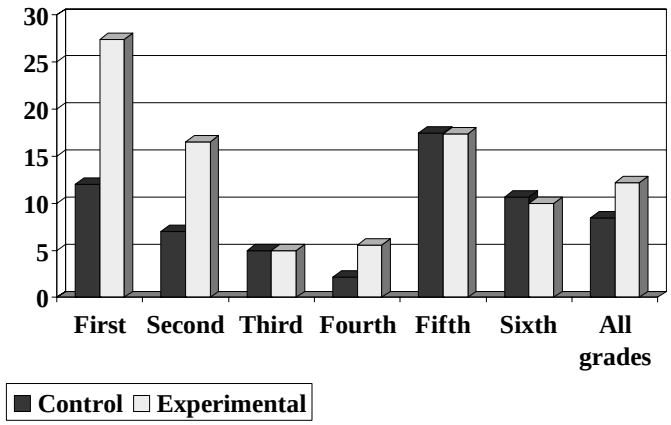
Classic experimental design

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

Example: food aversion therapy

Classic experimental design		Time →			
		Pretest		Posttest	
Experimental group	R	$O_1=0$	X	$O_2=10$	$O_2-O_1=10$
Control group	R	$O_3=0$		$O_4=30$	$O_4-O_3=30$

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



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

Solomon 4-group design
(hypothetical)

Solomon 4-group design		Time →		
		Pretest		Posttest
Experimental group I	R	O_1=3	X	O_2=10
Control group I	R	O_3=3		O_4=5
Experimental group II	R		X	O_5=8
Control group II	R			O_6=3

Effect of pretest

- O_2-O_5 = 10-8=2
- O_4-O_6 = 5-3=2

Effect of horror movie

- O_2-O_1 = 10-3=7
  (includes 2 for pretest)
- O_2-O_4 = 10-5=5
- O_5-O_3 = 8-3=5
- O_5-O_6 = 8-3=5

(strengthens conclusion that X → Y)

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]:

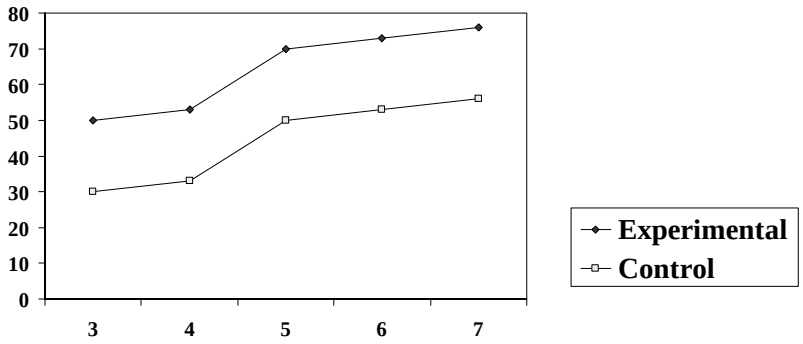
X O_e

O_c

Contrasted groups design

(Chambliss & Schutt: nonequivalent control groups)

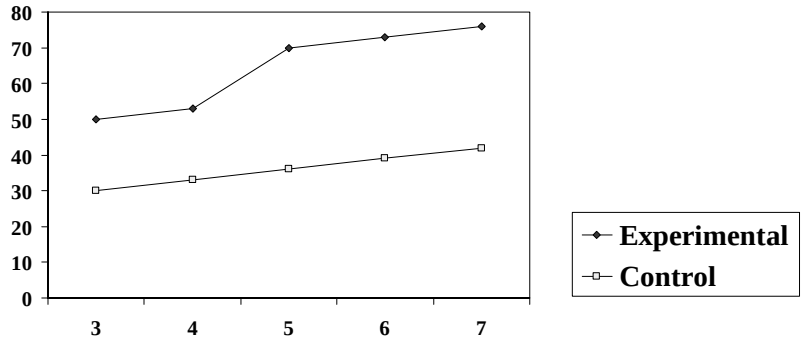
Figure A: Reading scores by grade



Contrasted groups design

(Chambliss & Schutt: nonequivalent control groups)

Figure B: Reading scores by grade



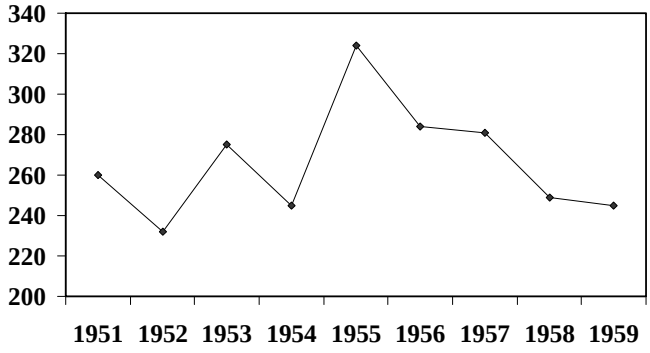
Time-series design

O1 O2 O3 X O4 O5 O6

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

Time-series design

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



Control-series design