Theory of speech perception**

**Motor Program (A)** is necessary for deriving meaning (B).

**Lenneberg (1962)**

- case study of an 8 year old boy
- 1) lacked motor skills for speech (no motor program)
- 2) could understand and follow simple commands.
Case studies and disconfirmation

Example 2: Flashbulb memory hypothesis
Brown & Kulick (1977) unexpected events that trigger a strong emotional response evoke a “special mechanism” that leads to the storage of vivid and detailed recollections of the circumstances surrounding the experience.

Strong emotion (A) is a sufficient cause of vivid and detailed recollections (B)

Example 2: Flashbulb memory hypothesis (cont)
Flashbulb memory and the Challenger explosion
“Susan . . . Stated that she was eating lunch in the cafeteria with John, Beth, and Jennifer . . . However, Tim . . . Stated that he was eating with John when he learned of the explosion, but did not remember Susan, Beth, or Jennifer being there. Beth . . . recollected that she was elsewhere at lunch the day (p. 175).”

C. Descriptive Uses of Case Studies
1. Provide a prototypical example:
   e.g., “The Three Faces of Eve”
2. Provide a detailed account of a rare or unusual phenomenon
   e.g., “The Mind of the Mnemonist”
   Lauria (1968)
C. Descriptive Uses of Case Studies

3. Demonstrate important methods or procedures.
   e.g., description of a behavior modification treatment of an autistic child
4. As a source of hypotheses
   e.g., Jean Piaget’s work

Conclusions

1. Alternative research designs can provide important information
   quasi-experimental, small n, case studies
2. But, they have clear limitations
3. Researchers should use the best designs possible, minimizing alternative explanations