Lecture 3 - Research Aims
## Comparison of Research Paradigms

<table>
<thead>
<tr>
<th></th>
<th>Scientific</th>
<th>Naturalistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Tech</td>
<td>Quantitative</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Quality criterion</td>
<td>Rigor</td>
<td>Relevance</td>
</tr>
<tr>
<td>Theory source</td>
<td>A priori</td>
<td>Grounded</td>
</tr>
<tr>
<td>Causality</td>
<td>Can x cause y</td>
<td>Does x cause y in nature</td>
</tr>
<tr>
<td>Knowledge type</td>
<td>Propositional</td>
<td>Propositional and tacit</td>
</tr>
<tr>
<td>Stance</td>
<td>Reductionist</td>
<td>Expansionist</td>
</tr>
<tr>
<td>Purpose</td>
<td>Verification</td>
<td>Discovery</td>
</tr>
</tbody>
</table>

**Audience**
## Comparison of Research Paradigms

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Specification</th>
<th>Design Style</th>
<th>Setting</th>
<th>Treatment</th>
<th>Analytic Units</th>
<th>Contextual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical device</td>
<td>Before inquiry</td>
<td>Preordinate</td>
<td>Intervention</td>
<td>Laboratory</td>
<td>Stable Variables</td>
<td>Control</td>
</tr>
<tr>
<td>Inquirer</td>
<td>During/after</td>
<td>Emergent</td>
<td>Selection</td>
<td>Nature</td>
<td>Variable Patterns</td>
<td>Invi'dint'ference</td>
</tr>
</tbody>
</table>
You may know enough to tell a reliable story

You really know nothing unless at every point you know the causes

What is causation?
Causation

* Hume: It is illusionary that cause is a compelling push that produces an effect

* Agreement: Where there is cause there is regularity
Causation

* Easily stated:
  Manager's behavior caused John to resign

* Adding precision:
  Maybe behavior a pretext
  Maybe provoked
  Maybe spouses fault

* Naturalistic
  Don't uncover the cause, just conditions
Causation - Naturalistic

Not what can be made to happen, but what does happen

* in vitro
* in sito
Causation - Scientific

Specific hypothesis formulated about a parameter of the population

A random sample is drawn from the population of observations and value of sample taken

Characteristics of distribution of statistic are examined for outcomes

Hypothesis is accepted if outcome is in line with expected outcomes, else rejected
Hypothesis

* Around a single mean: The test results will be 30

* Around two means: Measure some characteristic under two different conditions
  Measures on the same variable under two conditions

* Null Hypothesis:
  Mean of group x - mean of group y = 0
Alternative 2: Mean Hypothesis

* Looking for improvement? alternative hypothesis: 
  mean of group x > mean of group y

* Looking for improvement or impairment? alternative hypothesis: 
  mean of group x <> mean of group y
Hypothesis

* After 6 weeks or basic training, recruits should earn 30 points on Wind and Muscle test
  Null Hypothesis: The mean score will be 30

* Take sample of population, get their test score

* If significantly different from the expected mean, reject the hypothesis
  Expect means to circle around 30

* Usual practice is to reject the hypothesis if it is so deviant that its probability is .05 or less
Hypothesis

*Null hypothesis: to be subjected to the test
A statement of the population parameter
Usually point value, not range
* Alternative hypothesis
Condition contrary to null hypothesis
Hypothesis

* Statistically significant
* Not statistically significant
* Significant at the 5% level
Hypothesis Testing

- Null False
  - Accept Null H
    - * Type II Error
  - Reject Null H
    - * Correct decision
- Null True
  - * Correct decision
  - * Type I Error
Hypothesis

* Nondirectional and directional alternative Hypothesis

* Null Hypothesis: Mean would equal 30

* Alternative hypothesis: Mean would not = 30

* Non-directional: Reject the null hypothesis if
  * mean less than 30
  * mean greater than 30
Hypothesis

* Directional alternative Hypothesis

* Null Hypothesis: Mean would $\geq 30$

* Alternative hypothesis: Mean would not $< 30$

* Directional: Reject the null hypothesis if mean less than 30
Formulating Hypothesis

* Use of icons vs text:
  There will be no difference between text and icons in time taken to complete task
  (Alternative: iconic is more/less time)
  There will be no difference between text and icons in rate of error
  (Alternative: Iconic will have fewer errors)
What's Next

* Read an article (in a group)
* Identify the nature of the evaluation: Qualitative or quantitative
* Identify the null hypothesis and alternative
# Media Views

## Presentation

<table>
<thead>
<tr>
<th>Media</th>
<th>Declarative</th>
<th>Stylized</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Free Text</td>
<td>Outline</td>
<td>Shapes</td>
</tr>
<tr>
<td></td>
<td>Sentence,</td>
<td>Bold,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Italics</td>
<td></td>
</tr>
<tr>
<td>Sound</td>
<td>Speech</td>
<td>Intensity</td>
<td>Sound Effects</td>
</tr>
<tr>
<td></td>
<td>Dialogue</td>
<td></td>
<td>Earcons</td>
</tr>
<tr>
<td>Graphics</td>
<td>Rendering</td>
<td></td>
<td>Blueprints, Icons</td>
</tr>
<tr>
<td></td>
<td>Photos, Scans</td>
<td></td>
<td>Schmatics</td>
</tr>
<tr>
<td>Motion</td>
<td>Film Footage</td>
<td>Animation</td>
<td>Animated Movies</td>
</tr>
<tr>
<td></td>
<td>Time Elapsed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Media Views

While using technology

After using Technology

Media as elaboration

Media as essential
Possible Questions

so a question might be in square one:
sound improves the ability to use a hypermedia program

square two
using sound in the kiosk benefits retention

square three
?

square four
redundant representations improve learning