PSY 3393
Experimental Projects
Spring 2008
Dr. Peter Assmann

The course syllabus, project descriptions, class notes and additional course materials will be available at the following web address:
http://www.utdallas.edu/~assmann/PSY3393/

Course prerequisite:
Research Design and Analysis
PSY 3392 or PSY 3490

Required text:

McDermott library reserve books
Spring semester, 2007

Course goals

- *Experimental Projects* is the third in the sequence of quantitative methods courses in Psychology.
- Provides hands-on experience in the design and conduct of research in experimental psychology.
- Fulfills the Advanced Writing requirement.
- Participation in all stages of research, including (1) the formulation of research hypotheses, (2) review and interpretation of literature, (3) choice of research design and variables, (4) data collection and statistical analysis, and (5) presentation of results in written reports.

Course requirements

- **Quiz, homework, class participation (20%)**
  - In each class we will have a homework assignment, group project, or a brief quiz based on material covered in the previous class.
- **Project 1 (30%)**
- **Project 2 (40%)**
  - Late assignments (homework or projects) will be penalized 5% per day.
- **Oral presentations (10%)**

Important Deadlines

- **Jan 22:** Submit draft of Intro section for Project 1
- **Jan 31:** Submit draft of Methods section
- **Feb 19:** Project 1 due
- **Feb 26:** Oral presentations of Project 2 topic
- **Feb 28:** Oral presentations of Project 2 topic
- **Mar 20:** Submit draft of Intro section for Project 2
- **Apr 3:** Submit draft of Methods section
- **Apr 22/24:** PowerPoint oral presentations *
- **Apr 24:** Project 2 due

Attendance. Class attendance is mandatory and will count toward the participation grade. If circumstances lead to missed classes please see us to discuss the situation.

Turnitin.com

- A printed copy of each project must be turned in and an electronic version must be submitted to turnitin.com (a plagiarism detection service) by the dates assigned.
- Details for online submission of the papers will be provided in class and posted on the class web page.
Grading Scheme

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>96</td>
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<tr>
<td>A</td>
<td>93</td>
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<td>A-</td>
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<td>&lt;50</td>
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</tbody>
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Computer Labs

- **An active computer account is needed.**
- No computer experience is assumed; you will learn how to carry out statistical analyses using the SAS program and Excel.
- Computer labs will be held in several classes (TBA) to run statistical analyses for projects.

Measurement and Variables

**What is measurement?**
- *Measurement is the assignment of numbers to a physical or psychological dimension according to a set of well-defined rules (e.g. real number system)*

**Measurement and Variables**

**What is a variable?**
- *A variable is a mathematical construct that can take on more than one value (e.g. Celsius scale of temperature) according to well-defined rules of assignment.*

**What is a constant?**
- *A constant takes on a single value (e.g. \( \pi = 3.14 \)).*

Scales of Measurement

- **Nominal** – defines members of a category
- **Ordinal** – rank orders items along a scale
- **Interval** – equal intervals between points
- **Ratio** – equal intervals and a true zero point

Nominal Scale

- **Operations:** equal / not equal
- **Objective:** sort into categories
- **Examples:** zip codes, gender
### Ordinal Scale
- **Operations:** greater than / less than
- **Objective:** rank order on one dimension
- **Examples:** top ten hits; sports rankings

### Interval Scale
- **Operations:** add/subtract
- **Objective:** compare magnitudes but not form ratios (no true zero)
- **Examples:** verbal aptitude score; temperature in °F

### Ratio Scale
- **Operations:** add/multiply/subtract/divide
- **Objective:** specify distances between stimuli on a single dimension and express ratios of scale values
- **Examples:** weight in pounds; reaction time in sec; number of items correct on a memory test

### Research Methods
- **Descriptive** – exploratory study of the determinants of aggression in children
- **Correlational** – population study of the determinants of hearing loss
- **Quasi-experimental** – laboratory study of gender differences in spatial tasks
- **Experimental** – laboratory study of the effects of practice on memory recall

### Operational definitions
- Definition of a variable in terms of the operations used to measure it, e.g. anxiety level as defined by a set of physiological measures of stress.

### Variables in experimental research
- **Dependent variable** – behavioral outcome measure
- **Independent variables** – factor or variable *selected or manipulated* by the experimenter in order to observe its effects on behavior
Independent Variables

- **Selected variables** – participants chosen based on pre-existing characteristics (*quasi-experiments*)
- **Manipulated variables** – participants randomly assigned to conditions (*true experiments*)

Variables in experimental research

- **Control variables** – factors held constant because leaving them free to vary may interfere with the effects of the independent variable (*confounds*).

Experimental designs

- **Between-subjects design**: different groups of subjects are randomly assigned to the levels of the independent variable
- **Within-subjects design**: each subject is exposed to every level of the independent variable

Error variance

- Variability in scores due to factors *other than* the independent variable (background noise, extraneous uncontrolled factors)
  - Subject differences
  - Differences in testing conditions
  - Ineffectiveness of the independent variable
  - Lack of sensitivity of the dependent variable
  - Small sample size

Statistical Decisions

<table>
<thead>
<tr>
<th>Decision</th>
<th>H₀ is true</th>
<th>H₁ is false</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reject H₀</td>
<td>Type I error ( p = \alpha )</td>
<td>Correct decision ( p = 1 - \beta ) (power)</td>
</tr>
<tr>
<td>Do not reject H₀</td>
<td>Correct decision ( p = 1 - \alpha )</td>
<td>Type II error ( p = \beta )</td>
</tr>
</tbody>
</table>

H₀: null hypothesis (no significant effect)  
H₁: alternate (research) hypothesis (significant effect)
Replication

• Repeating an experiment using the same method and procedures, but with different participants, should produce same statistical outcome.
  – Possibility of type I error
  – Effect of sample size

Project 1 assignment

Stroop effect

• Collect data from about five subjects, apply the appropriate statistical analysis & write your report in APA format.

Stroop effect

  http://psychclassics.yorku.ca/Stroop/

Grading scheme

• Content 60% (accuracy of data interpretation, appropriateness of methods)
• Writing style 30% (how well findings are communicated)
• Format 10% (grammatical errors, spelling mistakes can cost up to 10% of grade)

Writing research reports

(1) select a research topic or question to be answered
(2) develop a hypothesis and a research design to test your hypothesis
(3) collect data and analyze it
(4) report research results

Sections of an APA paper

1. Title
2. Abstract
3. Introduction
4. Method
5. Results
6. Discussion
7. References