**Transcript: Variable Transformations in R Commander**

In this video, we're going to look at how to do some common variable transformations within R Commander. The data set we'll be using today is called Davis, and it's from the package carData. If we click on “View data set”, we'll be able to see our variables. This data set contains information on the weight and height of 200 individuals. We have their sex, their measured weight in kilograms and height in centimeters, as well as their self-reported weight and height in the same units.

We're going to be looking at the measured weight and height variables today and exploring some of the common variable transformations we might want to do using these variables. For example, let's say that even though we asked about height in centimeters, we want to convert it to inches. In order to do this, we need to divide the value of each participant’s height in centimeters by 2.54 because there are 2.54 centimeters in every inch. It would be very tedious to do this one at a time, for example, dividing 182 by 2.54 and then 161 and so on down the data set. And this would also introduce a fair amount of human error. So instead, we can use R Commander to create a new variable that divides each value by 2.54 and enters that valuable value into the new variable.

To do that, we will go to “Data”, “Manage variables in active data set”, and “Compute new variable...”. When we see this window, we will have a field here to enter our expression to compute. This is just a fancy way of saying that this is where we tell R Commander how we want to create our new variable. First, we're going to give our new variable a different name. The default is variable, but let's pick something that's more informative. In this case, I'm going to use “height\_inches”.

Then in this “Expression to compute” field, I'm going to enter how exactly we're going to compute height in inches. If you double click on a variable name, it will put that variable name into this field. So, if I double click on “height”, it's going to fill that in here. Now what I need to do in order to compute height in inches is divide our current height variable, which is in centimeters, by 2.54. So, I will enter that in here.

You can also use other mathematical expressions such as adding or subtracting with the plus or minus sign, if you want to divide you use the slash sign as I have here, and if you want to multiply you use the asterisk.

Once we filled in our formula, we can click “OK” and that will create our new variable. In order to see this, we can click “View data set”. As you can see here we have a new variable that's called “height\_inches”. It's always a good idea to double check to make sure that you've typed in your formula correctly, so you could get out your calculator and do 182 centimeters divided by 2.54 and make sure you're getting the same result of 71.65354 inches. That all looks great.

So let's think about another type of transformation that we might want to do. This time we are going to convert weight in kilograms to weight in pounds in order to illustrate how we can use multiplication to create a new variable. Once again, we will navigate to “Data”, “Manage variables in active data set”, and “Compute new variable...”. You can see here that our new variable name is already filled in as well as our “Expression to compute” with our last variable. So we're going to need to change that.

In this case, I'm going to call the new variable “weight\_lbs” for pounds. I'll also delete what has been filled in here for “expression to compute” from our last variable transformation and double click on “weight”. You could also type out “weight”. This is just a handy way to make sure that you don't have any typos which would mess up our variable computation. So instead of dividing this time, I'm going to multiply by 2.2 because there are 2.2 pounds in every kilogram. Next, I will click OK.

And once again, we've created a new variable. We can see here that each participant now has their height in inches as well as their weight in pounds recorded.

The next thing we're going to do is calculate BMI, which is going to be a variable transformation that requires a few more steps. BMI is equal to weight in kilograms divided by height in meters squared. The first thing we need to do is to create a variable that is participants’ height in meters. What we have currently in our data set is height in centimeters and height in inches. But what we need for this formula is height in meters.

We will navigate back to “Compute new variable...” and in this case I'm going to call it “height\_m” for height in meters. Our formula is height divided by 100. This is because there are 100 centimeters in each meter. Once we click “OK”, we've created a variable that contains participants’ height in meters and we're ready to proceed to calculating their BMI.

Once again, we're going to navigate to “Compute new variable...”. In this case, I'm going to call the variable “bmi”, and our formula is going to be a little bit more complicated. We're going to start by selecting “weight”, which is weight in kilograms. I've accidentally selected weight in pounds here, but I can just delete the last four characters to get “weight”, which is our original weight in kilograms.

I'm going to divide this by height in meters squared. To do that, I will put an open parentheses followed by the height in meters variable. And to indicate that I want to square that variable, I will put this caret (^), which is found at shift + 6 on your keyboard, and the number 2. This indicates that you're raising height in meters to the power of 2, which is equivalent to squaring that variable. Next, I can click “OK” and I've got a BMI variable which is weight in kilograms divided by height in meters squared.

When I click on “View data set”, we can see here our height in meters variable as well as BMI. So participant 1 has the BMI of 23.2 and if we go down the list we can also see the BMIs of each participant in our data set. So that is how we could compute a variable that is more complex than simply dividing or multiplying or adding or subtracting a single value.

The last thing we're going to go over is how to create *z* scores. If you remember from the lecture, *z* scores are also called standardized scores, and they transform a variable to have a mean of 0 and a standard deviation of 1. We could use the “Compute new variable...” frame to compute *z* scores, but writing the formula would be quite complex.

Luckily for us, R Commander has an easier way of doing it. To create *z* scores, we will go to “Data”, “Manage variables in active data set”, and “Standardized variables...”. Let's say we want to standardize that BMI variable that we just created. We can select it and click “OK”. Once we view our data set, we will be able to see this new variable. Our new variable is “Z.bmi” and this reflects that these are BMI scores in standardized values. So participant 1 has a *z* score of - .04, which indicates that their BMI is .04 standard deviations below the mean within this data set. We can go down and see for each participant what their standardized score on BMI is.

That's how we can conduct some different types of variable transformations that you might see when working with data in psychology research.