

## Specialized Designs

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PSY 6217 – Research Design




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## Mixed Designs

- ☞ Split-plot designs
- ☞ Subjects & repeated trials treated as factors
- ☞ Design below would be described as a 2 x 5 mixed design (note: subjects are nested in this example)

	Massed Practice						Distributed Practice				
	Time1	Time2	Time3	Time4	Time5		Time1	Time2	Time3	Time4	Time5
S1	score1	score2	score3	score4	score5	S6	score1	score2	score3	score4	score5
S2	score1	score2	score3	score4	score5	S7	score1	score2	score3	score4	score5
S3	score1	score2	score3	score4	score5	S8	score1	score2	score3	score4	score5
S4	score1	score2	score3	score4	score5	S9	score1	score2	score3	score4	score5
S5	score1	score2	score3	score4	score5	S10	score1	score2	score3	score4	score5

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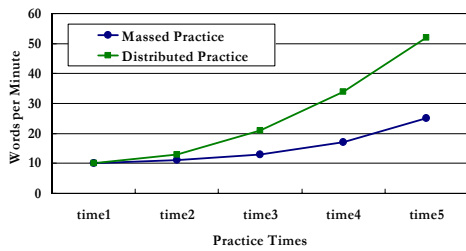
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## Hypothetical Results: Effects of Massed & Distributed Practice on Typing Speed




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### Nested Designs

Ratings of men & women of different racial identities with repeated measures for each sex x race combinations (pictures nested)

	Men						Women							
	Black		Asian		White		Black		Asian		White			
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12		
S1														
S2														
S3														
S4														
S5														

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### Nested Design

Serial Position Effects for Recall of Abstract and Concrete Words

	Abstract Words										Concrete Words											
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10		
S1																						
S2																						
S3																						
S4																						
S5																						
S6																						

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### Factorial Designs with a Covariate

- ☞ Alternative to matching
- ☞ Individual scores on the dependent measure are adjusted based on the covariate
- ☞ Statistical correction for individual differences related to the covariate based on regression
- ☞  $Y = b_0 + b_1 * X$ 
  - ◆  $b_0$  is a constant
  - ◆  $b_1$  is a weighting function based on the covariate
  - ◆  $X$  is the value of the dependent measure
  - ◆  $Y$  is the adjusted score for the dependent measure

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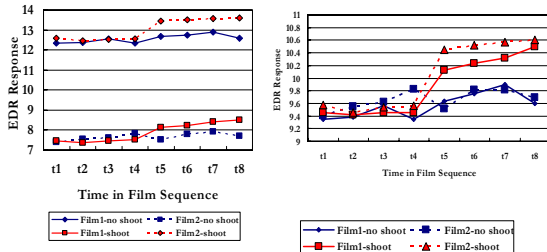
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### Comparison of Analysis with and without a covariate




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### Quasi-Experimental Manipulations in a Factorial Design

- ∞ Some Factors may be correlational (quasi-experimental or ex post facto) in nature
  - ◆ Age
  - ◆ Demographic factors (sex, race, etc.)
  - ◆ Personality variables, diagnoses, etc.
- ∞ Other Factors may be true experimental manipulations
- ∞ Data analysis is carried out as if all of the factors were experimental manipulations

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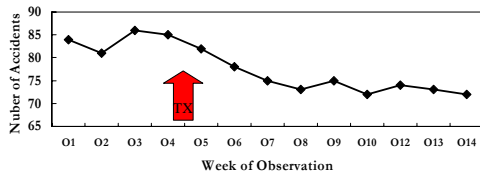
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### Time Series Designs

∞ Multiple Observations over time before & after Treatment

O1 O2 O3 O4 TX O5 O6 O7 O8




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## Equivalent Time Series Designs

- ☞ Multiple Observations made before and after treatment
- ☞ Treatment is administered and withdrawn
- ☞ Useful design to observe and document treatment effects that may be short-lived

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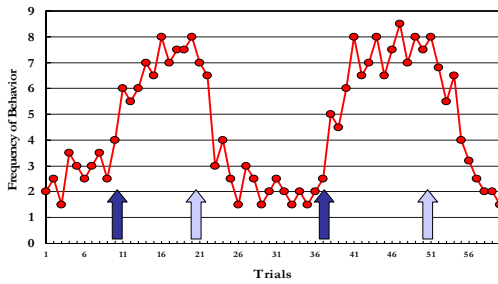
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### Multiple Baseline Design with Delivery & Withdrawal of Treatment within subject

Dark arrows show onset of Tx; Light arrows show removal of Tx




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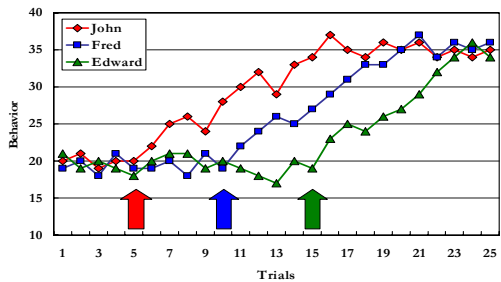
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### Multiple Treatment Design: Treatment applied to John at Trial 5, Fred at Trial 10, and Edward at Trial 15




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### Non-Equivalent Control Group Designs

⌘ Time series design for a treatment group compared to a non-equivalent no-treatment group (control)

O1 O2 O3 O4 TX O5 O6 O7 O8

O1 O2 O3 O4 O5 O6 O7 O8

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### Pretest-Post Test Designs

⌘ Mixed Design

⌘ Pretest – post-test is a repeated measure

Group 1 pretest Treatment posttest

Group 2 pretest posttest

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### Pre-test – Posttest Designs

⌘ Pretest-posttest comparisons can be combined with other variables in a factorial design

	Factor A	Factor B	
Pretest	Male Presenter	Positive Message	Posttest
Pretest	Male Presenter	Negative Message	Posttest
Pretest	Female Presenter	Positive Message	Posttest
Pretest	Female Presenter	Negative Message	Posttest

Pretest and Posttest measure attitude about topic of the message delivered (hypothesis about persuasion)

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### Solomon Four-Group Design

☞ Explicitly evaluated the effect of a pretest on responsiveness to treatment

G1	Pretest	Treatment	Posttest
G2	Pretest		Posttest
G3		Treatment	Posttest
G4			Posttest

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### Developmental Designs

- ☞ Cross-Sectional Designs
- ☞ Longitudinal Designs
- ☞ Cohort-Sequential Designs

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### Cross-Sectional Design

- ☞ All observations made at one point in time
- ☞ Between-subjects design
- ☞ Select participants to represent different age groups
- ☞ Advantages
  - ♦ Efficient, short duration
- ☞ Disadvantages
  - ♦ Generation effects confounded with the effect of age (cohort effects)

Observations at Time 1	
Group	Age
1	10
2	15
3	25
4	25

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### Longitudinal Design

- ☞ Repeated measures design
- ☞ Select one sample of individuals
- ☞ Observe Individuals at multiple points in time

	Time 1	Time 2	Time 3	Time 4
Age	10	15	20	25

- ☞ Threats to validity
  - ◆ Multiple observation effects (test reactivity, practice)
  - ◆ Mortality (attrition)
  - ◆ History
  - ◆ Generation may limit generalizability to this cohort

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### Cohort-Sequential Design

- ☞ Combines cross-sectional and longitudinal designs (mixed design)
- ☞ Multiple observations over time
- ☞ Cross-section of ages obtained at each point in time
- ☞ Can begin with a single sample and add cohorts with each observation period
- ☞ Can begin with a full cross-section and follow cohorts longitudinally

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### Cohort-Sequential Design

Year at Time a New Cohort of 18-year-olds is Added					
2004	2005	2006	2007	2008	2009
18	19	20	21	22	23
	18	19	20	21	22
		18	19	20	21
			18	19	20
				18	19

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### Cohort Sequential Design with a New Sample Added at Each Observation Time

	Age at Time of Observation				
	1 mo	2 mo	4 mo	6 mo	12 mo
Cohort 1	Event A	Test memory for event at 1 mo	Test memory for events at 2 mo	Test memory for events at 4 mo	Test memory for events at 6 mo
Cohort 2		Test memory for event at 1 mo	Test memory for events at 2 mo	Test memory for events at 4 mo	Test memory for events at 6 mo
Cohort 3			Test memory for events at 2 mo	Test memory for events at 4 mo	Test memory for events at 6 mo
Cohort 4				Test memory for events at 4 mo	Test memory for events at 6 mo
Cohort 5					Test memory for events at 6 mo

(Adapted from P. Bauer)

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### Cohort-Sequential Design

	Year a New Cross-Section is Added to the Design					
	2004	2005	2006	2007	2008	2009
Cohort 1	18	19	20	21	22	23
Cohort 2	19	20	21	22	23	24
Cohort 3	20	21	22	23	24	25
Cohort 4	21	22	23	24	25	26
Cohort 5	22	23	24	25	26	27

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