Visualizing Precision Comparatively to Support Invention

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We found it difficult initially for kids to understand the meaning of precision as a measure of the tendency of the measurement values to agree. Many confounded "perfect precision" with the location of the most precise clump or bin in the distribution, which led to re-invention of center strategies. This focus on the center clump was appropriate, but students kept resorting to the mean or median as its measure. To re-focus attention on the tendency of the measurements to agree, we asked students to compare the precision of the measurements of two different people's arm-spans (Mr. Brandt and Mrs. Thompson). We showed both together on Tinkerplots and led another discussion about the attribute of precision—of the tendency of the measurements to agree. In the resulting conversation, the kids were able to talk about whether Mr. Brandt's class or Mrs. Thompson's class was more precise and how we could describe these differences in precision. In one class, we generated a list of qualities that we could see as visually distinct between the distributions of the two classes (such as more measurements closer together, taller bins, fewer/shorter gaps). The students also noticed that the median of each teacher's arm span was different, but we asked them to focus on the way we could see that values tended to agree, rather than the location of the medians. Because one of the data sets had a clear outlier, this same comparison helped us later, during the measure review discussion, to decide when range would be a good or bad measure of precision.



The only conventional measure our students invented was range. This one even provided an interpretation guide:

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None of the student strategies found the range of a percentage of the data, like the IQR. However, some student inventions helped us introduce IQR, because these student strategies focused on clumps of data. One invented strategy was to count the number of cases in the identified clump, while another found its range.

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