# Describing relationship patterns in words and numbers 

StatPREP Class Activity

## Orientation

It's natural to display a linear regression as a graph modeling the response variable as a function of the explanatory variables. In the LA_linear_regression Little App, that function is shown as a line laid on top of the data.

Graphics are important, but it's also a good practice to summarize the relationship using words and numbers.

This lesson introduces the conventions for such a summary. Some of them may already be familiar to you.

The relationship shown in the LA_linear_regression Little App is (by default) a straight line. (If there is a covariate, there will be multiple lines, one for each level of the covariate.) There are two important ways you can describe such lines:

- Which way the line slopes? For instance, suppose the line slopes upward from left to right. The in-words description could be simply, "The regression line has a positive slope." Other possibilities are a negative slope or no slope. Another way to express this is with phrases like " $Y$ goes up with $X$ " (positive slope) or " $Y$ goes down with $X$ " (negative slope) or " $Y$ doesn't depend on $X$ " (no slope). Of course, use the variable names instead of " $Y$ " and " $X$ ". The response variable goes in to replace " $Y$ " and the explanatory variable replaces " $X$ ".
- A more detailed description of the pattern describes how much Y goes up (or down) with X." For example, "A difference in systolic pressure of 6 units corresponds to a difference in diastolic pressure of 10 units."


## Activity

1. Open up the LA_linear_regression Little App. (See footnote ${ }^{1}$ ). Select NHANES as the data frame and systolic blood pressure as the response variable.

Find an explanatory variable that produces a regression line that slopes up.
What is it?

Find another explanatory variable where the regression line slopes down.
What is it?
${ }^{1}$ https://dtkaplan.shinyapps.io/LA_ linear_regression/

For each of those two variables, find the numerical value of the slope of the line. Then summarize the relationship in this way:

As $\qquad$ (the explanatory variable) increases by $\qquad$ , the response variable
$\qquad$ will go up_or_down by $\qquad$

In filling in the two blanks following "by", make sure to give the units of the variables. You can find the units by looking at the codebook.

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