PSC 202

SYRACUSE UNIVERSITY

INTRODUCTION TO POLITICAL ANALYSIS

EXAM REVIEW, BIVARIATE HYPOTHESIS TESTING PART 3

STUDENT HOURS

- Next Monday: 9-11
- 530 Eggers or Zoom
  - Zoom info on syllabus

ANNOUNCEMENT

- No in-person sections on November 19
  - Friday before Thanksgiving break
  - Instead: Take-home assignment

TODAY

- Exam Review
- Bivariate hypothesis testing

EXAM

- Monday: Exam #2
  - Bring a calculator (no phone etc.)
  - Allowed to bring one single-page letter-size (8.5x11) sheet with you. What you put on it is up to you, but it has to be your own sheet (we'll collect it)
- If you take exam at CDR, please sign up now!

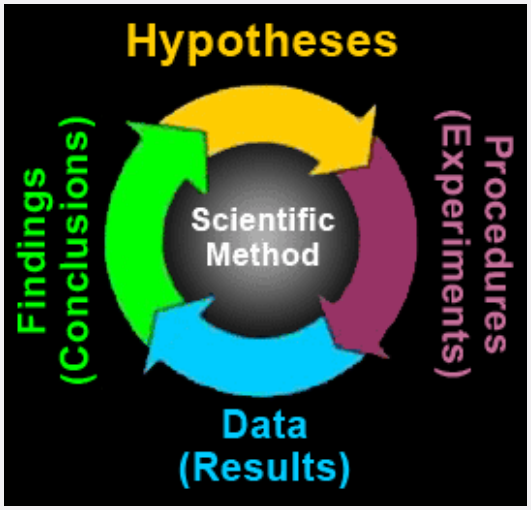
- No new problem set this week
  - Problem set 6 is due on Friday
  - Please type it

EXAM

- Material covered
  - Everything from Sep 29 (More Sampling and Surveys) to Oct 25 (More Bivariate Hypothesis Testing)

RESEARCH PROCESS

- Formulate research question
- Propose explanation/theory, hypotheses
- Data collection process
- Use data to evaluate hypotheses
- Reassess explanation



STUDY GUIDE

- Random sampling error
  - What is the standard error? Where does it come from and how can we compute it?
  - What is a 95% confidence interval? How can we compute it? How do we interpret it?

RECAP

$$\mathrm{SE} = \frac{s}{\sqrt{n}}$$

- SE: Standard error of the sample mean
  - A measure of how much random sampling error we have
- s: sample standard deviation
- n: sample size

RECAP

$$95\%\ \text{CI} = \bar{x} \pm (1.96 \times \text{SE})$$

- We draw a large number of random samples from population
- Do the confidence interval for each
- 95% of those intervals will contain the population mean μ

STUDY GUIDE

- Formulate research question
- Propose explanation/theory, hypotheses
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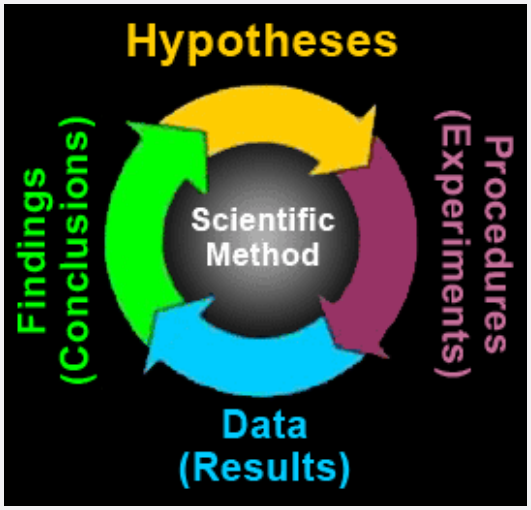
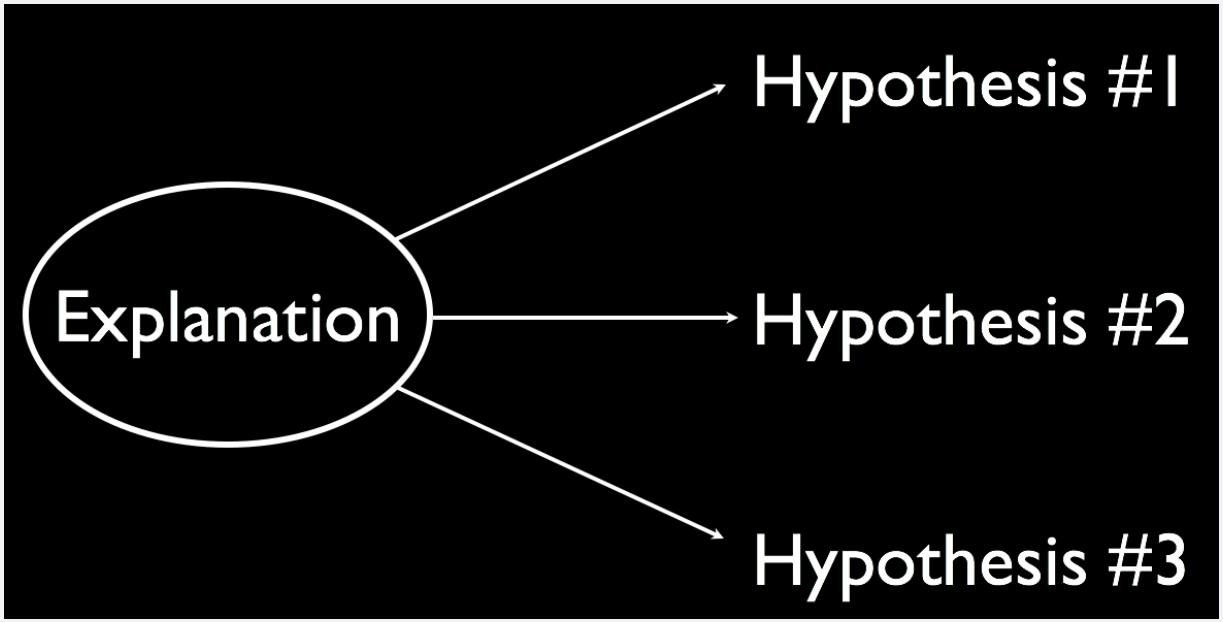


HYPOTHESES AND THEORY

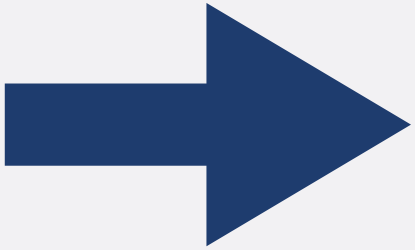
- **Explanation/Theory: (Simplified) description of how social reality works**
- **Hypotheses: Statements what, if the theory is true, we should observe in *our* data**



GOOD HYPOTHESES

- Involves two variables
  - dependent and independent variable
- Relationship between the variables is clearly specified and measurable
- Unit of analysis is clear
- Hypothesis is testable
  - falsifiable

CAUSALITY

Independent variable  Dependent variable

- Most of our theories: relationship between a single cause (independent variable) and a single effect (dependent variable)
- simple"bivariate" relationship (involves 2 variables)

HURDLES TO CAUSALITY

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- **Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?**

EMPIRICAL STUDIES

- Two ways to do empirical studies:
  - Qualitative, small N
  - Quantitative, large N
  - N=number of observations

QUALITATIVE STUDIES

- Talked about two forms of qualitative studies
  - Case study
  - Comparative case study

CASE STUDY

- Key technique: “Process tracing”
  - Method to identify the causal relationship in a particular case though detailed examination of each step in the causal chain

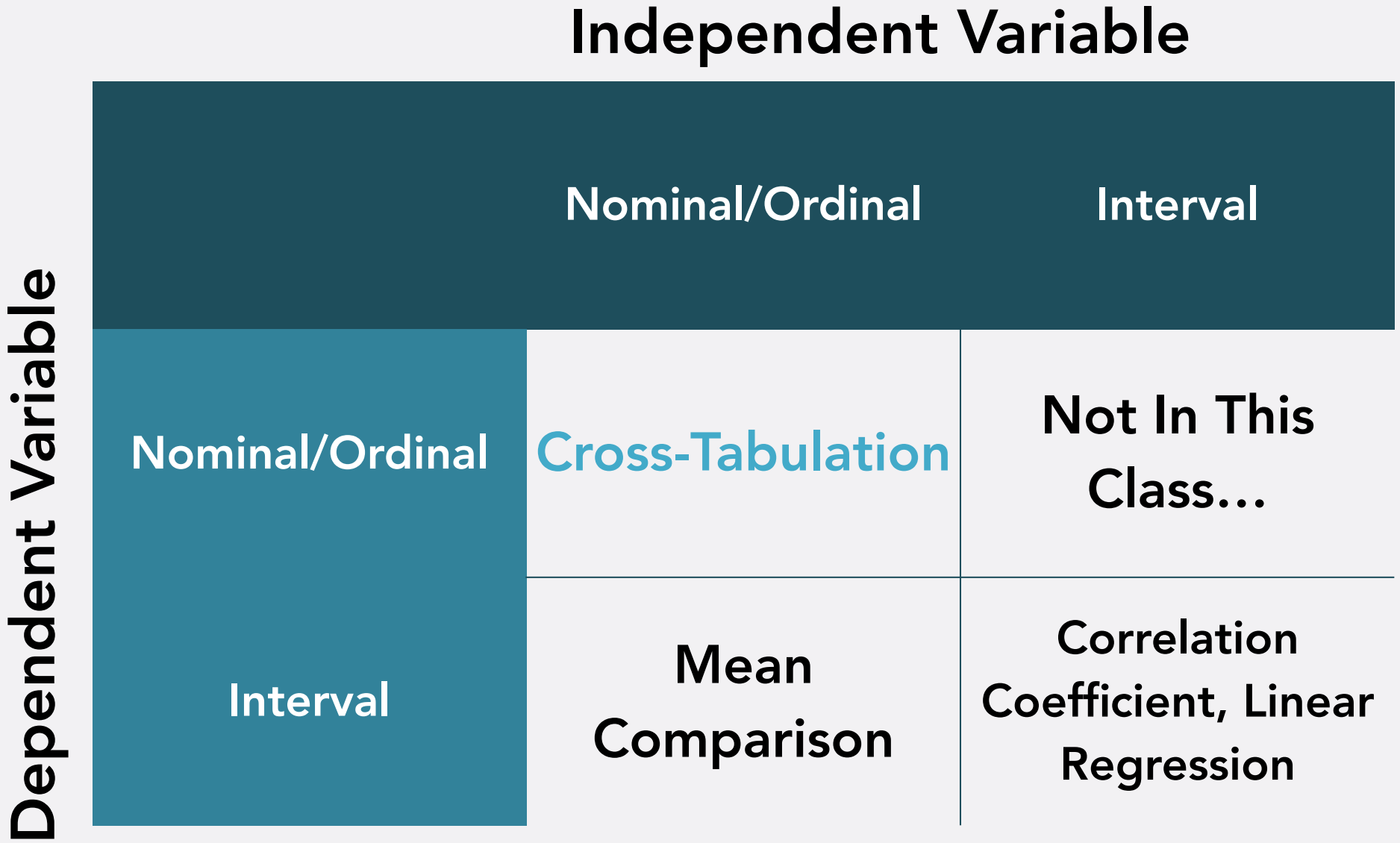
COMPARATIVE CASE STUDY

- Method of difference
  - Cases where dependent variable is *different* between cases
  - Identify independent variable that is different among cases in the same way as DV is
- Method of agreement
  - Cases where dependent variable is *same* between cases
  - Identify independent variable that is also the same among cases

QUANT AND QUAL

- Strength and weakness of small-n studies relative to large-n studies
  - Internal validity
  - External validity

QUANT: BIVARIATE RELATIONSHIPS



CROSS-TABULATIONS

Independent Variable

Dependent Variable	I V Value 1	I V Value 2	Total
D V Value 1	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
D V Value 2	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
Total	100% (# In Column)	100% (# In Column)	100% (# Total)

CROSS-TABULATIONS

Gender

Approve of Biden	Male	Female	Total
Approve	44.0% (11)	52.4% (22)	49.2% (33)
Do Not Approve	56.0% (14)	47.6% (20)	50.8% (34)
Total	100% (25)	100% (42)	100% (67)

TERMINOLOGY

- Zero-order relationship: relationship between two variables, without controlling for any other factors

ZERO-ORDER RELATIONSHIP

Gender

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Approve	44.0% (11)	52.4% (22)	49.2% (33)
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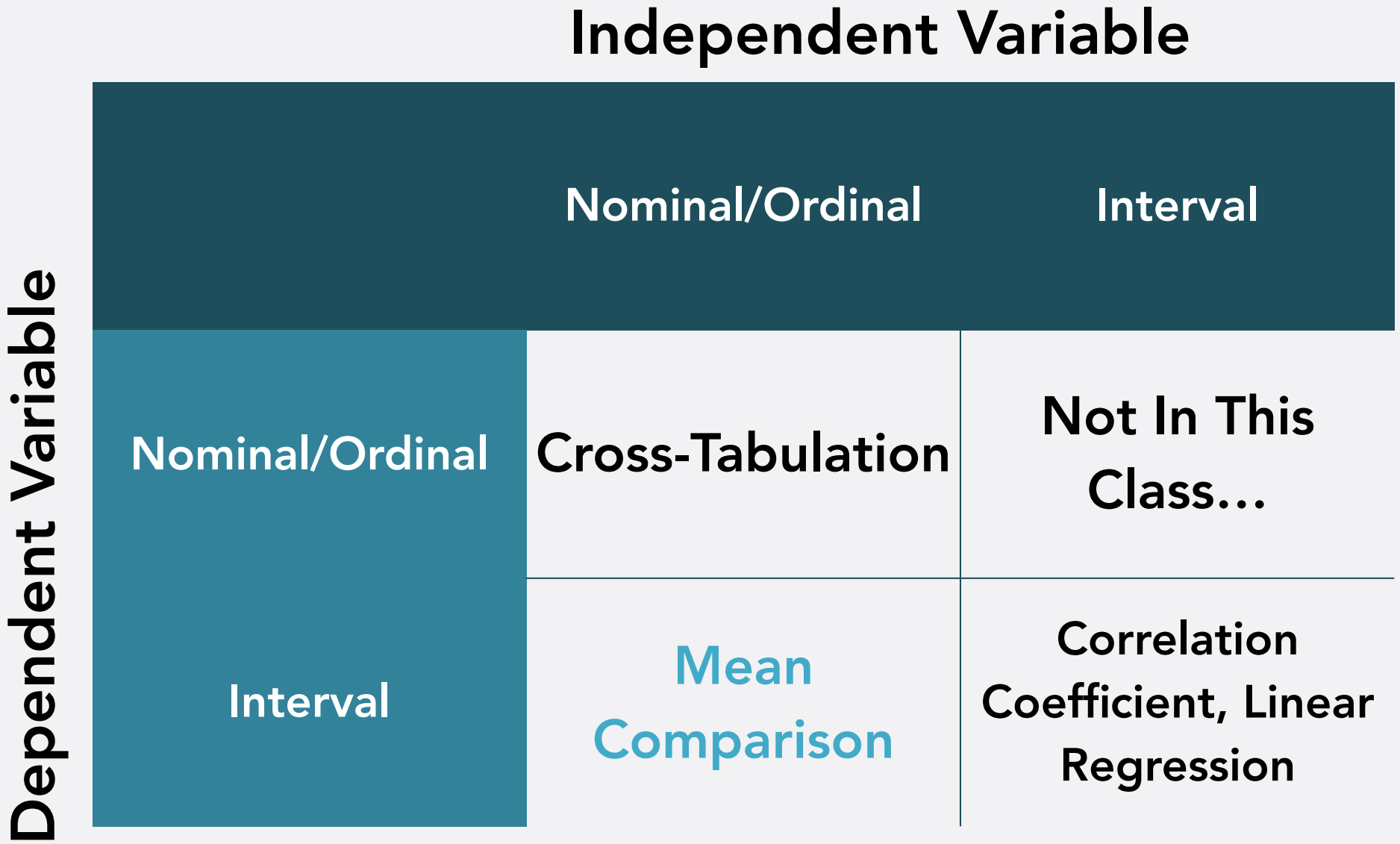
8.4%

BIVARIATE RELATIONSHIPS



MEAN COMPARISON TABLE

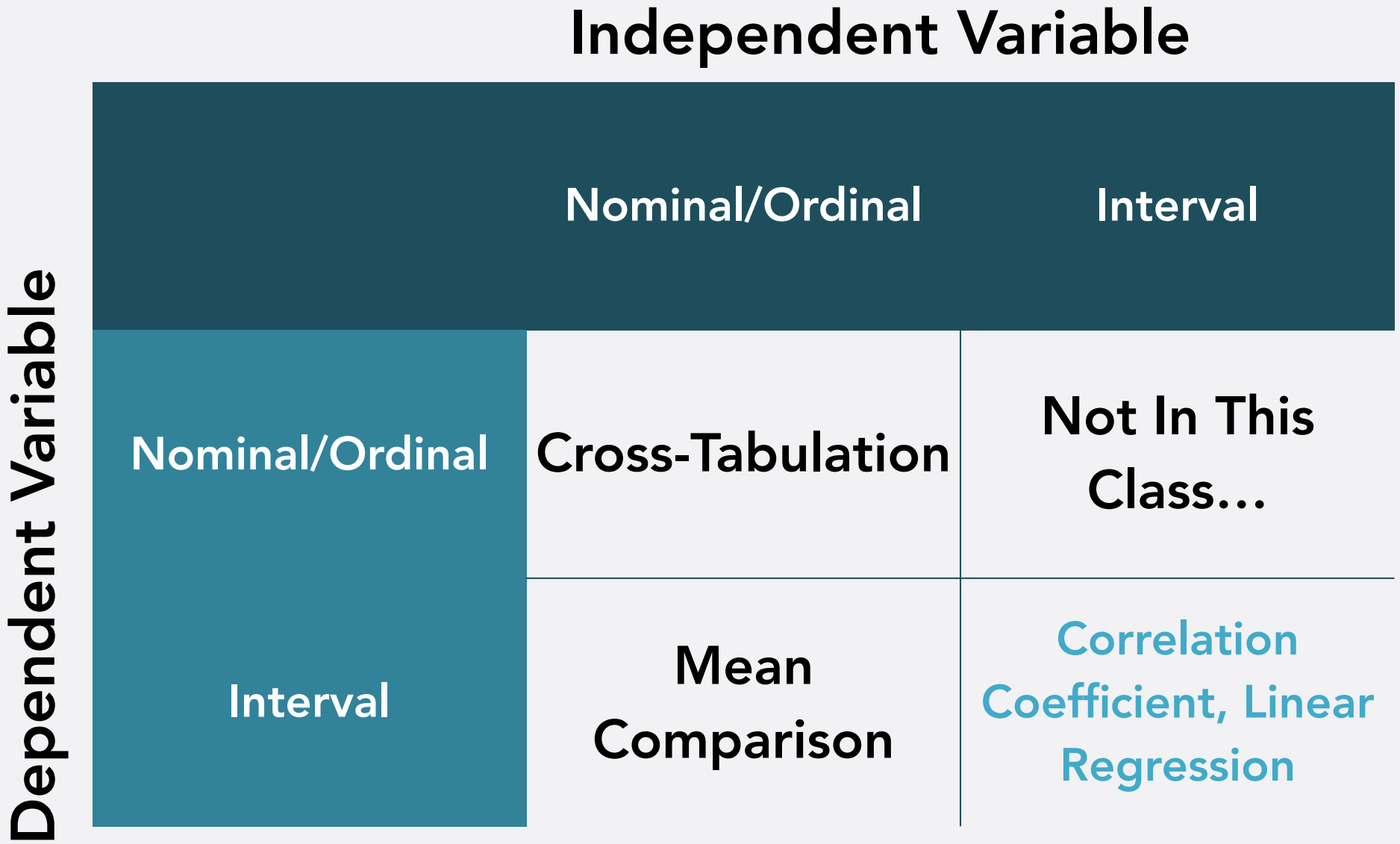
	Average of DV	Frequency
IV Value 1	Mean of DV for IV Value 1	# Cases IV Value 1
IV Value 2	Mean of DV for IV Value 2	# Cases IV Value 2
Total	Mean of DV overall	# Cases overall

ZERO-ORDER RELATIONSHIP

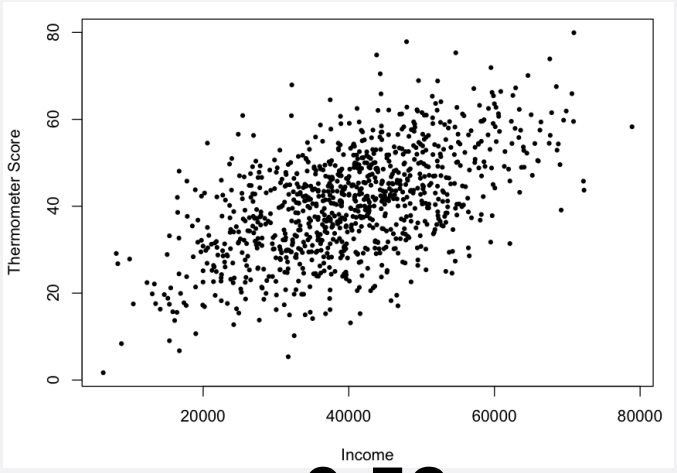
	Mean Thermometer Score	Frequency
Female	57.9	54
Male	50.0	27
Total	55.6	81

7.9

BIVARIATE RELATIONSHIPS



CORRELATION



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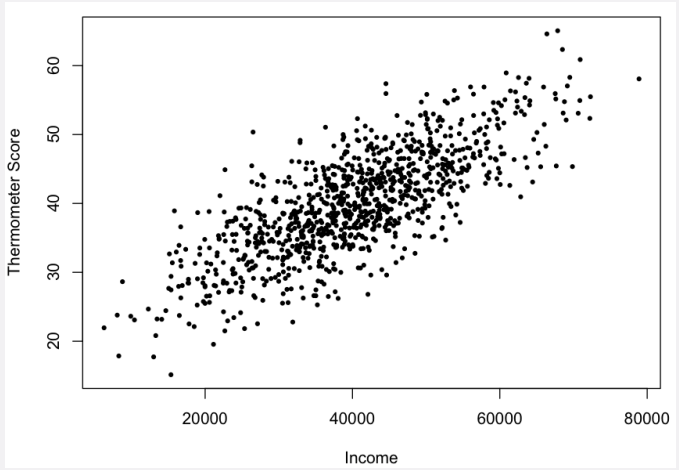

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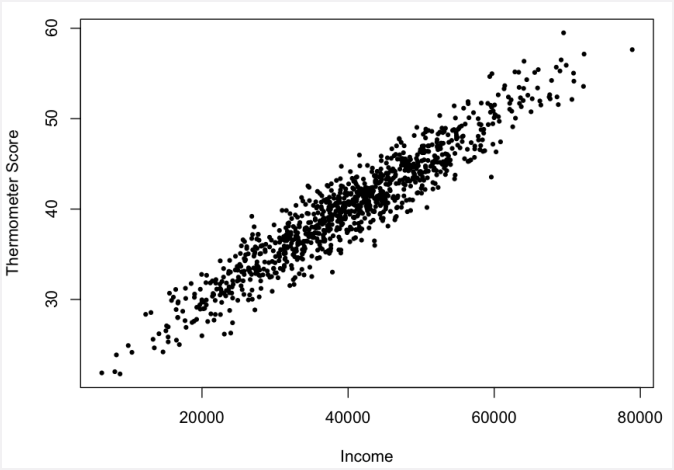

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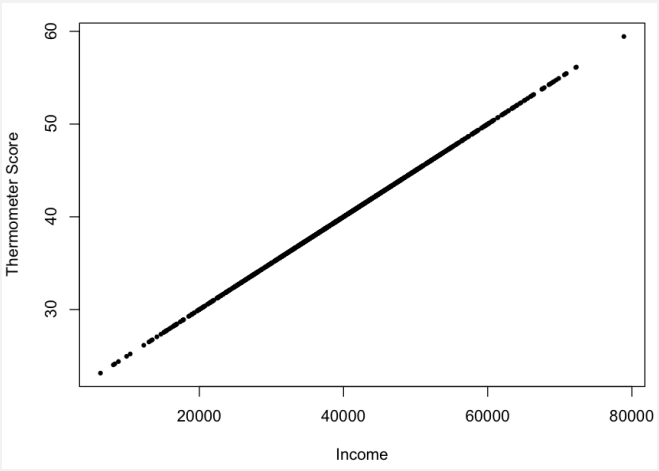

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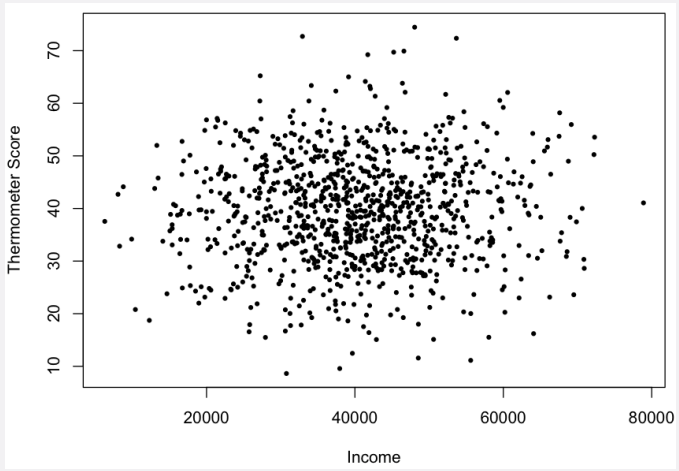
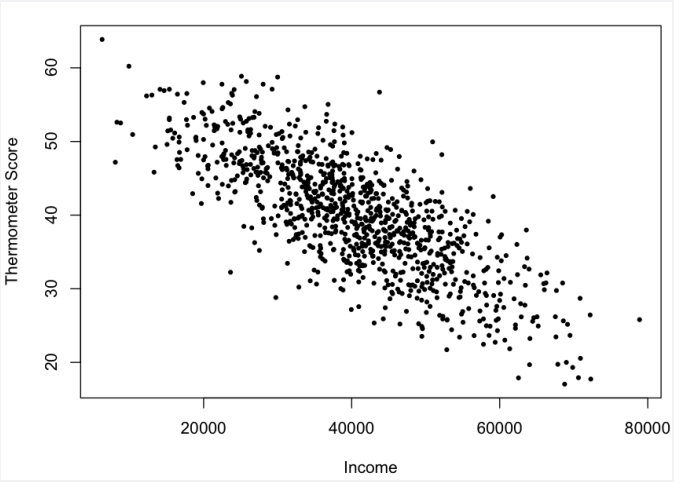
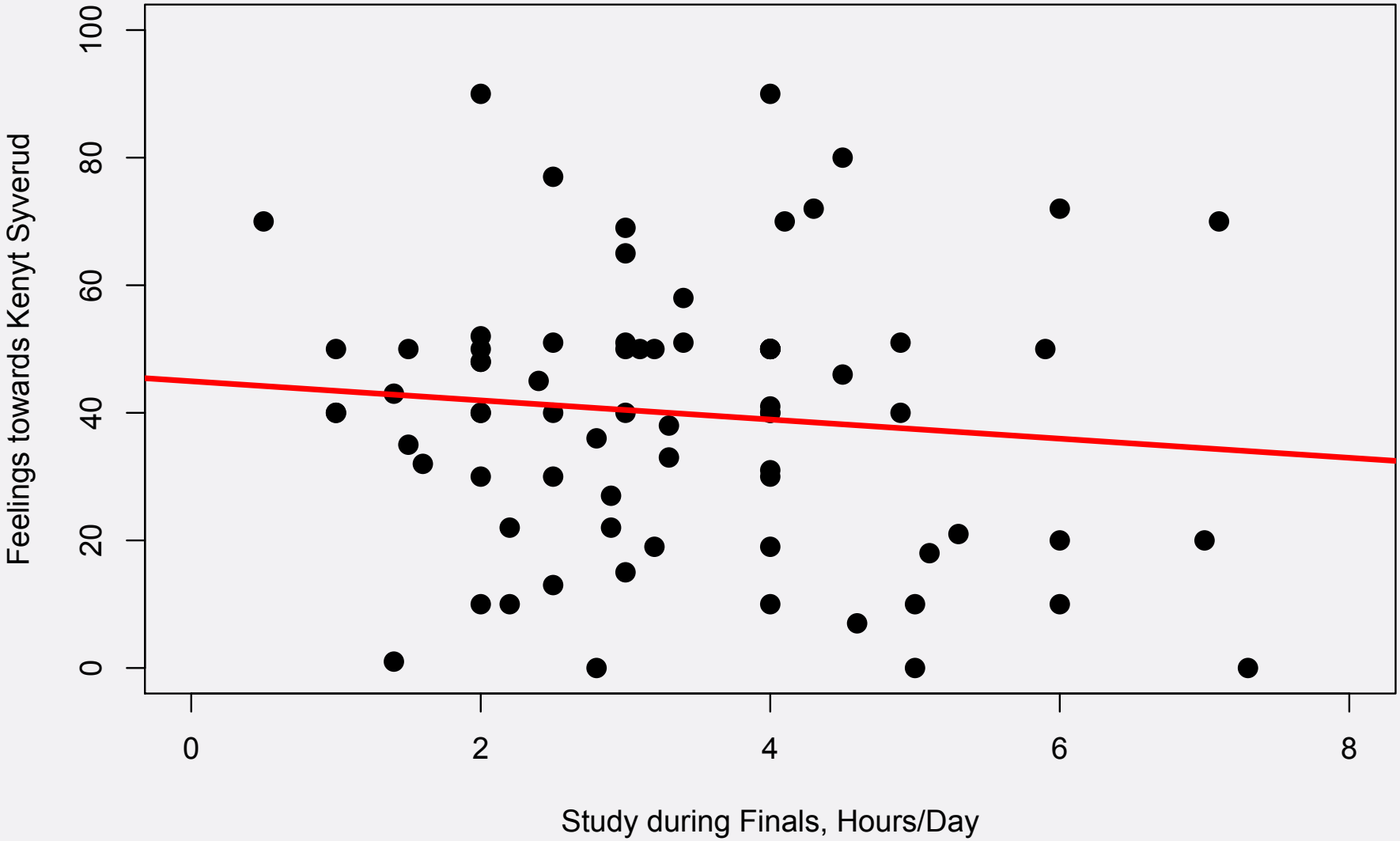


r=0

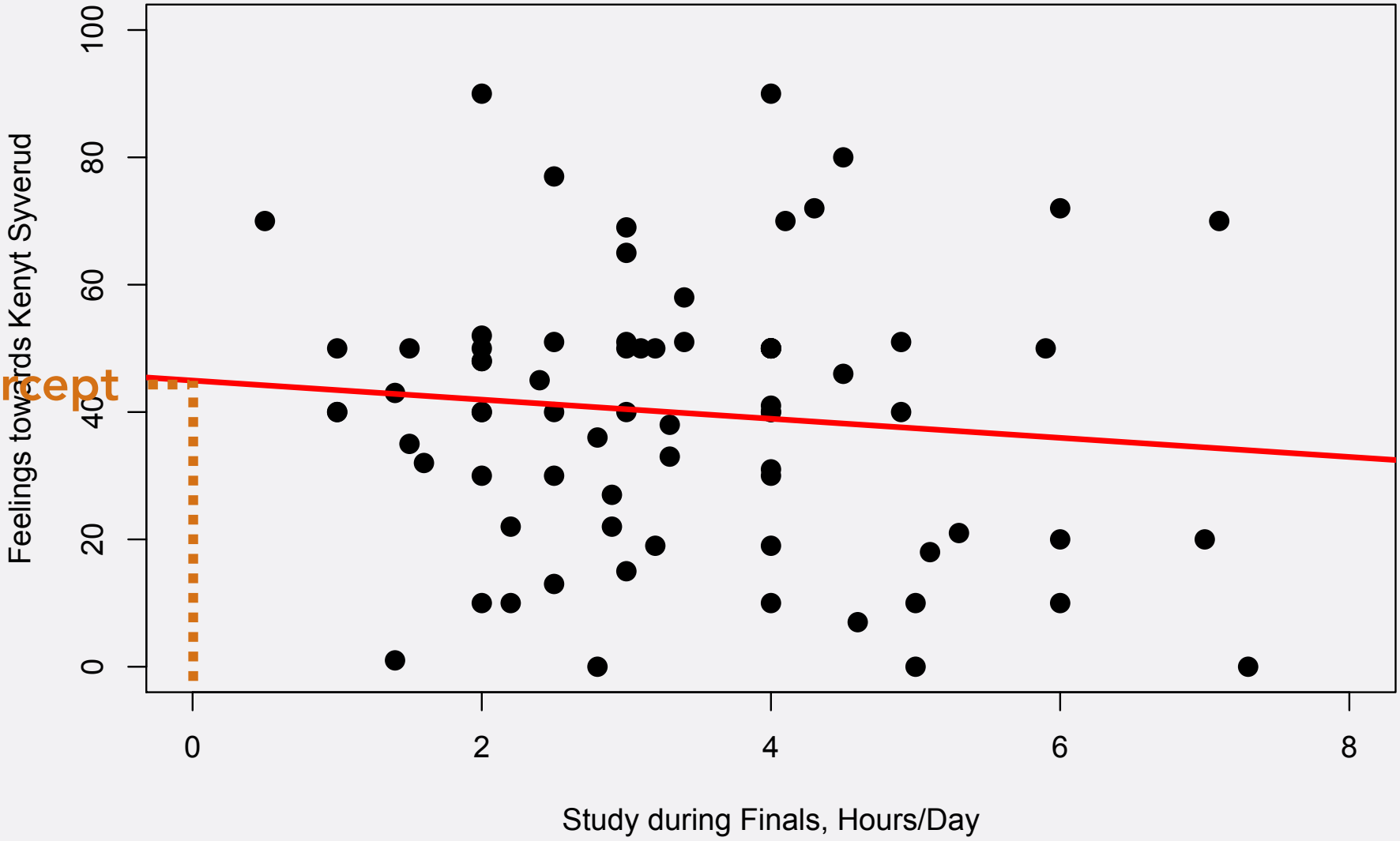


r=-0.77

REGRESSION LINE

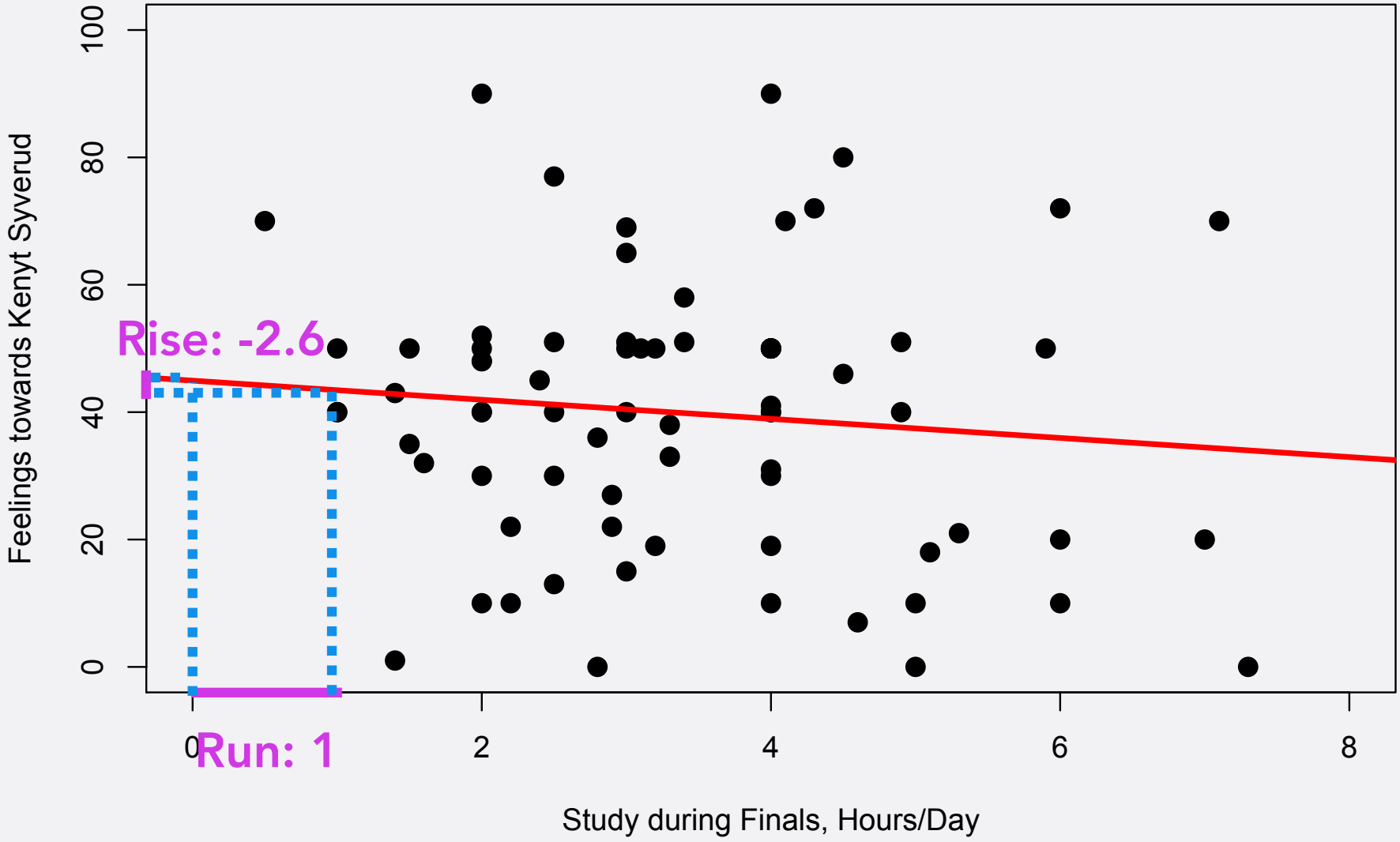


REGRESSION LINE



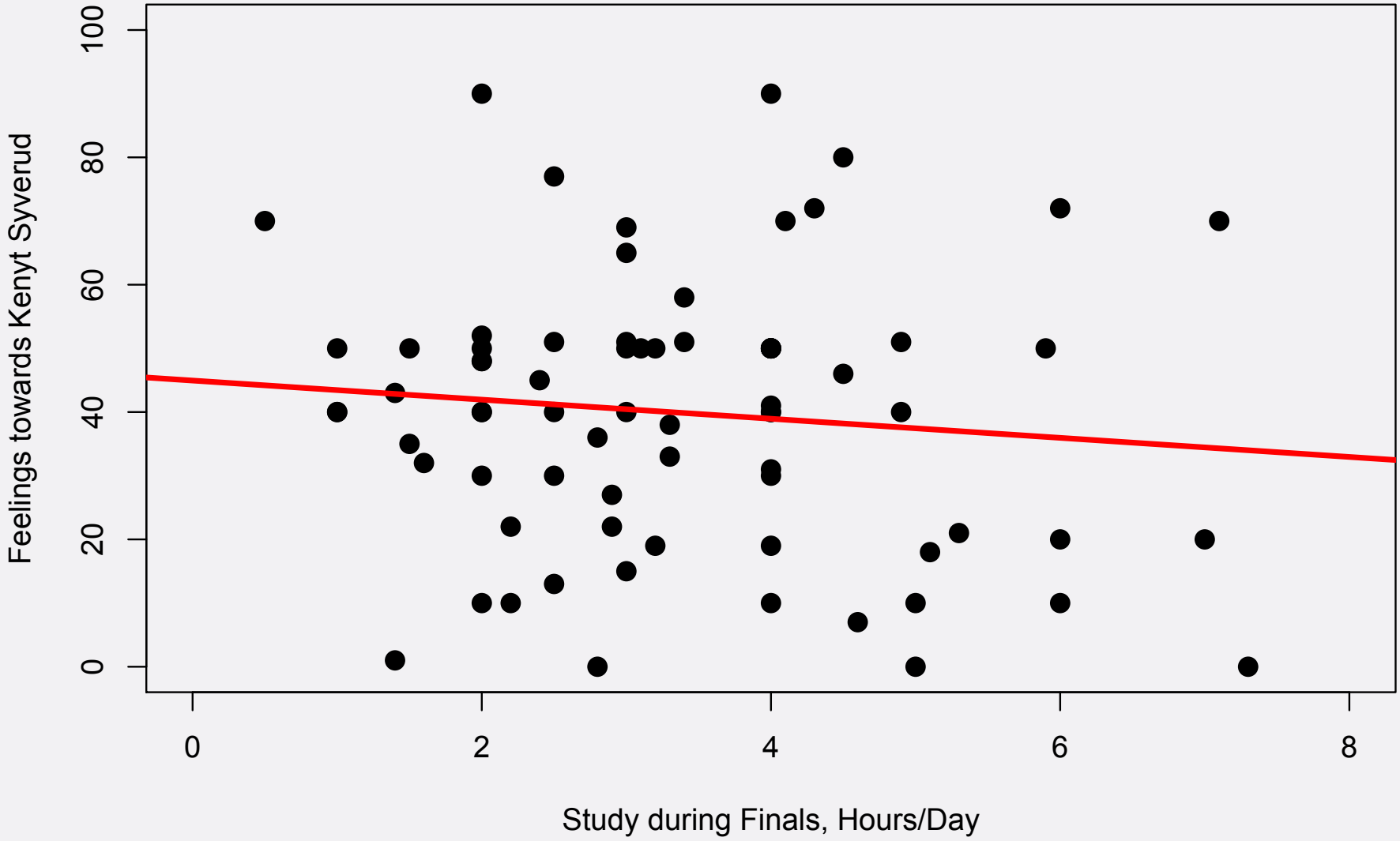
- Intercept: 55

REGRESSION LINE



- Slope = Rise over run = -2.6/1 = -2.6

REGRESSION LINE



- Thermometer Score = 55 - 2.6 * Hours/Day

REGRESSION EQUATION

- Thermometer score = 55 - 2.6 * Hours/Day
- General form: y = a + b * x
  - y: dependent variable
  - a: intercept
  - b: slope
  - x: independent variable

SLOPE

- y = a + b * x
  - Interpretation of slope: For every one unit increase in x, y changes by b units
  - Interpretation of intercept: When x=0, y takes the value a

EXERCISE

- Thermometer Score = 55 - 2.6 * Hours/Day

- What is the expected thermometer score of someone who studies 6 hours per day?

EXERCISE

- Thermometer Score = 55 - 2.6 * 6 = 39.4

EXERCISE

- Income/year = 10000 + 2000 * Years of Education

- What does the 10000 tell us?
- What does the 2000 tell us?
- How much money is someone with 16 years of education expected to earn?

EXERCISE

- Income/year = 10000 + 2000 * 16 = 42000

STUDY GUIDE

- Questions?