Examining 2 Variables at a Time

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1. Is there a relationship between **gender** and **test scores** on a standardized test.?

2. Is there a relationship between the **type of light** a baby sleeps with (no light, night-light, lamp) and whether or not the child develops **nearsightedness**?

3. Are the **smoking habits** of a person related to the person's **gender**?

4. How well can we predict a **student's freshman year GPA** from his/her **SAT score**?

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Imposing a Causal Model

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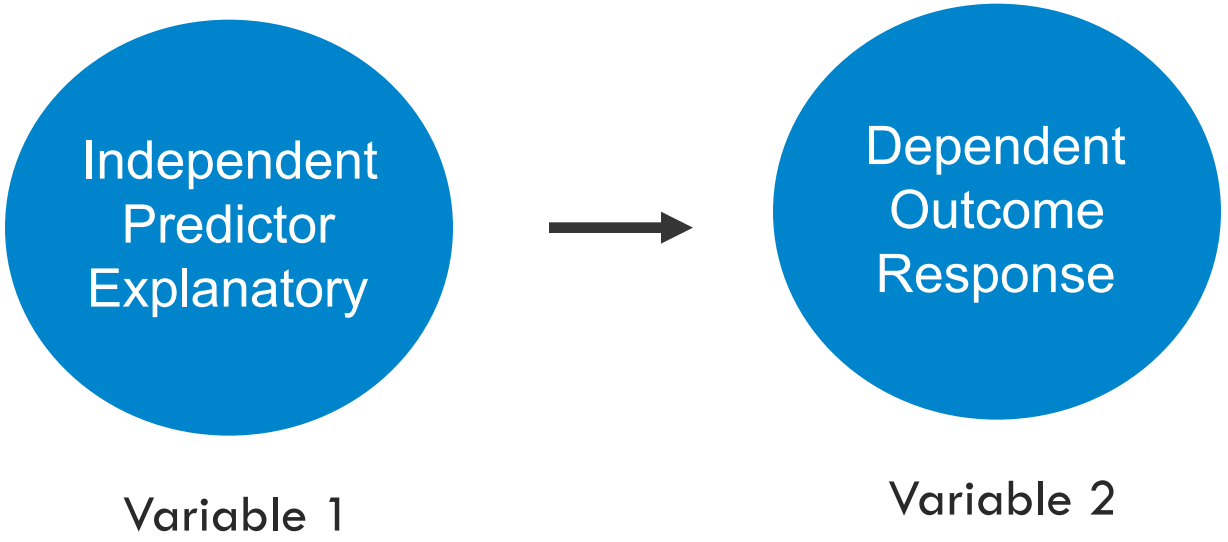
Observational Data



Variable Role Type Classification

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*note that the independent/explanatory variable is always listed first

Dependent Variable

Independent Variable		Response: Categorical	Response: Quantitative
Explanatory	Categorical	C → C	C → Q
	Quatitative	Q → C	Q → Q

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We want to explore whether the outcome of the study—the score on a test—is affected by the test-taker's gender.

Therefore:
Gender is the **explanatory**
Test score is the **response**

In this study we explore whether the nearsightedness of a person can be explained by the type of light that person slept with as a baby.

Therefore:
Light type is the **explanatory**
Nearsightedness is the **response**

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Here we are examining whether a student's SAT score is a good predictor for the student's GPA freshman year.

Therefore:
SAT score is the **explanatory**
GPA of freshman year is the **response**

Here we are examining whether a person's outcome on the driving test (pass/fail) can be explained by the length of time this person has practiced driving prior to the test.

Therefore:
Time is the **explanatory**
Driving test outcome is the **response**

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Imposing a Causal Model

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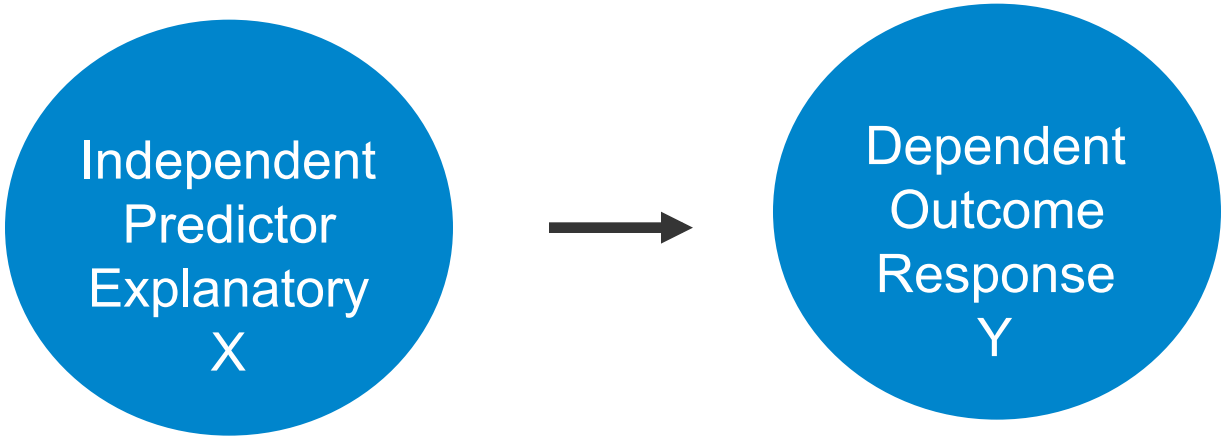
Observational Data



Variable 1

Smoking

Variable 2

Nicotine Dependence

Setting up a bivariate (2 variable) graph

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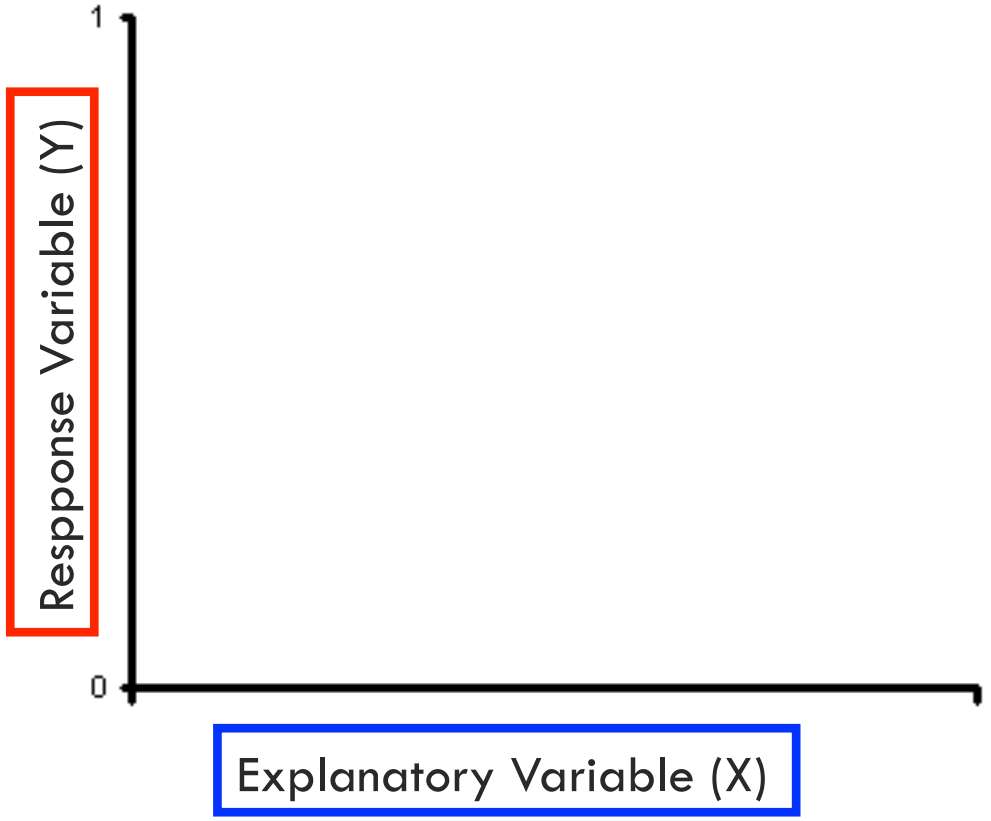
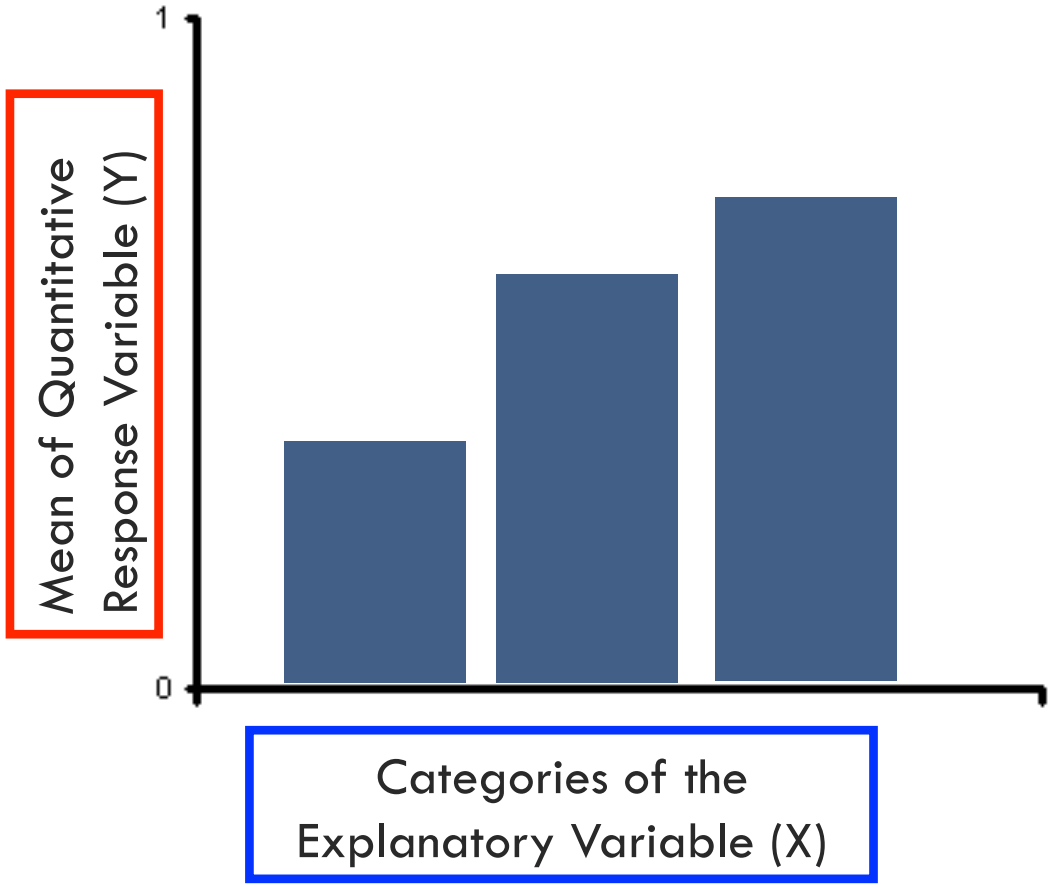
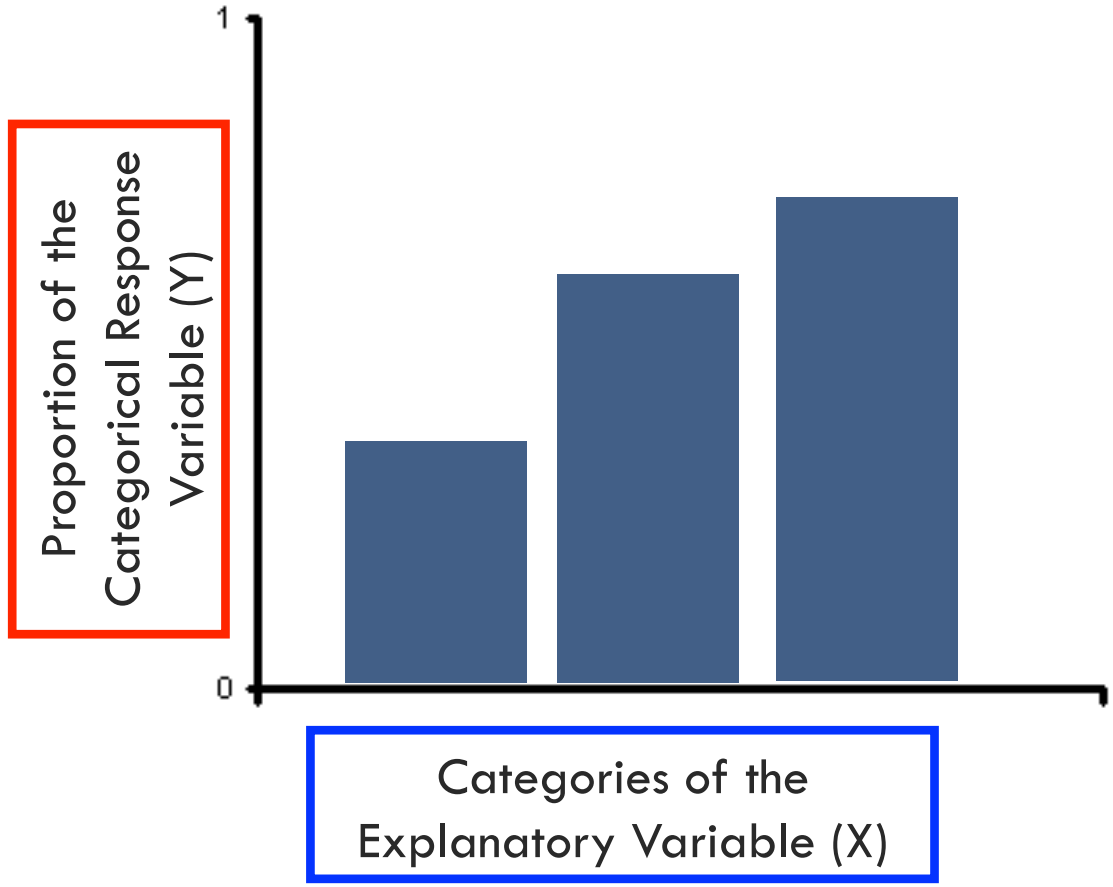



1
0
Mean of Quantitative Response Variable (Y)
Categories of the Explanatory Variable (X)


1
0
Proportion of the Categorical Response Variable (Y)
Categories of the Explanatory Variable (X)

Scatterplots

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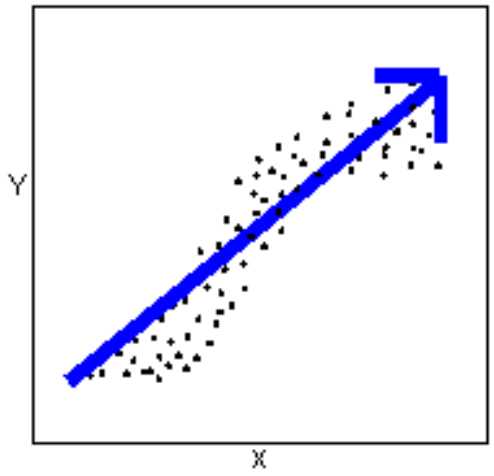
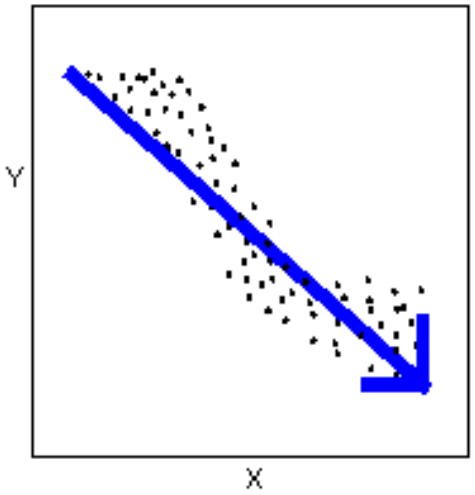
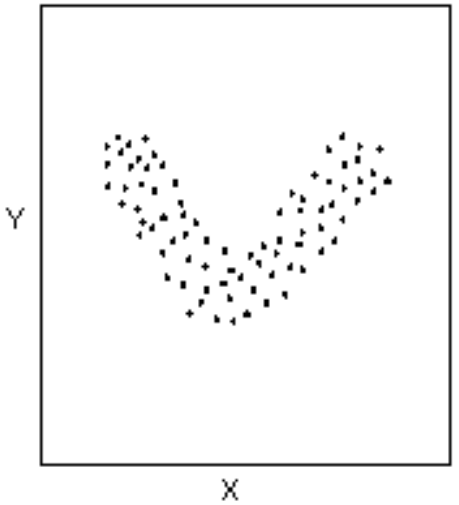


Positive relationship



Negative relationship



Neither positive nor negative

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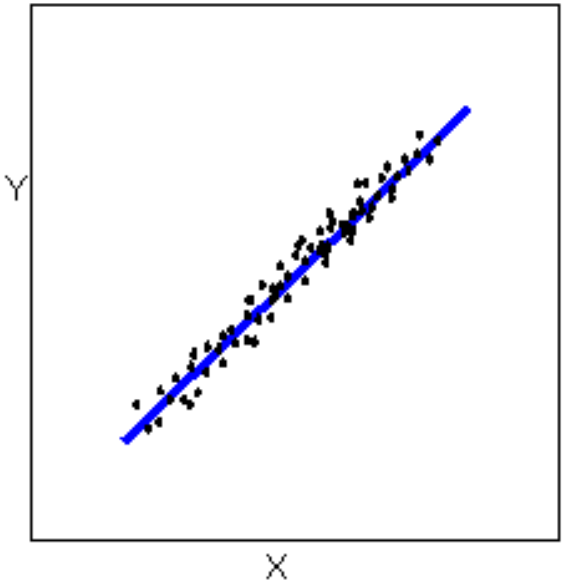
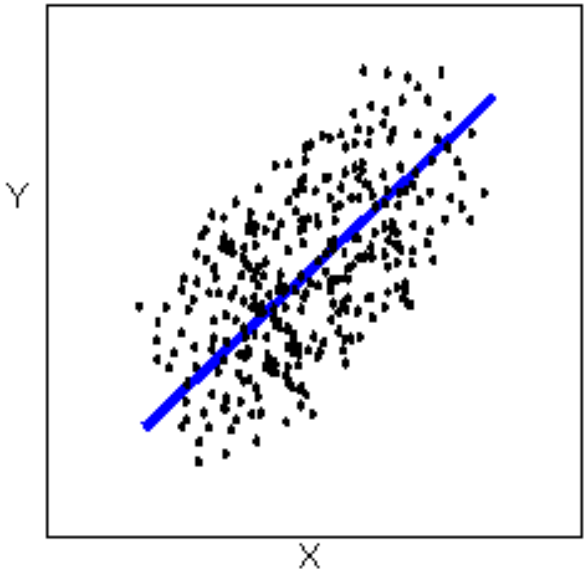


strong relationship



weaker relationship

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