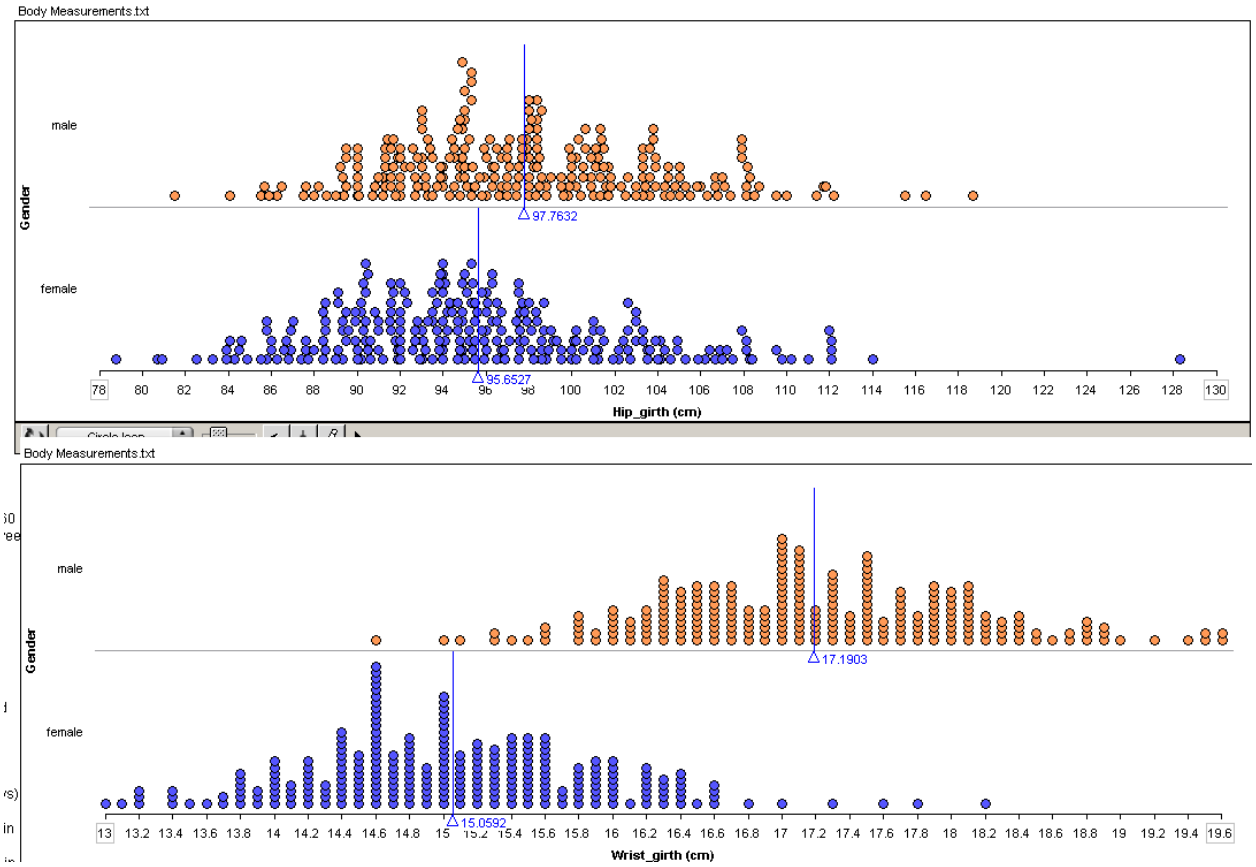
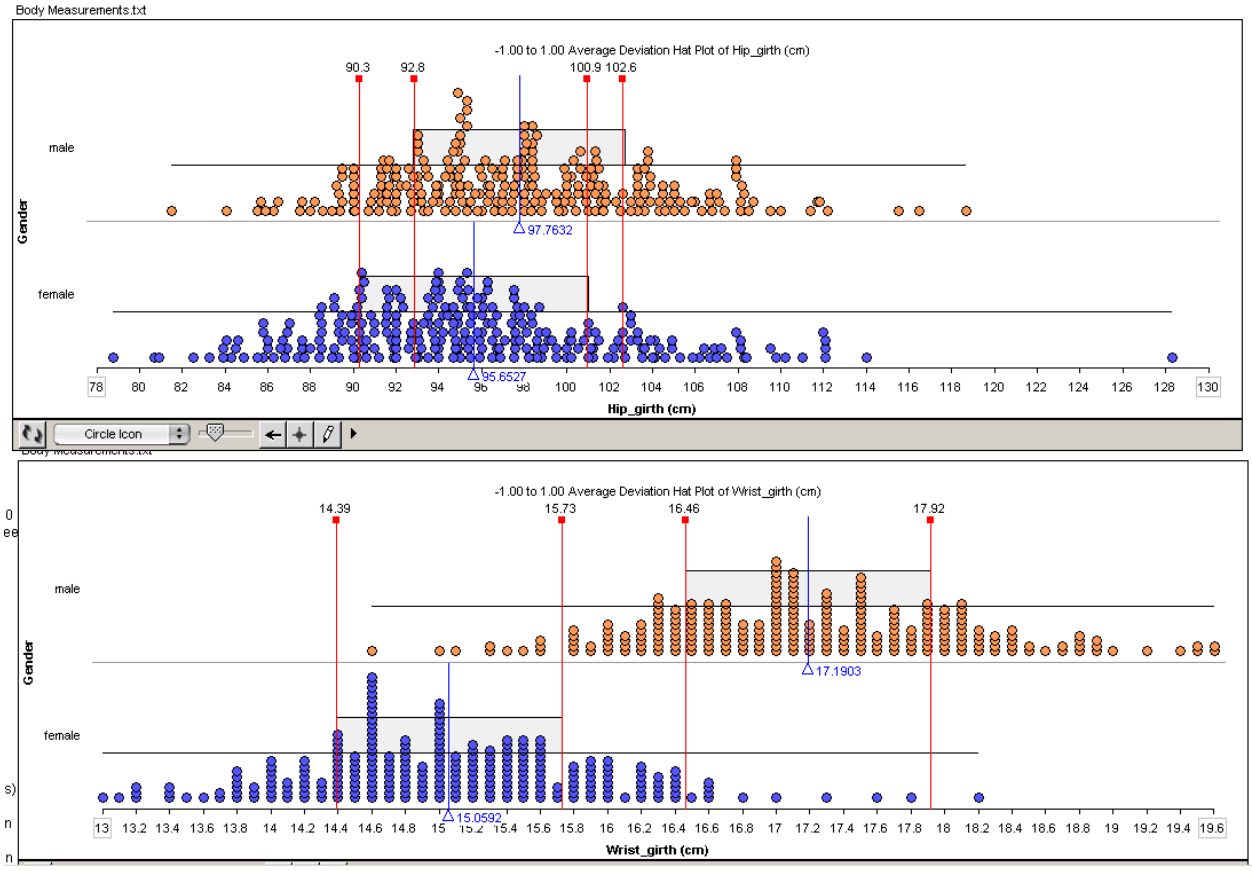
When I am analyzing a quantitative variable and comparing two groups, my first move is often to compare "typical" values. I do this by comparing means or medians. For example, I see in the first graph below that the average male has a wrist girth that is about 2.2 cm larger than the average wrist girth for females. I see in the second graph that the average male has a hip girth that is about 2.1 cm larger than the average hip girth for females. So for both attributes the differences between the typical male and the typical female is about the same.



Now step back and compare the distributions in the first graph. Based just on a visual comparison, I will argue that males are significantly larger than females when we consider wrist girth. Looking now at the second graph, I will argue that males are NOT significantly larger than females when we consider hip girth.

OK, now wait a minute. I already pointed out that the differences in the means are about the same for these two attributes, 2.2 cm for wrist girth and 2.1 cm for hip girth. So how can I argue that there are significant differences between the sexes in wrist measurements but not in hip measurements? Well, I have to take into account the variability in the data. I need to look at the differences in the means relative to the spread in the data. To do this I need to use a measure of spread. Since I am using means, I have to use the average distance from the mean to measure spread relative to the mean.



Let's look at wrist measurements. Using the *mean* ± *one ADM* to define a typical range of measurements for men, I estimate men tend to have a wrist girth between 16.5 and 17.9 cm. Women tend to have a wrist girth between 14.4 and 15.7 cm. These intervals do not overlap, so this supports the claim that men are significantly larger than women when we consider wrist girth.

Let's now look at hip measurements. Using the *mean* ± *one ADM* to define a typical range of measurements for men, I estimate men tend to have hip girth between 92.6 and 102.7 cm. Women tend to have a hip girth between 90.1 and 101.2 cm. These intervals overlap quite a bit, so this supports the claim that men are NOT significantly larger than women when we consider hip girth.

So what's the point? Comparing means is not a convincing way to argue that one group has larger measurements than another, though it is a good first step. You need to compare ranges of typical values and analyze the overlap. So you must look at the spread of the data when you compare means.