Observational Studies – Week #4

Dr. Michelle Edwards

November 14, 2018

Putting it all Together and Analyzing our Data

Research Question: Experimental Study

Are penguins exposed to a fluorescent coloured ball more active than those exposed to a black coloured ball?

Are penguins exposed to a fluorescent coloured ball more active than those exposed to a black coloured ball?

1. **Exposed** - what exactly does this means?

2. **More active -**

1. Clarify – each penguin will be given a ball (either fluorescent or black) for 30 mins.
2. More – comparing the penguins with the fluorescent ball to the penguins with the black ball

Are penguins exposed to a fluorescent coloured ball more active than those exposed to a black coloured ball?

3. **More active -**

3. Active??
   - **Waddle** – walk more then 2 feet in distance
   - **Dives** into the pool
   - **Touches** the ball
   - The number of times each of these behaviours occurs will be recorded

How will we record measures?

- Continuous recording
  - Check off the number of times each behaviour has occurred in a 5 minute interval for a total of 30 minutes
- Recording medium
  - Checksheet

Sample Checksheet

Observer:				**Date:**		
PenguinID:						
Ball Colour:						
Behaviour	0900	0905	0910	0915	0920	0925
Waddle more than 2'						
Dives into pool						
Touches the ball						

Data Collection……

- Review Excel input
- Clean data for Data Analysis
- Codes for data

Data Types

- Categorical
  - Nominal
  - Ordinal
- Continuous
- Qualitative vs Quantitative

Types of Data/Statistical Analyses

- Descriptive Statistics
- Inferential Statistics
- Exploratory Statistics

Descriptive Statistics

- Describing your data
- Means, Standard Deviation, Standard Error, Variation, Median, Mode, Frequencies
- GRAPHS!
- GOAL: To get a feeling for your data – to see what it's doing.

Descriptive Statistics

- Where and how can you do this?
- Excel, SPSS, SAS, R, etc…
- Let's try a few out in Excel as an example….

Descriptive Statistics

- Which statistics you use will ALWAYS depend on the type of data you are working with.
- For example:
  - Calculating the mean of a count?
  - Calculating the mean of a code?
  - Calculating the mean of a categorical variable?
- Remember computer programs will run what you ask them to do!!

Descriptive Statistics

- First thing you should do
- You should always be comfortable with your data

Inferential Statistics

- Statistics that answer hypothesis-type questions
- Statistics that you can make inferences from
- Classic analyses include:
  - T-Test, ANOVA, Regression, etc…

Inferential Statistics

- Always work from your Research Question!

Are penguins exposed to a fluorescent coloured ball more active than those exposed to a black coloured ball?

- What is our hypothesis?

Hypotheses

- Null hypothesis and Alternate hypothesis

  Ho: $\mu_{waddles\text{- }fluorescent} = \mu_{waddles\text{- }black}$

  Ha: $\mu_{waddles\text{- }fluorescent} \neq \mu_{waddles\text{- }black}$

- We had 3 measures, so we would have 3 hypotheses

Statistical Test?

- We are comparing 2 groups – and only 2 groups.

T-test

T-test will test whether the difference between 2 groups = 0

Statistical Test

- What if you have more than 2 groups?
- What statistical test would you conduct?

ANOVA

Statistical Test

- ANOVAs can get more and more involved
- WHY??

- Depends on your experimental design!
  - RCBD – Randomized Complete Block Design

Relationships between measures?

- Is there a relationship between **waddle, dive, ball?**

- Whenever you are looking at relationships

CORRELATION

Relationships between measures?

- Once we see that there is a relationship between 2 measures, we may want to go a step further and determine WHAT that relationship is

REGRESSION

Research Question

- Are penguins exposed to a fluorescent coloured ball more active than those exposed to a black coloured ball?

- Do we need to do CORRELATION or REGRESSION???

Taking it further

- 3 measures of “active”: waddle, dives, ball contacts.
- Create an index - regression???
- ANOVA – Repeated measures ANOVA???

Taking it too far?

- Always come back to your research question!
- Repeated Measures ANOVA as an example – Am I interested in the changes in behaviour during the 30 minutes I observed?
- Just because I have the data – doesn't mean I need to run the further analysis

Exploratory Statistics

- Are used to “explore” trends that may exist in your data
- Often used when you have a LOT of measures and you want to see whether you can either:
  - Reduce the number of measures you are working with
  - Cluster them into groups

Exploratory Statistics

- Principal Component Analysis (PCA)
- Factor Analysis (FA)

- Cluster Analysis

Research Question: Descriptive / Observation Study

- Observe and describe the behaviour of the armadillo housed at a rehabilitation centre.

How will you measure this?

ZSL | LONDON ZOO

Ethogram Template

Research your chosen species and fill out the headings in the form below.
Use a stopwatch and tick the behaviours observed at 30s intervals.

Name(s) of observers	Date	Study Species
Weather	Time	Study Animal (identifying features)
Other relevant information (e.g. no. of visitors, feeding time, keeper presence)		

Time (mins)	Behaviours (Fill in the headings below with appropriate behaviours for your focal species e.g. sleep, eat, play, groom)								Notes (Record anything affecting behaviour)
								Other (describe)	
0:30									
1:00									
1:30									
2:00									
2:30									
3:00									
3:30									
4:00									
4:30									
5:00									

How do you analyze?

- Observing behaviours
- Goal is to learn how and what the armadillos do?

- Descriptive Statistics!

Ethogram - example

- Armadillo ethogram

Statistical Analysis

- Should ALWAYS answer your research question!