Lecture 10: Response and Conditions

Three Decisions
*Chapter 4 looks at the Three Decision discussed earlier in more detail.

What is the response?
*This seems like an easy question but can be very important to get it right.

Diet Experiment
*In the diet experiment the blood pressure after 3 months was used.
*A better response might be the change in blood pressure from before the diet until after 3 months.

Response Scales
*Nominal – named categories
*Ordinal – ordered categories
*Interval – distance between values is meaningful
*Ratio – there is a natural zero

Response Scales
*It is not that important to remember the names but to realize that how we analyze the response can depend on the scale.
Example

When is it appropriate to compute sample means and run an analysis of variance on data?

Example

Response: Favorite color
1 = blue, 2 = brown, 3 = red, 4 = green

Calculating a mean makes no sense because the numbers are really a nominal scale, numbers replacing names.

Context 1

Response: Rating scale
1 = very unfavorable
2 = unfavorable
3 = favorable
4 = very favorable

Context 2
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Context 2

* The response is an ordered category scale.
* 4 is more favorable than 3.
* 3 is more favorable than 2.

Context 2

* Means and ANOVA are not appropriate because the distance between categories is not the same.

Context 2

* Perhaps if it were a 5-point scale with a neither favorable nor unfavorable being a 3, means might make some sense.

Context 3

* Response: Temperature C
* This is an interval scale because 4 is 1C warmer than 3 and 3 is 1C warmer than 2.

Context 3

* Calculating means and performing the analysis of variance makes sense.

Context 4

* Response: Weight g
* This is a ratio scale because there is a natural zero.
* 4 g is twice as heavy as 2 g.
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Context 4

*Calculating means and performing an analysis of variance makes sense.

Comment

*For our purposes, as long as the response is numerical (interval or ratio) calculating means and performing an analysis of variance makes sense.

Conditions?

*When deciding on the conditions you want to isolate the effects of interest.

Example

*The text discusses an experiment using mammary ligation to reduce pain for angina patients.

Another Example

*Gastric freezing for the relief of pain from stomach ulcers.

Gastric Freezing

*A patient with stomach ulcers is sedated, a tube with a balloon on the end is inserted down the throat into the stomach, a very cold liquid fills the balloon, the liquid and balloon are removed.
The very cold liquid is thought to cauterize the ulcers thus giving relief to pain.

Most reports of the use of gastric freezing did not include a placebo, control group.

A patient with ulcers is sedated, a tube with a balloon on the end is inserted down the throat into the stomach, a body temperature liquid fills the balloon, the liquid and balloon are removed.

Patients exposed to gastric freezing reported a reduction in pain.

Patients exposed to the placebo reported a reduction in pain.

There was no statistically significant difference in the average reduction in pain between the two treatments.

The sedation, or patients recognizing they were being treated and so should feel better, could be having an effect on pain and were not isolated from the gastric freezing.