Chauncey the Outlier

Chauncey Avernill Winthrope IV earned his money the old-fashioned way … he inherited it. Chauncey had so much money he had to buy a big safe to put all his little safes in. When he wanted to build a mansion, he drove through all the rich sections of town to find the perfect property, but those sections were all surrounded by golf courses or by water. Chauncey hated golf … almost as much as he hated the idea of living next to the water. The next day, he instructed his chauffer to drive through the medium income sections of town, where he found row upon row of two-story houses with children skateboarding in the streets and obese fathers sunbathing by their pools in the backyards. "This leaves me but one choice," exclaimed Chauncey, for exclamations were his only form of communication. On the third day, Chauncey's limousine navigated through the poorest sections of town, where the visionary Chauncey spied a beautiful lot at the end of two rows of very small homes. The beautiful lot was covered in broken bottles. Weeds competed with poison ivy to be the favored plant species. But as Chauncey knew, money pays for bulldozers, and bulldozers eventually make everything beautiful. Chauncey purchased the lot with the bills in his left jacket pocket and ordered the immediate construction of Winthrope Manor, which or course had many rooms. The estate cost a total of $10,400,000 to build. Chauncey didn't build a fence around the manor. He had a huge playground constructed on the East lawn and neighborhood children were always welcome to play. No skateboards, though.

At city hall, where they track such things, the average value of the homes in Chauncey's new neighborhood was changed as it rose from $50,000 to more than a half-million dollars. Real estate brokers were confused for months, as every time they wanted to help someone buy a half-million dollar home, they drove to this very poor neighborhood and saw only tiny homes – except of course for Chauncey's. What happened?

Statistically, the word for Chauncey's home is an "outlier." When we analyze a list of data, we should look for numbers that are so large, or small that they significantly change the rest of the numbers. Let's take a look. There were 19 homes in Chauncey's neighborhood before he built the 20th. The mean (average) value of these homes was $50,000. To find the total value of these homes (pre-Chauncey) do this:

19 x 50,000 = $950,000

Add to this the price of Winthrope Manor: 950,000 + 10,400,000 = $11,350,000

Divide this total by 20, as there are now 20 houses: 11,350,000 ÷ 20 = $567,500

Technically, the mean value of homes in Chauncey's neighborhood is $567,500. Is this the most accurate measure of these homes? Probably not. The median value of $50,000 is a far better description of the homes there.

This was not the first time that Chauncey was an outlier, however. On the day he was born, four other babies were born in the same hospital. Chauncey was born prematurely, meaning he was born several weeks before his mother was due to have him. At birth he weighed just 2 lbs. 2 oz. and fit in the Doctor's hand. He remained in the hospital for more than five weeks and when he had grown large enough, the Doctors sent him home, healthy and happy. The birth weights of the other four babies born the same day as Chauncey were 7 lbs. 3 oz., 6 lbs. 8 oz., 6 lbs. 11 oz., and 7 lb. 5 oz.

Let's calculate the mean (average) weight of these babies *without* the outlier and *with* the outlier to see how much baby Chauncey changed the data set. We can use one of two methods: (1) convert the weights to decimals while remembering that there are 16 ounces in a pound, or (2) convert all the weights to ounces, make the calculations, then convert them back to pounds and ounces afterward.

Method 1

7 lbs. 3 oz.	=	7 3/16	=	7.1875
6 lbs. 8 oz.	=	6 8/16	=	6.5000
6 lbs. 11 oz.	=	6 11/16	=	6.6875
7 lb. 5 oz.	=	7 5/16	=	7.3125
		Total	=	27.6875 ÷ 4 = 6.921875 = 6 lbs. 14.75 oz. (without)

Add Chauncey

2 lbs. 2 oz.	=	2 2/16	=	2.1250
		Total	=	29.8125 ÷ 5 = 5.9625 = 5 lbs. 15.4 oz. (with)

Method 2

7 lbs. 3 oz.	=	7 x 16 + 3	=	115 oz.
6 lbs. 8 oz.	=	6 x 16 + 8	=	104 oz.
6 lbs. 11 oz.	=	6 x 16 + 11	=	107 oz.
7 lb. 5 oz.	=	7 x 16 + 5	=	117 oz.
		Total	=	443 oz. ÷ 4 = 110.75 oz. = 6 lbs. 14.75 oz. (without)

Add Chauncey

2 lbs. 2 oz.   =   2 x 16 + 2   =   34 oz.

                                                    Total   =   477 oz. ÷ 5 = 95.4 oz. = 5 lbs. 15.4 oz. (with)

By including Chauncey's birth weight in the data set, the **mean** weight of the babies born at the hospital that day is nearly a full pound less than it would have been if this outlier data had not been included. The **median** weight of the five babies, 6 lbs. 11 oz., is more representative of the data.

U TRY IT: Eight students took a test. Seven studied hard and scored 100's, one did not study and scored a zero. What is the mean test score for the students with and without the outlier?

Outliers in sports

At the Olympics, there are several sports where the scoring is unambiguous (cut-and-dried). A soccer ball striking the back of a net is worth one point. A basketball dropping through a net is worth one, two or three points, depending upon from whence it was launched. Of course an official may call off-sides in soccer or a charging foul in basketball and deny the points, but the scoring is fairly straightforward. Gymnastics, diving and figure skating depend upon judges for their scoring. Judges are former athletes or coaches who understand every little detail about the performance, and while we may see nothing but grace and beauty, judges notice a toe pointed out that should have been pointed in, or a rotation that wasn't quite completed. Of course we all notice when a figure skater falls on their butt, or a diver does a belly flop. Judges are people – working with numbers – and if one of them were to become an outlier because their country is at war with an athlete's country, for example, their score could really change the competition. Therefore, before finding the mean of all the judges' scores, the high score and low score are typically removed from consideration … thrown out. If there are seven scores, the diver, gymnast, or skater will be graded by only five of them.