Classical Experiments

- Most clear-cut example of how data are collected and used to test hypotheses
- Closest thing social scientists have to the labs of physical scientists
- Best for small-group research

Classical Experiments: Why important?

1) better understand the logic of all research designs
2) a strong research design for *inferring causality*

Classic experimental design

<u>Classic experimental design</u>		Time →			
		<u>Pretest</u>		<u>Posttest</u>	
Experimental group	R	O_1	X	O_2	O_2-O_1=d_e
Control group	R	O_3		O_4	O_4-O_3=d_c

Definitions

- R = random assignment
- O = observation
- X = experimental stimulus (= independent var)
- ***Randomization*** is particularly important: divides systematic biases between two groups

Decisions

- If de > dc, then + relationship
- If de < dc, then – relationship
- If de = dc, then no relationship

Example: food aversion therapy (hypothetical)

✓Smokenders, food therapy

✓***Hypothesis***: those who undergo food therapy eat less

Example: Manhattan Bail Project

- Bernard Botein, 1965, "The Manhattan Bail Project: Its Impact in Criminology and the Criminal Law Process," Texas Law Review 43:319-331.
- Initiated by Vera Institute, NYC
- Examining whether people could be safely released from jail prior to trial *without* bail
- Would they show up for trial?

Manhattan Bail Project: methods

- Restricted to people accused of felonies and misdemeanors (nothing more serious)
- NYU law students and Vera staff members evaluated defendants' records with respect to employment, family, residence, references, current charges, and previous records
- Randomly split *those recommended* into experimental and control groups
- Experimental group: recommended for pretrial release *without* bail
- Control group: released only *with* bail

Manhattan Bail Project: findings

- ✓ Between 1961 and 1964, less than 1% of the experimental group failed to show up for trial
- ✓ This was considerably less than the control group
- ✓ $d_e < d_c$ (negative relationship)
- ✓ Pretrial release without bail reduced default rates

Pygmalion in the Classroom

- ➢ Robert Rosenthal and Lenore Jacobson, 1968, Pygmalion in the Classroom: Teacher Expectation and Pupils' Intellectual Development, New York: Holt, Rinehart and Winston.
- ➢ Central idea: others' expectations may change behavior; self fulfilling prophecy?

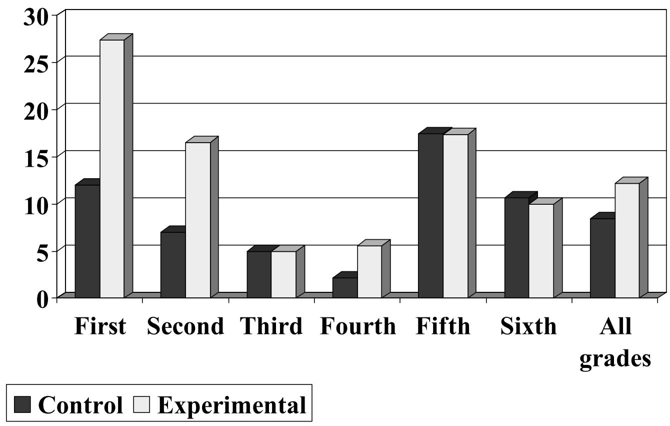
Pygmalion in the Classroom: methods

- Sampled students in public elementary schools in lower class community (Oak School K-5th grades)
- Administered standard tests of intelligence
- Gave results to teachers, identifying 20% as "*intellectual bloomers*"
- ***Reality***: 20% were randomly assigned to experimental group; rest to control group
- End of year: standard tests of intelligence again

Pygmalion in the Classroom: methods

- "Harvard Test of Inflected Acquisition":
- Alias for standardized, relatively nonverbal test of intelligence: Flanagan's Tests of General Ability (TOGA)
- Designed to measure basic learning ability (verbal ability and reasoning)
- Called them "IQ tests"

Pygmalion in the Classroom:
Gains in IQ points, by grade



Use of control group

- Why use control group: "R O_3 O_4"
- Separate effects of independent variable (experimental stimulus) from effect of test itself (e.g., teachers' expectations vs. IQ test)
- Hawthorne test: effect of test itself

Hawthorne Effect

Fritz Roethlisberger and William Dickson, 1939, Management and the Worker, Cambridge, MA: Harvard University Press.

"Hawthorne Effect": why do you need a control group?

- Analysis of working conditions and worker satisfaction in Western Electric Works, Hawthorne, Illinois
- Improved working conditions → improvement in satisfaction and productivity
- Improved working conditions again → yet another increase in satisfaction and productivity
- Is there a relationship?

“Hawthorne Effect”: why do you need a control group?

- To substantiate their claims, they dimmed the lights
- Whoops! → satisfaction and productivity improved again!
- Workers responding to study, not improved working conditions
- Attention to them → increased satisfaction and productivity

Internal validity: problems in experiments

Did the independent variable really *cause* the dependent variable?

Internal validity:
12 problems leading to internal invalidity

1) history
2) maturation
3) testing and retesting
4) instrumentation
5) statistical regression
6) selection biases
7) experimental mortality
8) causal time order
9) diffusion or imitation of treatments
10) compensation
11) compensatory rivalry
12) demoralization

Internal validity

- Classic experimental design: guards against history, maturation, testing, instrumentation, statistical regression, selection bias, experimental mortality
- Rest (8-12) handled through careful administration of design (keep 2 groups separate)

External validity: problems in experiments

- ***External validity***: can the results be generalized beyond experiment?
- Question: how representative is sample?
- Question: does the artificial nature of the experiment affect generalizability?

Solomon 4-Group Design

- Classic experimental design is weak on external validity (generalizability)
- Handle via Solomon 4-Group Design
- Described as useful for:

1) Addressing generalizability
2) Addressing external validity
3) Addressing the effects of the pretest

Solomon 4-group design

Solomon 4-group design		Time →		
		Pretest		Posttest
Experimental group I	R	O_1	X	O_2
Control group I	R	O_3		O_4
Experimental group II	R		X	O_5
Control group II	R			O_6

Solomon 4-group design

- Does the pretest have an independent effect?
- Does pretest sensitize people so that posttest gives different response, over and above the effect of experimental stimulus?

Decisions:

To judge effect of pretesting, compare:

- ✓ O_2-O_5 (experimental group with and without pretest)
- ✓ O_4-O_6 (control group with and without pretest)

Solomon 4-group design: conclusion

We can generalize beyond the experiment: we're confident that the movie did indeed increase stress levels

Solomon 4-group design:
Example

Michael Robinson, 1976, "Public Affairs Television and the Growth of Political Malaise: The Case of the Selling of the Pentagon." American Political Science Review 70:409-432.

Michael Robinson:
"The Selling of the Pentagon"

- Up to 1960's, political scientists believed television and mass media had little effect on attitudes and behaviors
- With the growth of TV journalism, shift in attitude: TV could have major impact on beliefs
- ***Hypothesis***: TV fosters cynicism and feelings of helplessness

“The Selling of the Pentagon”: Methods

- Applied the Solomon 4-group design
- Tested impact of a CBS documentary, “The Selling of the Pentagon”
- Opinions about the behavior and credibility of social and public institutions, public officials, private citizens, and news organizations via public opinion questionnaires
- Pretest to two experimental groups: November, 1971
- Posttest to all four groups: December, 1971

“The Selling of the Pentagon” Conclusions

✓CBS documentary changed people’s beliefs about the behavior of the American military

✓Program reduced support for the military

✓Program increased belief in governmental misconduct

Pre-experimental designs: natural settings

1) One-shot case study: X O_1
2) Pretest-posttest design: O_1 X O_2
   [Before-and after design]
2) Posttest-comparison group design [ex post facto control group design]:

$$\begin{array}{cc} X & O_e \\ \hline & O_c \end{array}$$

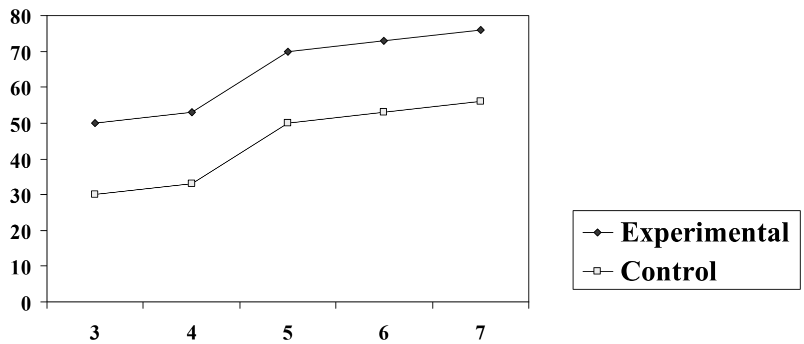
Quasi-experimental designs (n=3)

- No lab setting possible
- No possibility of randomizing into experimental and control groups
- *Purpose*: to enhance causal inference by strengthening internal and external validity

Contrasted groups design

(Chambliss & Schutt: nonequivalent control groups)

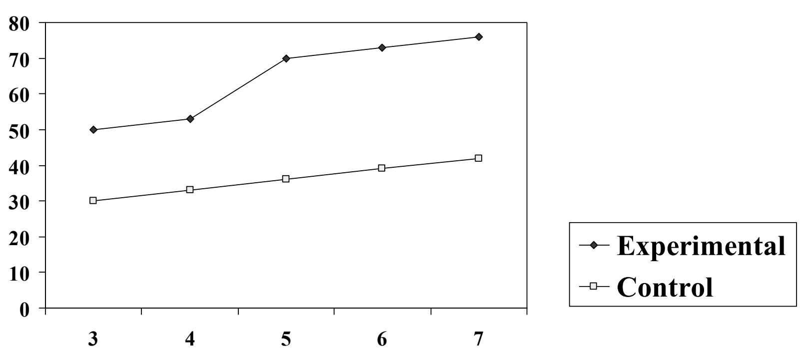
Figure A: Reading scores by grade



Contrasted groups design

(Chambliss & Schutt: nonequivalent control groups)

Figure B: Reading scores by grade



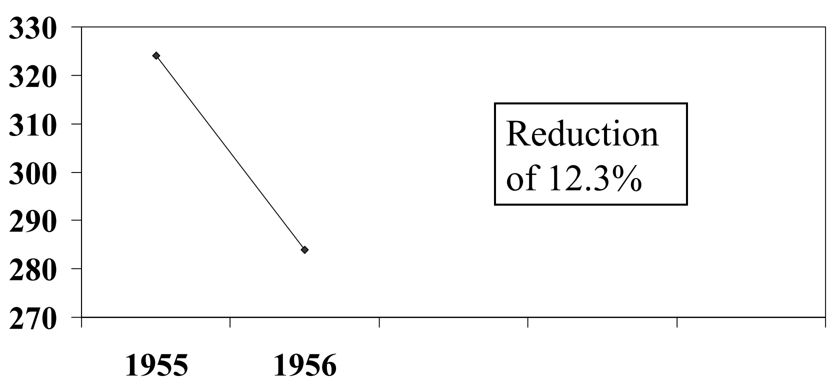
Time-series design

O1 O2 O3 X O4 O5 O6

- ➢Multiple observations over time
- ➢Example: Connecticut crackdown on speeding (1955)

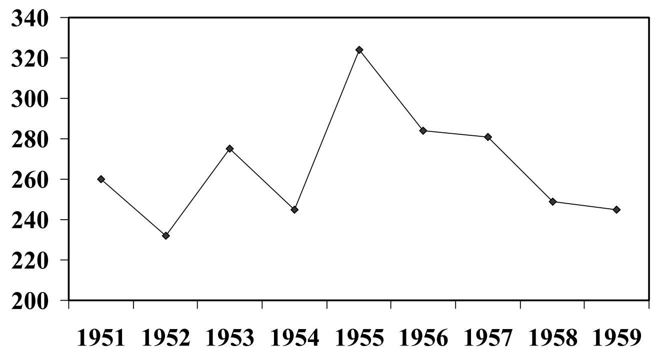
Time-series design

Figure A: # of fatalities, CT., 1955-56



Time-series design

Figure B: Number of fatalities, CT., 1951-59



Control-series design

Fatality Rates, 1951-59