

Q) Explain how visualization used both ineffectively and effectively determined the fate of the Challenger launch by NASA officials. Please explain in detail the choices of the mark types, encodings, and visual decisions made in the charts that affected the decision process. If you were to create a chart to show the issue with the O-rings, how would you go about doing so? And why? Please include a sketch or a chart supporting your thought process.

-> Ineffective: The visualization is not clear and not easy to understand

-> Effective: The visualization is clear and easy to understand

The fate of the Challenger launch was that the officials did not take the risk of the launch because of the cold weather. The ineffectively visualization was the one that was used by NASA officials to show the temperature of the O-rings. The chart was a line chart that showed the temperature of the O-rings over time. The chart was not clear and not easy to understand. The effective visualization was the one that was used by the engineers to show the temperature of the O-rings. The chart was a bar chart that showed the temperature of the O-rings over time. The chart was clear and easy to understand.

In 'The Challenger Launch Decision' the events that led up to the decision to launch the challenger in 1986. NASA has consultant regarding the cold temperature conditions (between 25-30 deg F) under which the Challenger would need to launch, and whether the O-rings might have an issue. Interestingly, the consultant gave the opinion that it may not be safe, due to the shuttle never having launched in such cold temperatures, and that the O-rings might fail and cause an explosion. The evidence cited was that the O-rings were often damaged at launches below 53 degrees. During a three-hour meeting, NASA engineers and managers argued amongst themselves about what to do, since there were also O-ring failures at 70 degrees and above, and there wasn't any clear evidence that a launch would be unsafe.

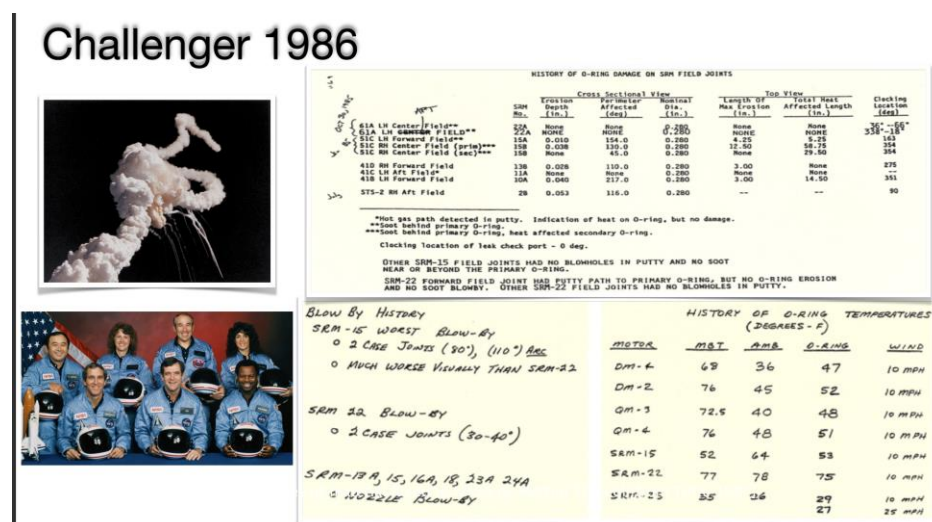


Figure 1: The Challenger Launch Decision

The figure below shows a graph from the commission's report. The graph plots the number of "incidents" per shuttle launch against the calculated temperatures of the O-rings at different launches in the past.

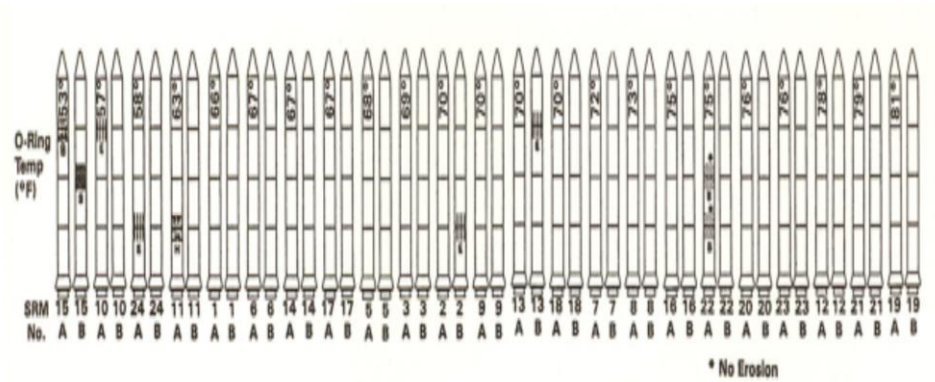


Figure 2: The Challenger Launch Decision

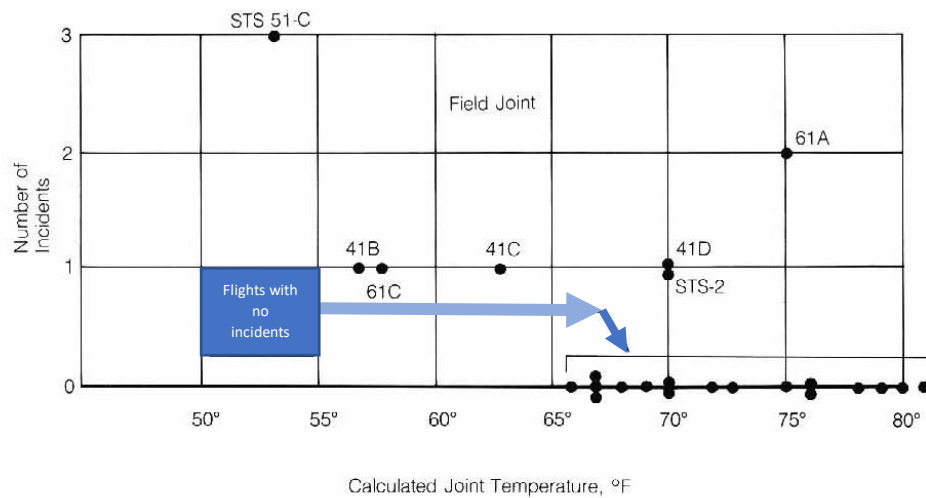
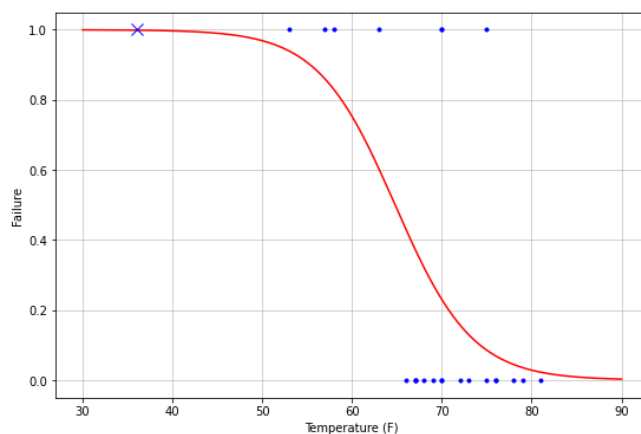


Figure 7
Plot of flights with and without incidents of O-ring thermal distress

Figure 3: Taken from library book forgot the name of it. (I will check it next time).

The figure is a little difficult to follow, so I've transposed the information below. Here, the "Number of Incidents" has been condensed to simply the occurrence of a failure or not.



The probability of failure occurring is extremely high anywhere below 50 degrees Fahrenheit. I was unable to find Challenger's O-ring temperature on the day of the fatal launch, so the blue X in the

upper left corner of the plot instead marks the outside temperature. At this temperature, these data and the associated model give a probability of over 0.99 for a failure occurring. We can see now that the chances of an O-ring failure occurring on the day of Challenger's launch were incredibly high. For whatever reason, the NASA and Thiokol engineers were unable to effectively communicate this to those in charge of scheduling the launch.

Q) Imagine you start a new restaurant and you have installed sensors in the kitchen, collecting data from food ordering, preparation, to delivery to the customer. Explain the questions you would ask of the data and what transformations of the data to visual form are useful. Apply stages of decision making (from Bertin's Postmortem of an Example reading) to your exploratory visual analysis. Add illustrations, sketches, and/or charts to support your answer.

We know **Bertin's Postmortem** had following decision making stages which are as follows:

- first stage: Define the problem
- second stage: Defining the data table
- third stage: adopting a processing strategy
- fourth stage: Processing the data: simplifying without destroying the information
- fifth stage: Interpreting and deciding or communicating the results

Decide on relevant metrics such as food type veg or non veg. and collect data at the end of a project to determine if goals were met. Pick out the specific items that produced success. List the shortcomings, drawbacks, and what could have been better. Identify factors that pose a challenge or stumbling blocks. You can use questionnaires to get feedback from different team members. Recap and draw conclusions: To wrap-up, compile your findings and draw key takeaways.