A Guide to Interpreting Run Charts: The Four Rules for Finding Non-Random Signals

Once you have plotted your data over time and added a median line, the next step is to analyze it for meaningful patterns. These four rules help you distinguish between normal, random variation (known as "common cause") and statistically significant patterns (known as "special cause" or "non-random signals").

A signal tells you that something has likely changed in your process—for better or worse.

Before You Begin: Key Definitions

+ **Median:** The horizontal line on your chart representing the middle value of your data set. Half the data points are above it, and half are below.
+ **Run:** One or more consecutive data points on the same side of the median. A new run begins every time the data line crosses the median.
+ **Useful Tip:** When analyzing a chart, ignore any points that fall exactly on the median. They do not break a pattern, nor do they count towards one.

Rule 1: The Shift

A "shift" is a clear change in the center of your data, suggesting your process has moved to a new sustained level of performance.

What to look for: Six or more consecutive points that are all above or all below the median.

+ **What it means:** A fundamental and sustained change has likely occurred. For example, a shift of points below a median of fall rates after implementing a new safety protocol suggests the change was effective.
+ **Visual Example:**

Rule 2: The Trend

A "trend" shows a continuous and sustained change in one direction, indicating a gradual improvement or decline in performance.

What to look for: Five or more consecutive points that are all going up or all going down.

+ **What it means:** The process is steadily changing over time. A downward trend in fall rates is positive, while an upward trend would be a cause for concern.
+ **Important Note:** If two points have the same value (are flat), it does not break the trend. Simply skip that point and continue counting. For example, the sequence 3.1, 3.3, 3.5, 3.5, 3.8, 4.0 counts as a trend of six points going up.
+ **Visual Example:**

Rule 3: Too Many or Too Few Runs (The "Runs" Rule)

This rule identifies non-random patterns by looking at how often the data crosses the median. It is a more statistical and less visual test.

What to look for: An unusually high or low number of runs (times the data line crosses the median).

+ **How to check:**

1. Count the total number of data points you have (ignore points on the median).
2. Count the number of runs on your chart.
3. Compare your run count to the expected range in a statistical table. For most quality improvement projects, the following simplified guide is sufficient.

Total Data Points	Too Few Runs Is...	Too Many Runs Is...
10-14	3 or fewer	9 or more
15-19	5 or fewer	13 or more
20-24	7 or fewer	16 or more
25-29	9 or fewer	19 or more

What it means:

+ **Too Few Runs (Clustering):** Your data points are clustered together on one side of the median for long periods. This often appears as a shift that wasn't quite long enough to trigger Rule 1.
+ **Too Many Runs (Oscillation):** The data is frequently crossing the median, suggesting a systematic up-and-down pattern or potential measurement issues.

Rule 4: The Astronomical Point

This rule identifies single, dramatic events that are clearly outside the normal range of performance. It is a "common sense" or "eyeball" test.

What to look for: A single data point that is obviously and dramatically different from all the others—much higher or much lower.

+ **What it means:** An unusual, one-time event occurred. It is crucial to investigate what made this point so different. For example, an astronomical fall rate in one month could be due to a reporting error, an extreme weather event, or a localized power outage.
+ **Visual Example:**

Summary: Putting It All Together

When you see any of these four signals, it's an invitation to investigate. A signal is not a conclusion; it's a starting point for asking, "What happened at this time to cause this pattern?" If no rules are triggered, the variation you see is likely random noise, and you shouldn't waste time trying to explain every minor up and down.