1. **Chapter 3. A Picture is Worth a 1000 words**
    a. Make a Picture
        i. How – 1st count and sort – get frequencies (example)
        ii. Relative Frequency Table (uses percentages in addition to counts)
    b. Why?
        i. To describe the DISTRIBUTION of data
    c. Area Principle
        i. Basically, be careful when you graph numbers (p. 16)
2. **Chapter 3 after page 17 is optional**
3. **Chapter 4. Examining Quantitative Data with the histogram (page 37 of your text.)**

    a. First sort the data in increasing order
    b. Choose class intervals
    c. Count the number of observations that fall into each class interval
    d. Construct rectangles with observations proportional to the relative frequencies (percentages) with which the observations fall in each interval

There are no standard rules for determining appropriate class intervals, and the impression one gets of how the data are distributed depends on the number and location of the intervals. Histograms are usually used for large datasets.

4. **Things to be aware of with respect to histograms**
    - *Shape:*
        - *Unimodal, bimodal, multimodal,uniform*
        - *Symmetric or skewed?*
        - *Exceptions? Outliers* and Gaps
    - *Center*
    - *Spread*
    - *Remark:* the histogram can take all kinds of shapes.
    - *Usually histograms are interesting to compare and a single histogram is not usually interesting by itself*

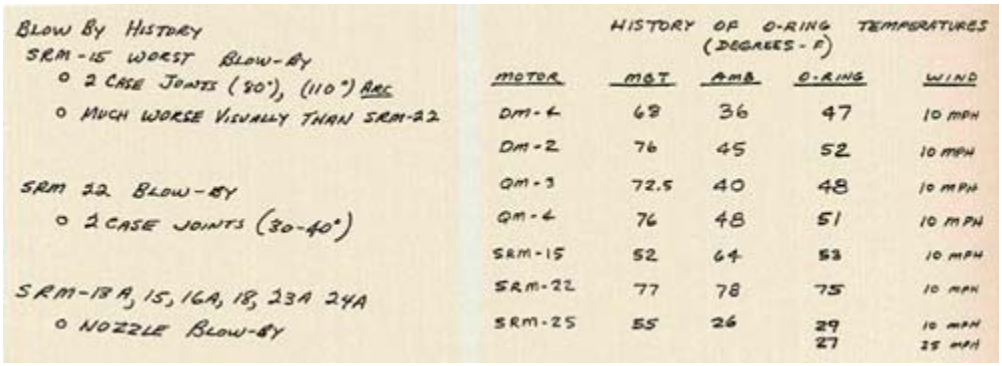
5. **Time Plots (p. 43-44) go ahead and skip this section**

6. **What Can Go Wrong?**

The whole point of chapters 3 and 4 is to help you convey information in a meaningful and truthful way using graphics and to help you understand that there are tools which can help you compare data from different sources

7. Why this matters

Good graphics allows us to see patterns, trends, or other structures that would be hidden if drawn poorly. The story behind the space shuttle Challenger is perhaps the saddest chapter of statistical graphics. The Space Shuttle Challenger exploded shortly after take-off in January 1986. Subsequent investigation determined that the cause was failure of the O-ring seals used to isolate the fuel supply from burning gases. This is data in it's rawest form. An engineer's notes with some organization.



Blow By History

SRM-15 WORST Blow-By
- 2 Case Joints (30°), (110°) Arc
- Much worse Visually than SRM-22

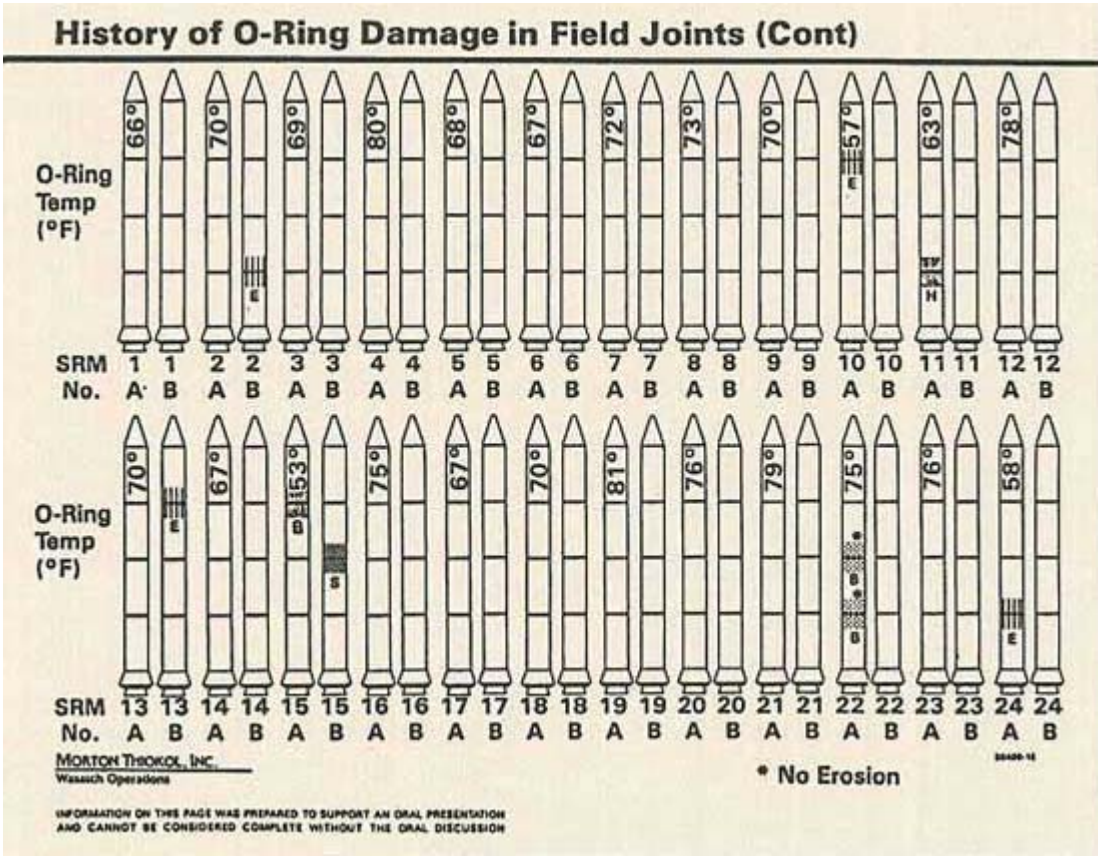
SRM 22 Blow-By
- 2 case joints (30-40°)

SRM-18A, 15, 16A, 18, 23A 24A
- Nozzle Blow-By

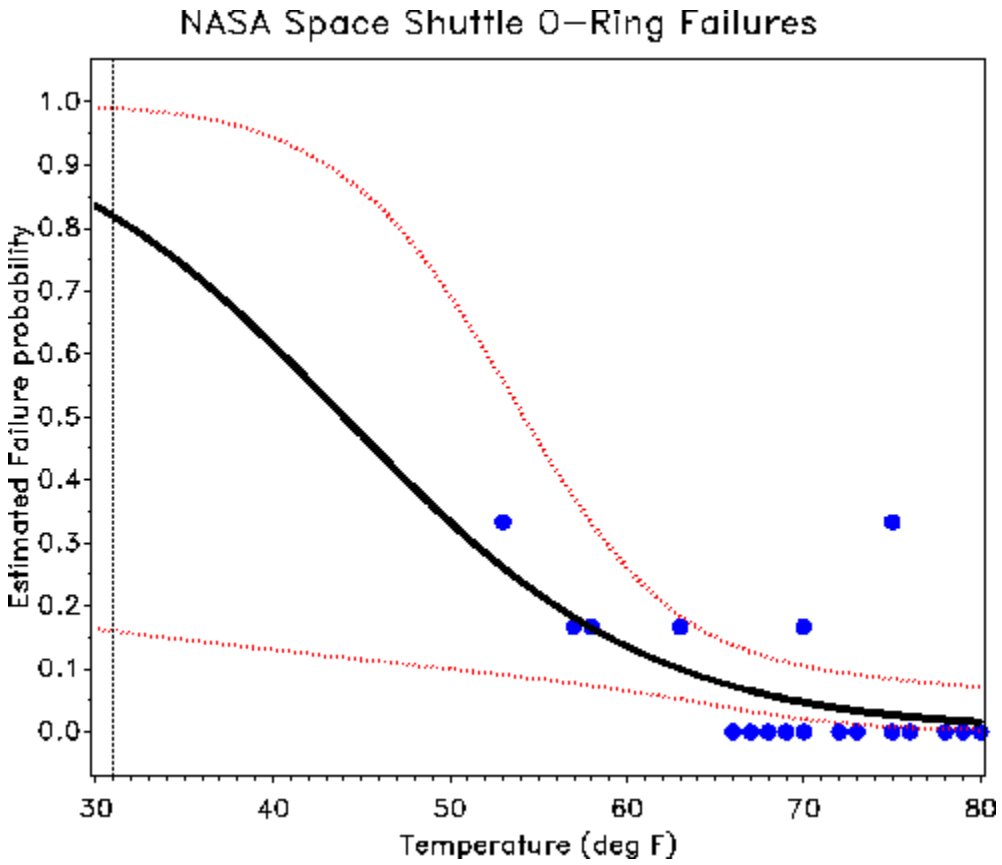
HISTORY OF O-RING TEMPERATURES (DEGREES - F)

MOTOR	MBT	AMB.	O-RING	WIND
DM-4	68	36	47	10 MPH
DM-2	76	45	52	10 MPH
QM-3	72.5	40	48	10 MPH
QM-4	76	48	51	10 MPH
SRM-15	52	64	53	10 MPH
SRM-22	77	78	75	10 MPH
SRM-25	55	26	29 27	10 MPH 25 MPH

This is the data as summarized by the engineers at Morton Thiokol and presented to their supervisors.



The same information, reorganized. The temperature on the launch pad that morning was about 29 degrees Fahrenheit.


NASA Space Shuttle O–Ring Failures
Estimated Failure probability
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
30
40
50
60
70
80
Temperature (deg F)