Outliers and What They Do

Fences: Q1 − 1.5 IQR and Q3 + 1.5 IQR. Past a fence is an outlier. Outliers pull the mean and standard deviation; the median and IQR resist. Fix mistakes; keep real values.

1 THE VOCABULARY
Words we use

Outlier a value past a fence.

Fence Q1 − 1.5 IQR below; Q3 + 1.5 IQR above.

Modified box plot outliers as dots; whiskers stop inside the fences.

Resistant the median and the IQR.

Pulled the mean and the standard deviation.

- Watch out for these.
- Using 1.5 times Q1 instead of 1.5 times the IQR.
- Forgetting the lower fence.
- Deleting an outlier without asking why it is there.
- Expecting the median to jump when an outlier is added.

2 THE METHOD
The 1.5 IQR rule

1. IQR Q3 − Q1.
2. TIMES 1.5 the allowed distance past the box.
3. FENCES Q1 minus it; Q3 plus it.
4. JUDGE past a fence: outlier.
5. THEN describe with the median and IQR; fix a mistake, keep a real value.

WHY OUTLIERS PULL THE MEAN AND Σ

Both use every value's size. A far value adds a lot to the sum, and its distance from the mean gets squared into the standard deviation.

3 THE BASKETBALL TEAM
Nine players, then a 74

before: mean 66.3, median 67, IQR 3, σ ≈ 2.0	nine players
fences with ten players: 60.5 and 72.5	Q1 65, Q3 68, IQR 3
74 is past 72.5	an outlier
after: mean 67.1, σ ≈ 3.0	pulled
median 67, IQR 3	unchanged: the median describes a typical player

THE SONGS

IQR 11.5; 1.5 × 11.5 = 17.25; fences −10.75 and 35.25; 88 is an outlier; the whisker stops at 32.

SAY IT OUT LOUD

IQR, times 1.5, subtract and add. Past the fence is an outlier. Outliers pull the mean; the median resists.