Comparing Samples Measured with Different Tools:

Why Do the Mean and Median Remain About the Same?

Natosha West, Huntsville Middle School, Huntsville, AR

It is important to support the idea of a statistic as a measure of something about a distribution. With the repeated measurement data we collect with two different tools, the process of measurement changes. But the length of the attribute does not. The perimeter of the table remains the same. The length of a person's arm-span does not grow or shrink. This implies that the value of the mean or the median of the two samples—one generated with a crude tool like a short ruler and the other with a better tool like a meter stick or a tape measure—should be approximately the same. This is because the mean or the median estimates the true measure—what is called the best guess or best estimate in Unit 2. Sometimes I use the data that we collected, but sometimes I use the data provided in Unit 1. Using the Unit 1 data of the same process that we used (we measured my arm-span), but measuring a different person, helps students think about the process more generally. I ask students to find the median (1/2 of the students) or mean (the other ½ of the students) of each sample and to explain why the values are so close, even though the spread of the data is so different. I ask students to explain why the spread of the data is different, which anticipates the conversation in Unit 3. The worksheet on the next page can be copied and used to support this activity.

To introduce the activity:

These are displays of the measurements of another teacher's arm-span. One display represents measurements of her arm-span made with a 15 cm. ruler. The other display represents measurements of her arm-span with a meter stick.

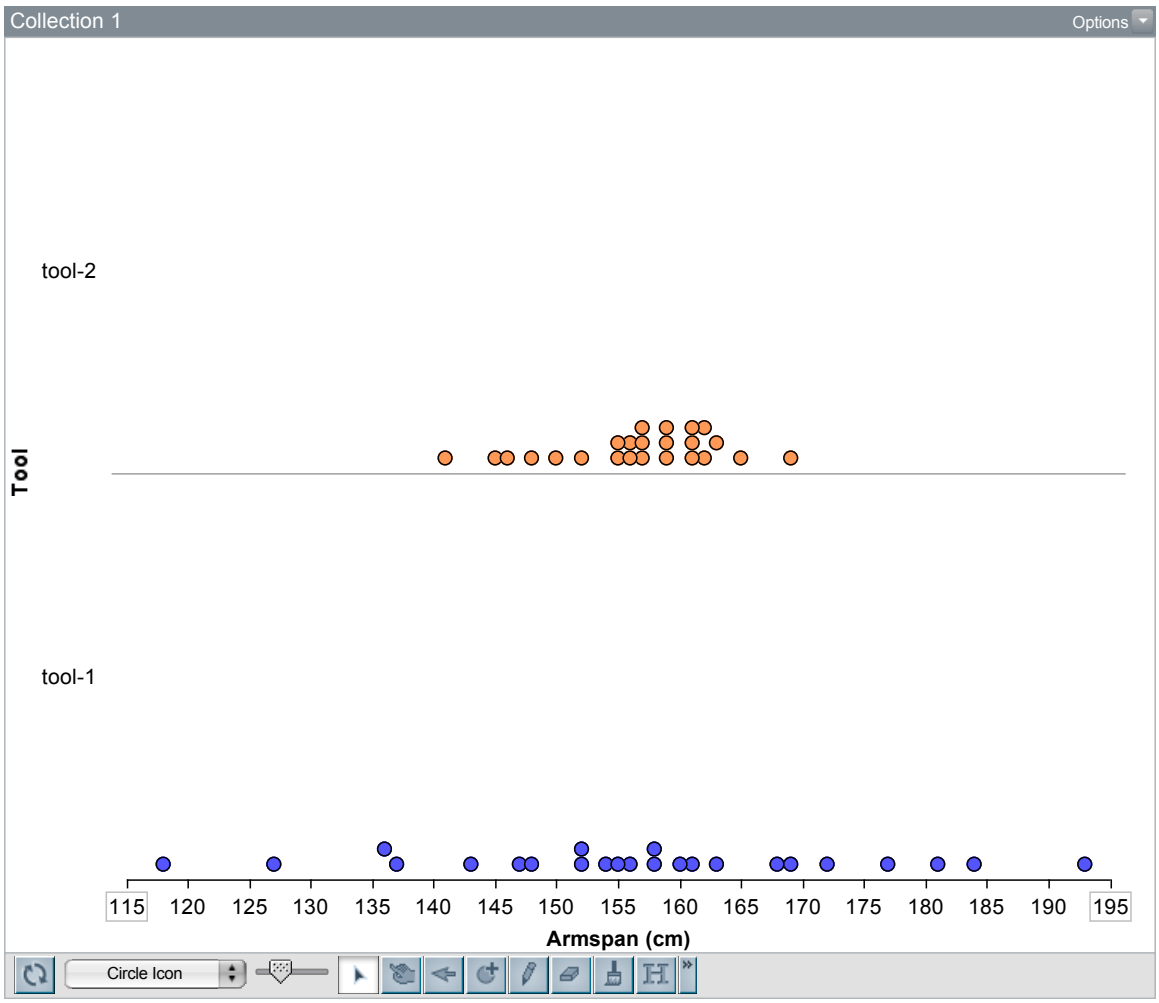
Look at the displays. Which shows the measurements made with a 15 cm. ruler? Which shows the measurements made with a meter stick? Why do you think so?

Some of us will find the median of each sample (What do we mean by the word sample? –a part of a repeated process—what was the repeated process here?). What do you expect will happen? Will the medians be about the same or very different? Why?

Some of us will find the mean of each sample. What do you expect will happen? Will the means be about the same or very different? Why?

As students work:

Show the mean or the median on each display. What do you notice?



Tool-2 Measurements (cm.) 141, 145, 146, 148, 150, 152, 155, 155, 156, 156, 157, 157, 157, 159, 159, 159, 161, 161, 161, 162, 162, 163, 165, 169

Tool-1 Measurements (cm.) 118, 127, 136, 137, 143, 147, 148, 152, 152, 154, 155, 156, 158, 158, 160, 161, 163, 168, 169, 172, 177, 181, 184, 193