Lecture 19: Descriptive Statistics

Wednesday, November 1, 2023

Your Teaching Fellows:

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Lectures: MWF 12:00 PM – 1:00 PM (003); 1:00 PM – 2:00 PM (004); 2:00 PM – 3:00 PM (010)
Office hours: Tuesdays 2:00 PM – 4:00 PM

For the exam

- Bring pencil, pen, eraser, a simple or scientific calculator (no programmable calculator)

Recall…

- Goals of science:
  - To describe behaviour
    - Descriptive statistics
    - Correlation
  - To predict behaviour
    - Regression
  - To determine the cause of behaviour
  - To understand or explain behaviour

Cultural adaptation

- What do we need in order to predict someone's score on an outcome variable?
  - Relationship between two variables
  - Some "point of origin"

Regression

- Extension of correlation:
  - Both measure relationships among variables
  - Neither implies causation
- Important characteristics:
  - Key terms, not just “variable 1” and “variable 2”
    - Use score on one variable (“Predictor”) to predict changes in another variable (“Criterion”)
  - Regression models = a set of theoretically relevant predictors predicting a criterion variable
    - Can look at how 1 or more predictors can uniquely predict variability in criterion, amongst a set of predictors

Cultural adaptation

- Correlation question:
  - Is there a relationship between

r = -.49

Cheung, Chudek, & Heine, 2011

Cultural adaptation

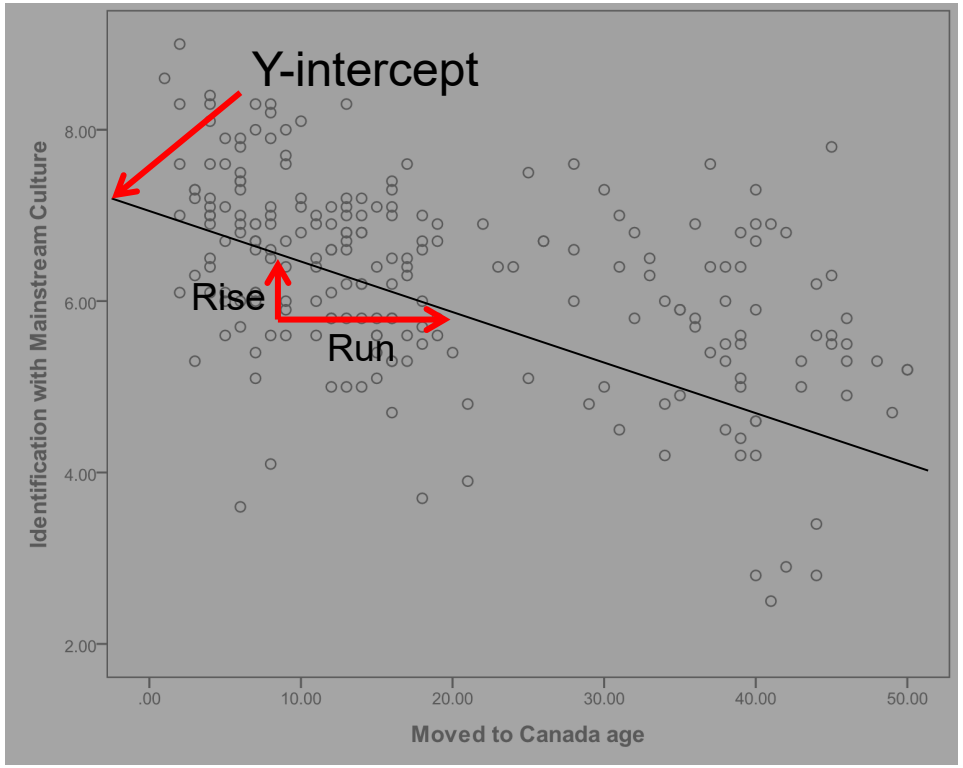
- What do we need in order to predict someone's score on an outcome variable?
  - Relationship between two variables
  - Some "point of origin"

Cultural adaptation

- Regression question:
  - Can we use one's age of immigration to predict current identification with Canadian culture?
  - Regression line:
    - $\hat{Y} = a + bX$
    - b = slope
      - Rise over run
    - a = y-intercept
      - When predictor = 0, what is the value of the criterion?
    - $\hat{Y} = 7.03 - .04X$

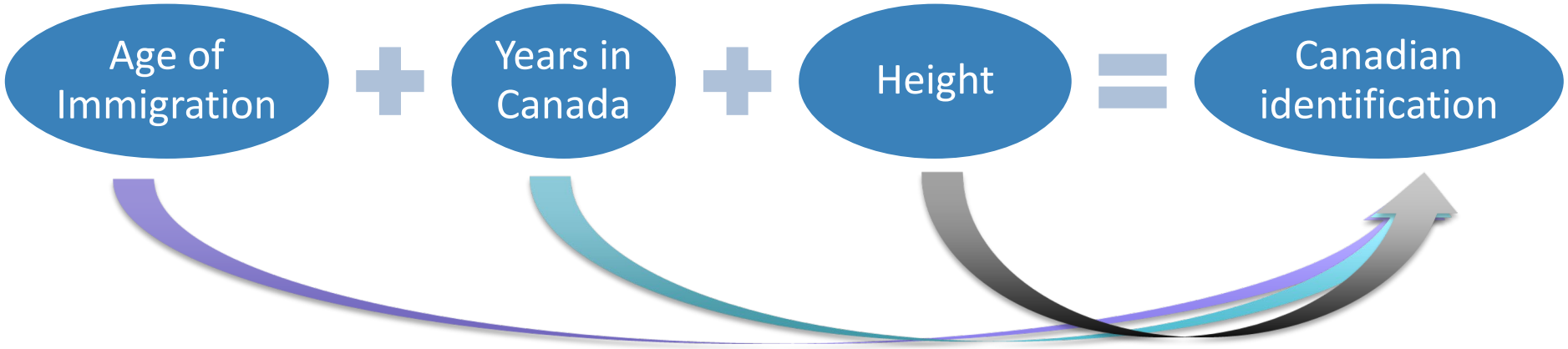
Relationship

"Point of origin"



Cultural adaptation

- Most important benefit of regression:
  - Can investigate role of *multiple predictors* in independently predicting the criterion



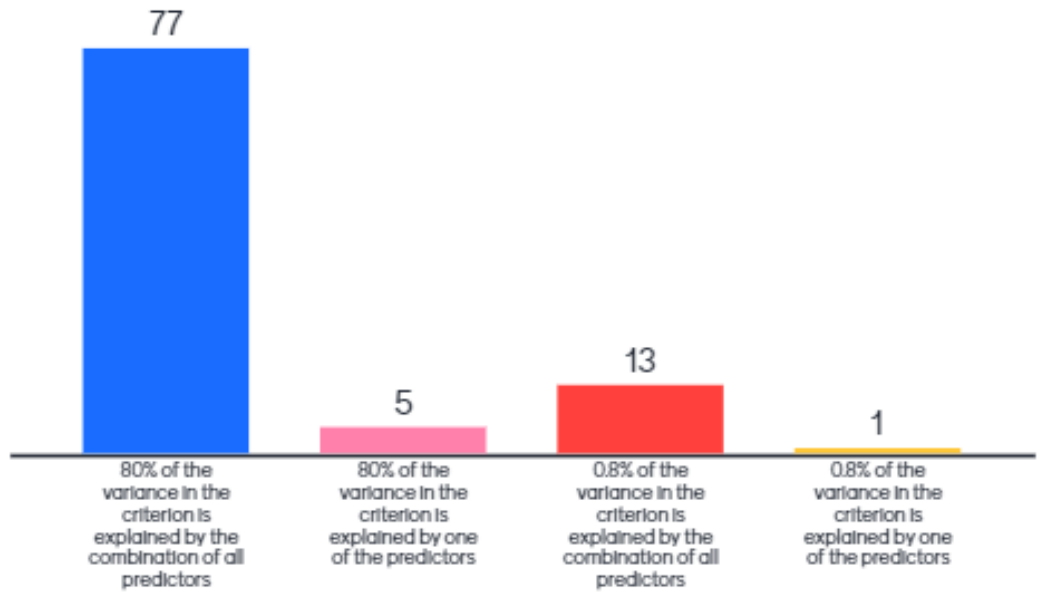
Cultural adaptation

- To examine contribution of each predictor, we use the multiple regression equation
  - $\hat{Y} = a + b_1X_1 + b_2X_2 + b_3X_3$

$$\hat{Y} = 6.90 - .04(\text{age of immigration}) + .01(\text{years in Canada}) + .02(\text{height})$$

- Multiple correlation coefficient (*R*) $R = .49$

The Multiple Correlation (R) indicates the contribution of all predictors combined in predicting the criterion. What does an R^2 of .80 mean?



Cultural adaptation

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- Multiple correlation coefficient (R) $R = .49$

$R^2 = .24$

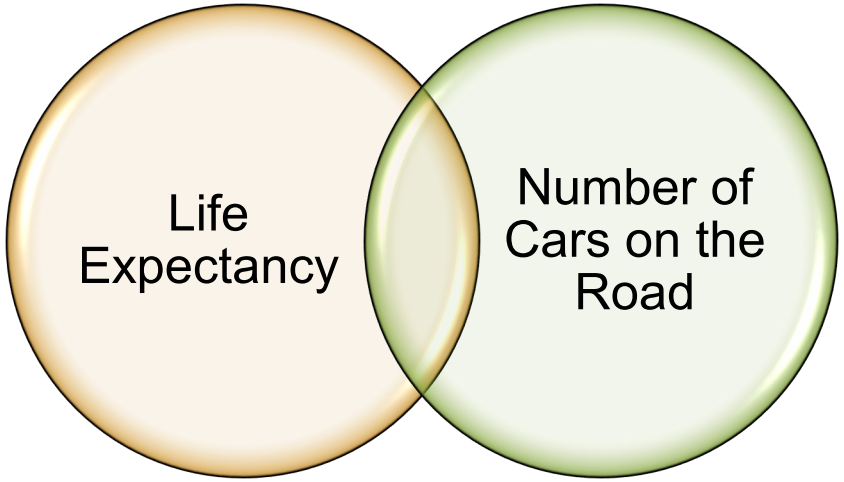
Partial correlation

- 3rd variable problem
  - Some other variable is responsible for the relationship between X & Y

- Identify and statistically control for 3rd variable!

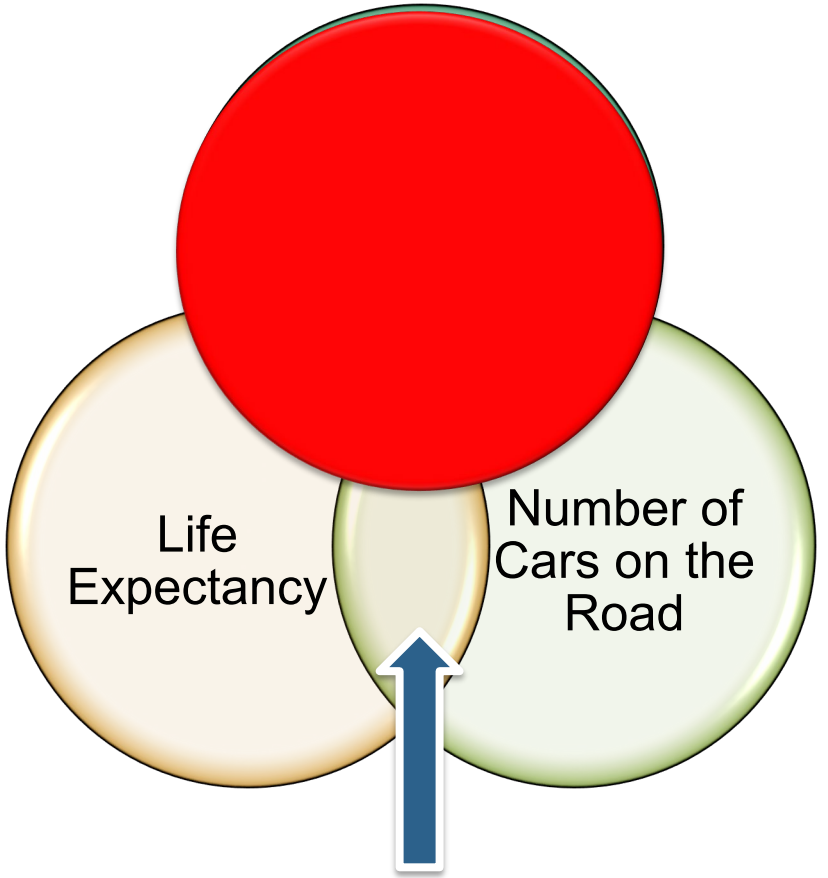
Example of partial correlations

"SOCIETIES IN WHICH PEOPLE LIVE THE LONGEST HAVE THE MOST CARS! CARS IMPROVE LIFE EXPECTANCY! "



TORONTO SUN

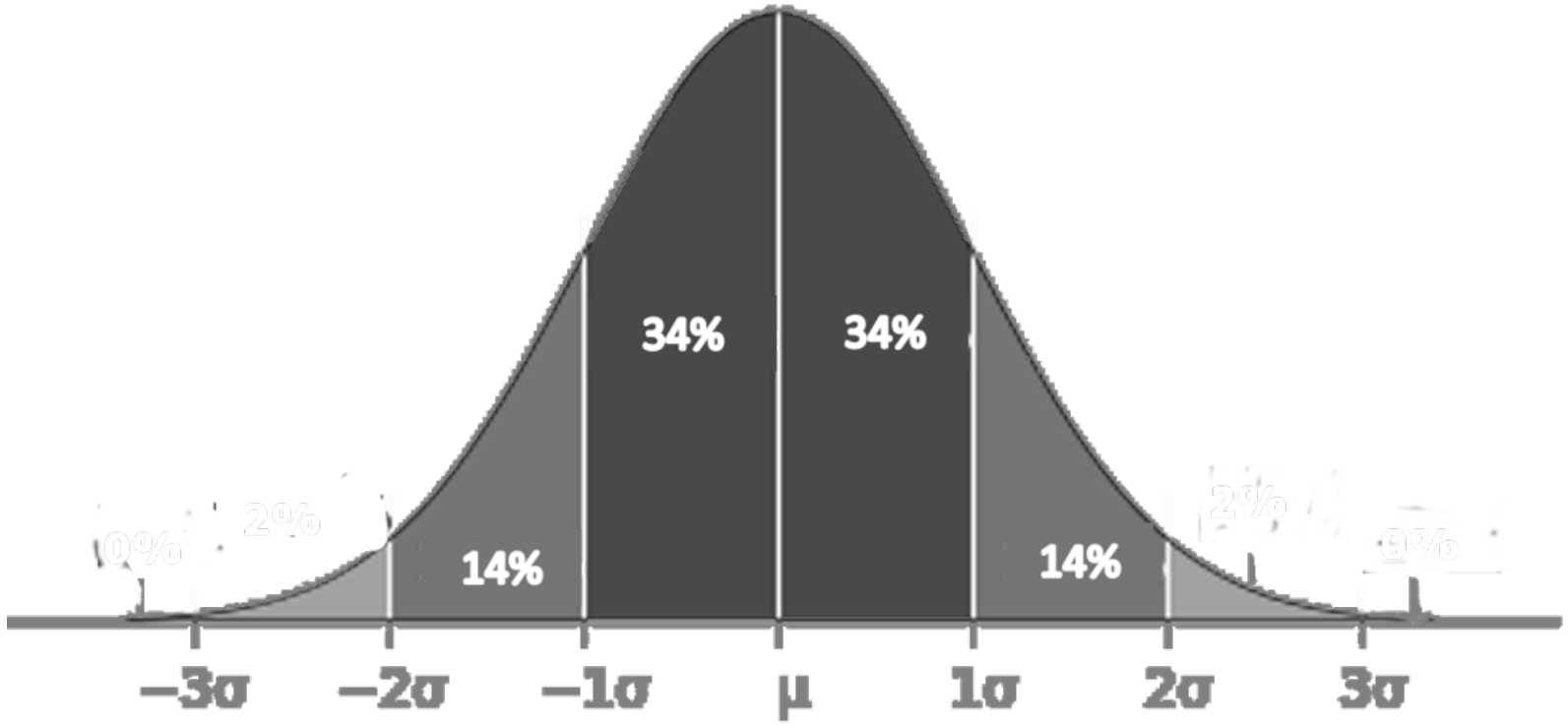
REMOVE THE EFFECTS OF…



Measures of relationship

- Bivariate correlation (r)
  - Standardized index of how much two variables change with each other
- Squared Correlation (r^2)
  - Proportion of variability shared by 2 variables
- Multiple Regression
  - A technique used when we want to test how well one or more predictors individually predict the criterion
- Multiple Correlation (R)
  - A type of correlation coefficient that indexes how much a set of predictors, when combined, is related to the criterion
- Squared Multiple Correlation (R^2)
  - Proportion of variability in criterion accounted for by set of predictors
- Partial Correlation
  - A correlation between X and Y that statistically removes the effect of 3rd variable

Any questions?



Study, ask questions