Chapter 3: Two-Variable Associations

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Motivation Example

"Mutton busting" is a popular rodeo intermission event in which children are placed on top of a sheep (mutton) and ride around until they fall off (busting). The following table contains the ride times and heights of 10 little mutton busters:

Ride Length (s)	0.12	0.79	3.57	3.14	4.54	1.74	3.11	5.96	10.58	7.21
Height (in)	37.0	39.5	41.0	42.0	42.5	43.0	44.0	44.5	45.0	46.0
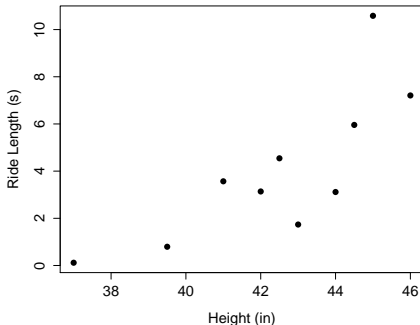
Motivation Example

Using what we learned in previous chapters, we can *separately* explore the heights of the mutton busters as well as their ride times. However, we are also interested in the *relationship* between the height of a child and how long they can stay on the mutton. For instance, from the plot it appears that taller children tend to have longer ride times.

Goal:
Determine if (and in what way) two variables are associated.

Association

Definition: association

Two variables measured on the same subjects are *associated* if some values of one variable tend to occur more often with some of the second variable.

When exploring the relationship between two variables, we typically distinguish between which is the *response* variable and which is the *explanatory* variable.

Sometimes this distinction is obvious, while at other times different variables can be considered a response, depending on the goal of the analysis.

Response and Explanatory Variables

Definition: response and explanatory variables

A *response variable* measures an outcome that is thought to occur in response to an *explanatory variable*.

Examples:

- In the relationship between blood alcohol content (BAC) and the # of beers one drinks,

  response variable: **BAC**
  explanatory variable: **# of beers consumed**

- In the relationship between one's gender and their political party affiliation,

  response variable: **party affiliation**
  explanatory variable: **gender**

Connection to Future Chapters

In the next couple of chapters we will explore the following types of associations:

Chapter 11: Associations between 2 **categorical** variables

Chapter 12: Associations between 2 **quantitative** variables