ASQ North Jersey
Spring Quality Conference
Thursday, April 18, 2024
10:00 AM

Process Performance Determined by Distributions

Created by Carl Perini
Presented by Ed May

In Memory of Carl Perini

Long time ASQ Section 304 Member, Executive Board Member and Education Committee Chair, **Carl Perini**, passed away at age 73 on Monday, July 17, 2023 at his home in Wayne, New Jersey. **Carl** was surrounded by his wife Eve, daughter Sara, son Glen and other family members. **Carl** was a truly wonderful person and was cherished and adored by many. He was especially proud of his new grandson Remy.

Carl Perini joined ASQ Section 304 North Jersey in 2003. **Carl** was a Senior Member. He served as the Education Chair since 2006. He was an ASQ CSSBB, CQA and CPGP. He taught many education courses for ASQ Section 304. **Carl** was an Adjunct Instructor of Quality Systems at New Jersey Institute of Technology. **Carl** belonged to the American Chemical Society and New Jersey Pharmaceutical Quality Control Association.

During his career, **Carl** worked at AIL, ITT, ISP, Fisher Scientific and Getinge. **Carl** never retired. He was on medical leave from Getinge when he passed away.

In Memory of Carl Perini

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Our Quality Message

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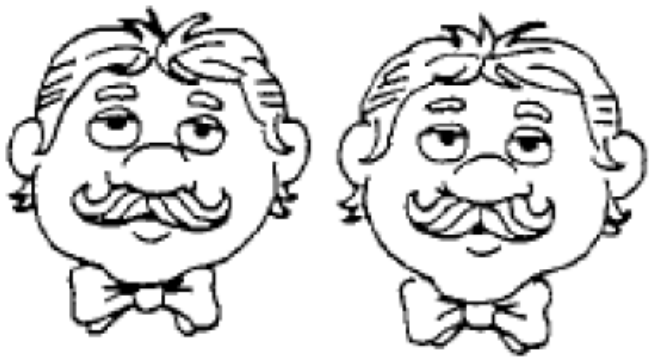
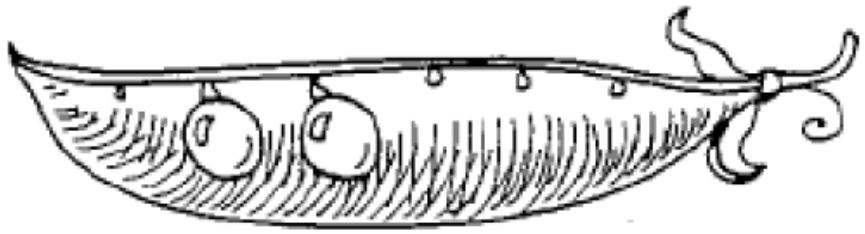
DISTRIBUTIONS

We have often heard the expression, "They are as alike as two peas in a pod." This expression usually means that the two people or things being compared are so similar, you can't tell them apart.





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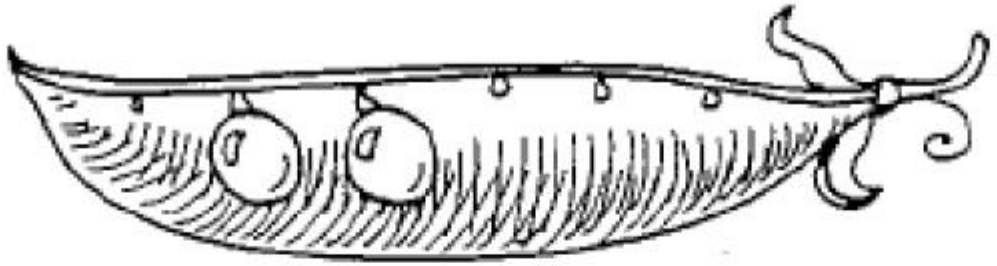
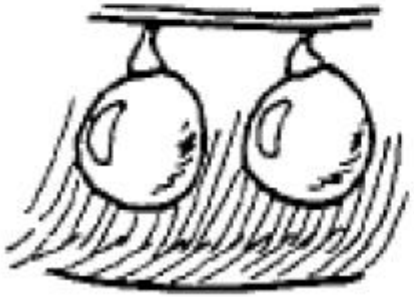
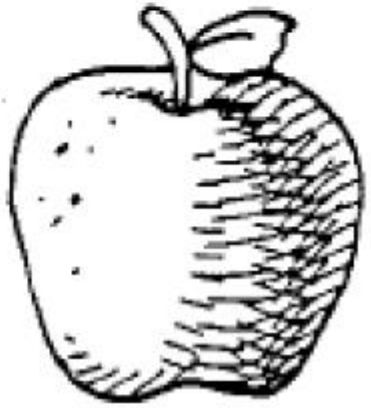


The two peas are, in fact, quite similar. They are especially alike when you compare them to tomatoes or apples, for example.





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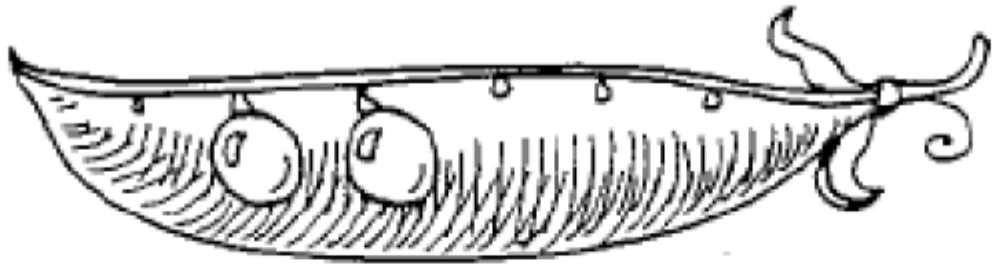
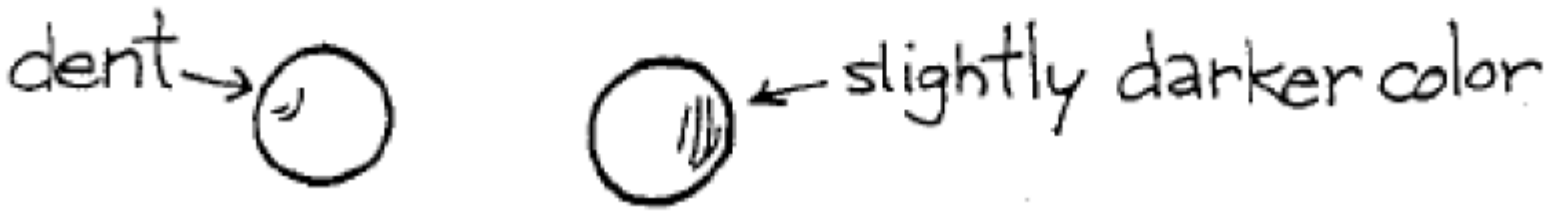


Are they *really* alike, though? Take a close look at them. There are very tiny differences between them.



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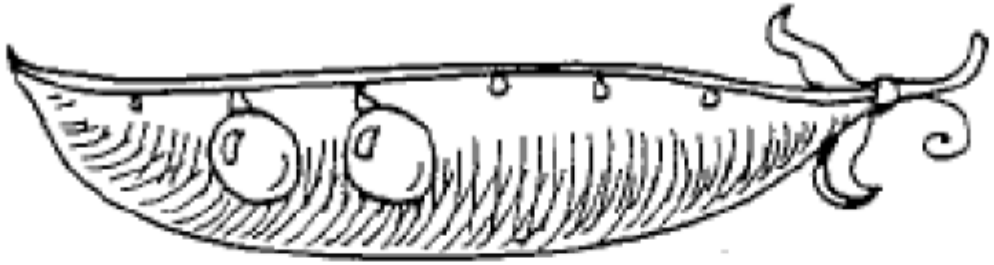
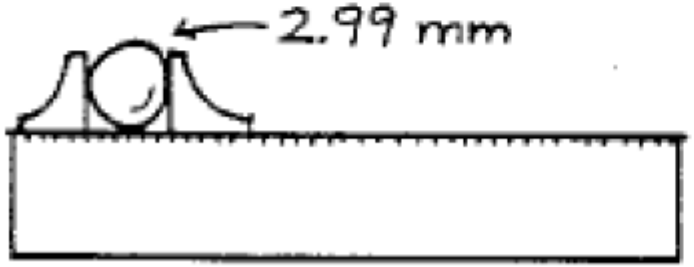
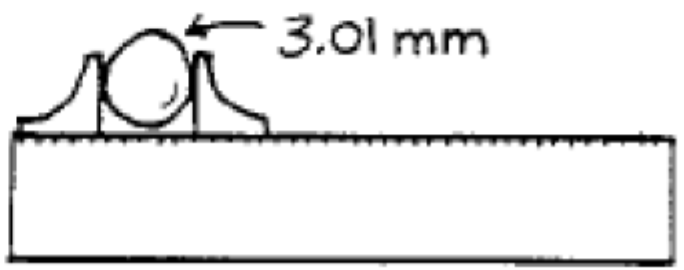


If we took a very precise ruler and measured the diameter of the peas, it is likely that we would find a small difference in their width.





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A completed checksheet shows that all of our peas are very close to 3mm in diameter, with just a little bit of variability. Some are exactly 3mm, but the actual measurement of each pea is between 2.9 and 3.1mm.

Pea Measurement Checksheet					
3.00	3.09	3.02			
3.01	3.08	3.04			
2.92	2.98				
3.00					
3.00					

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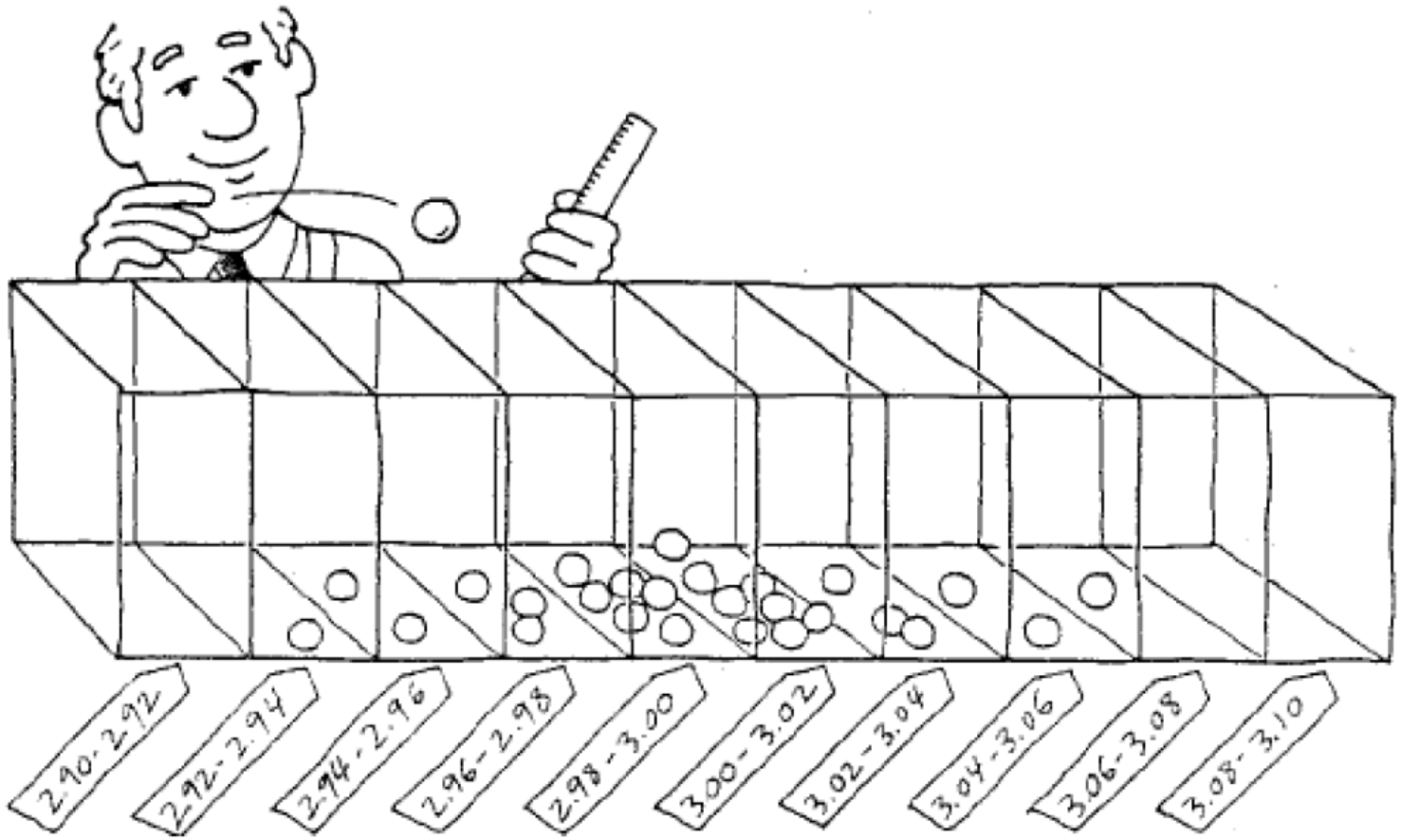
If we lined up ten plastic bins and sorted the peas by size,



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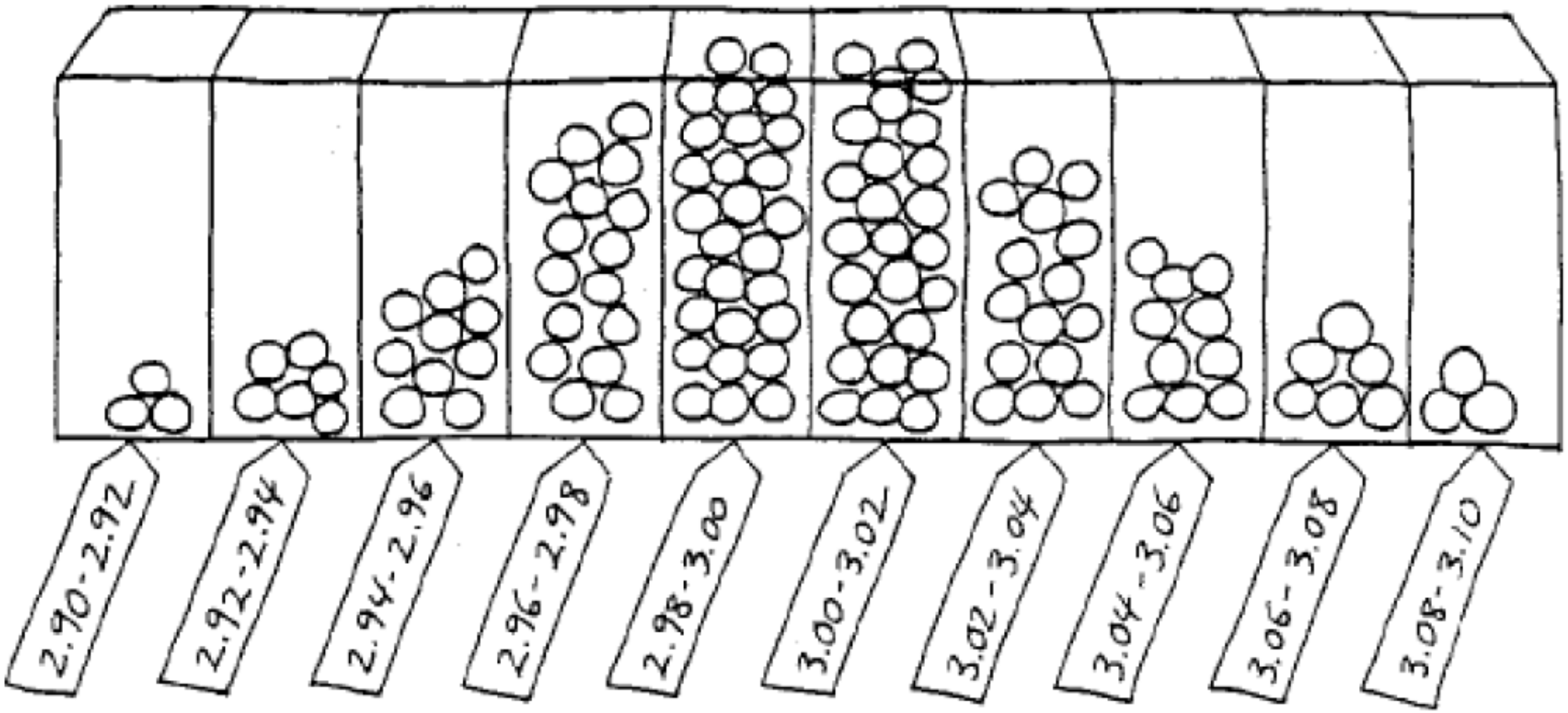
we would find that the middle bins are most full and the ones toward the sides are less full.



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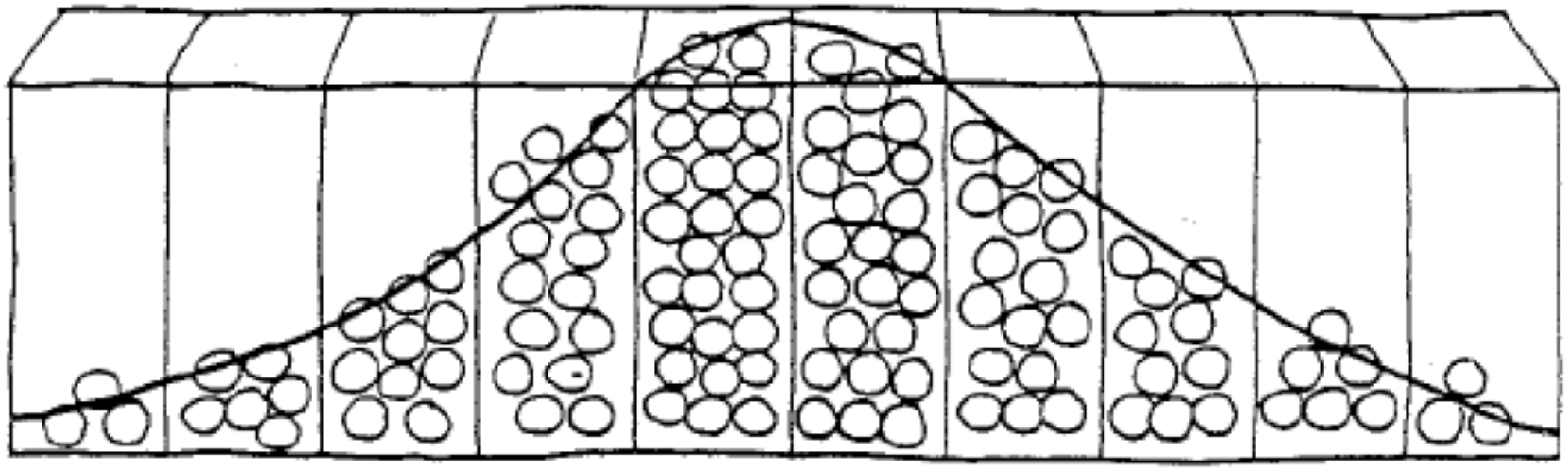
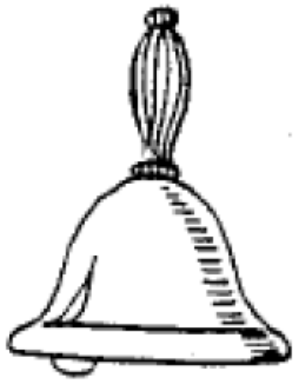
The shape of the outline of the piles is a curve, a bell-shaped curve.





Aka: a normal curve
a normal distribution

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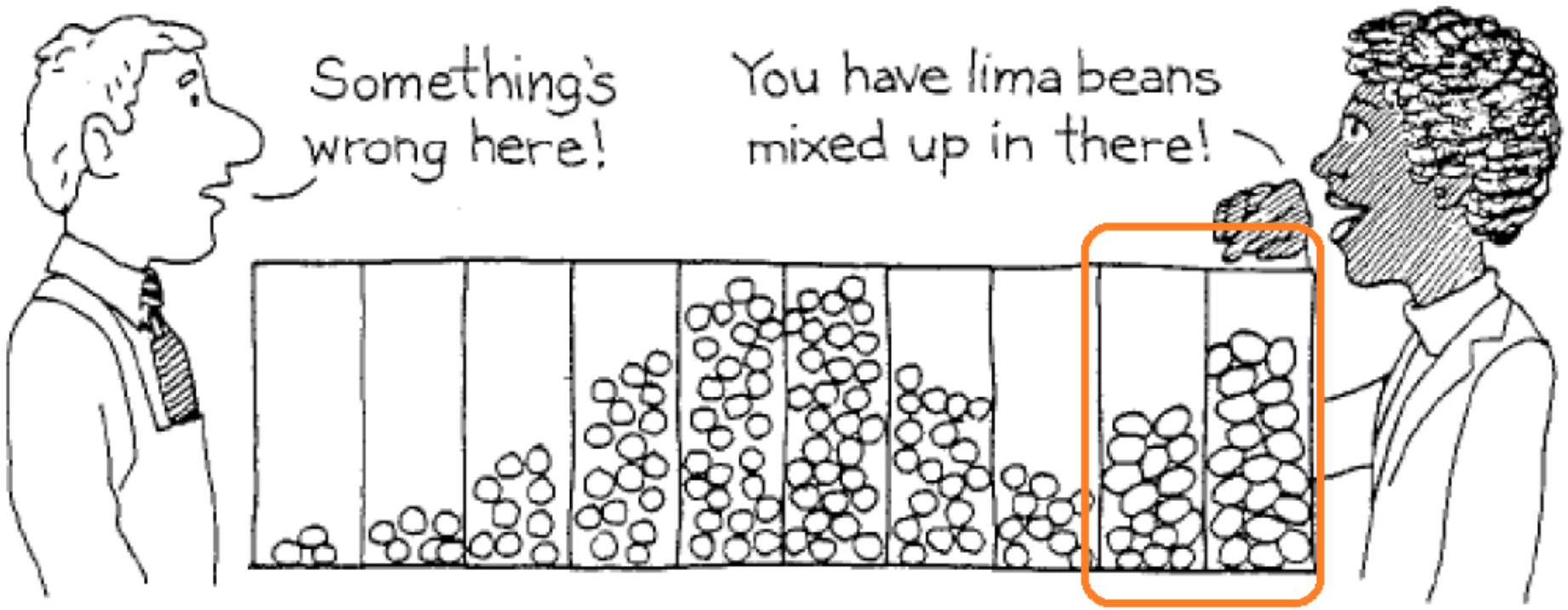
Knowing what a normal distribution looks like is important. Since normal curves are expected, non-normal curves should be unexpected. You should be suspicious when your distribution does not look bell-shaped; this may indicate that something is wrong.



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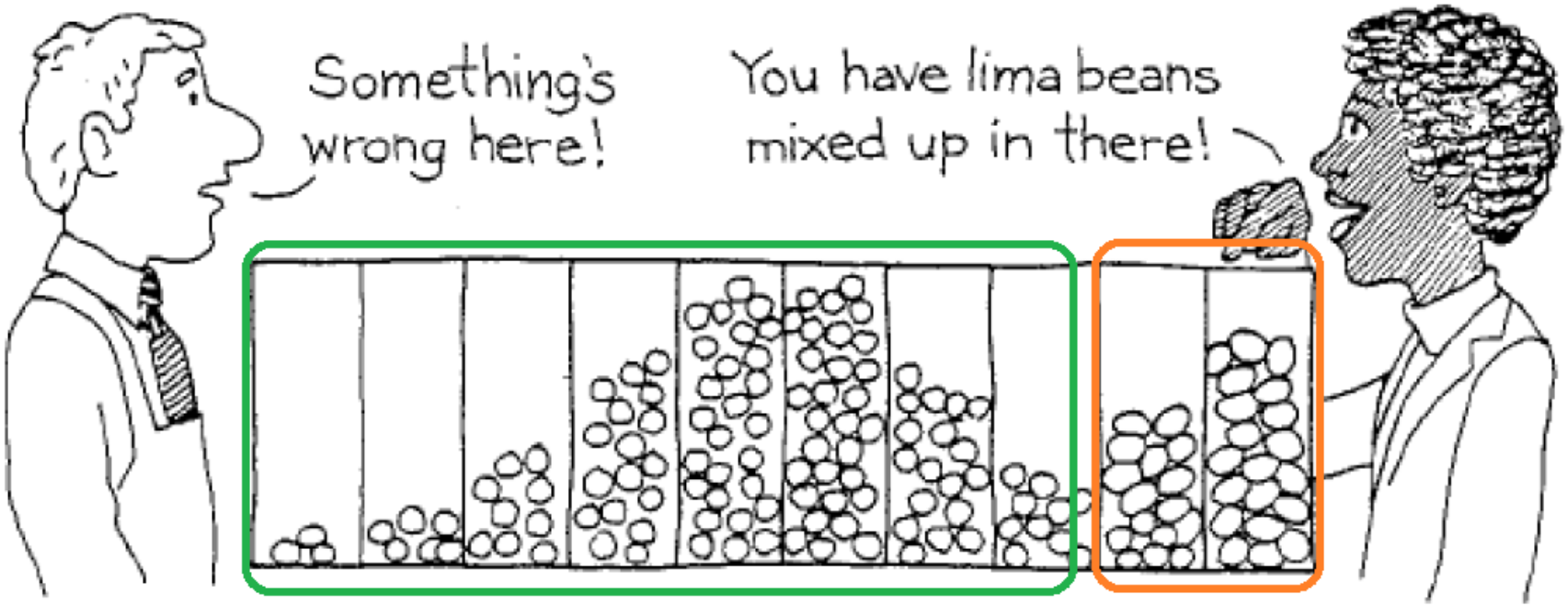

Central tendency
- bimodal

-two different populations

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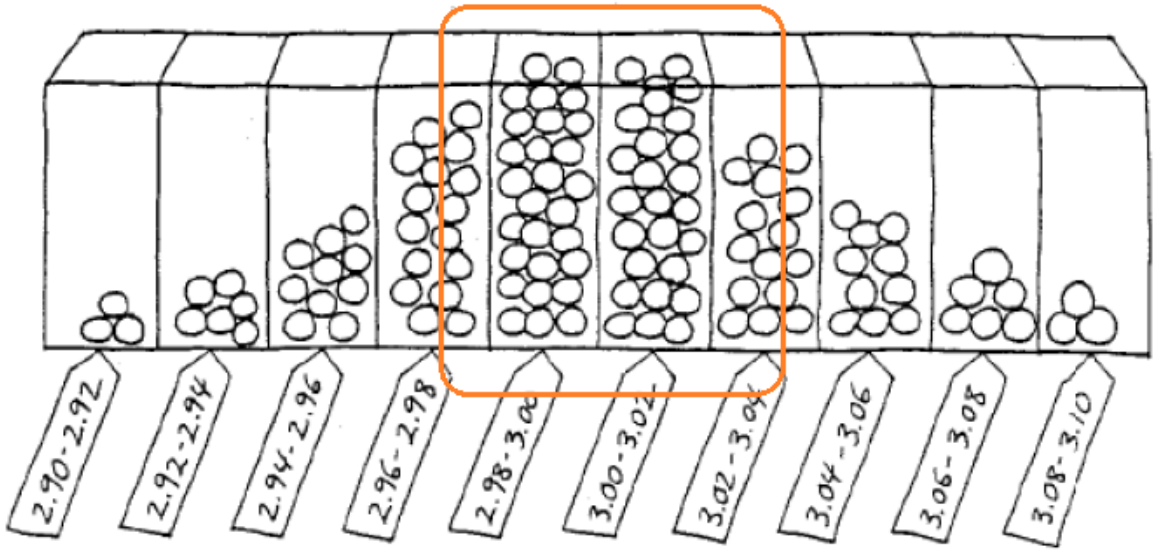

- **Central tendency**
  - mean (average) - μ
  - median (middle)
  - mode (most frequent)

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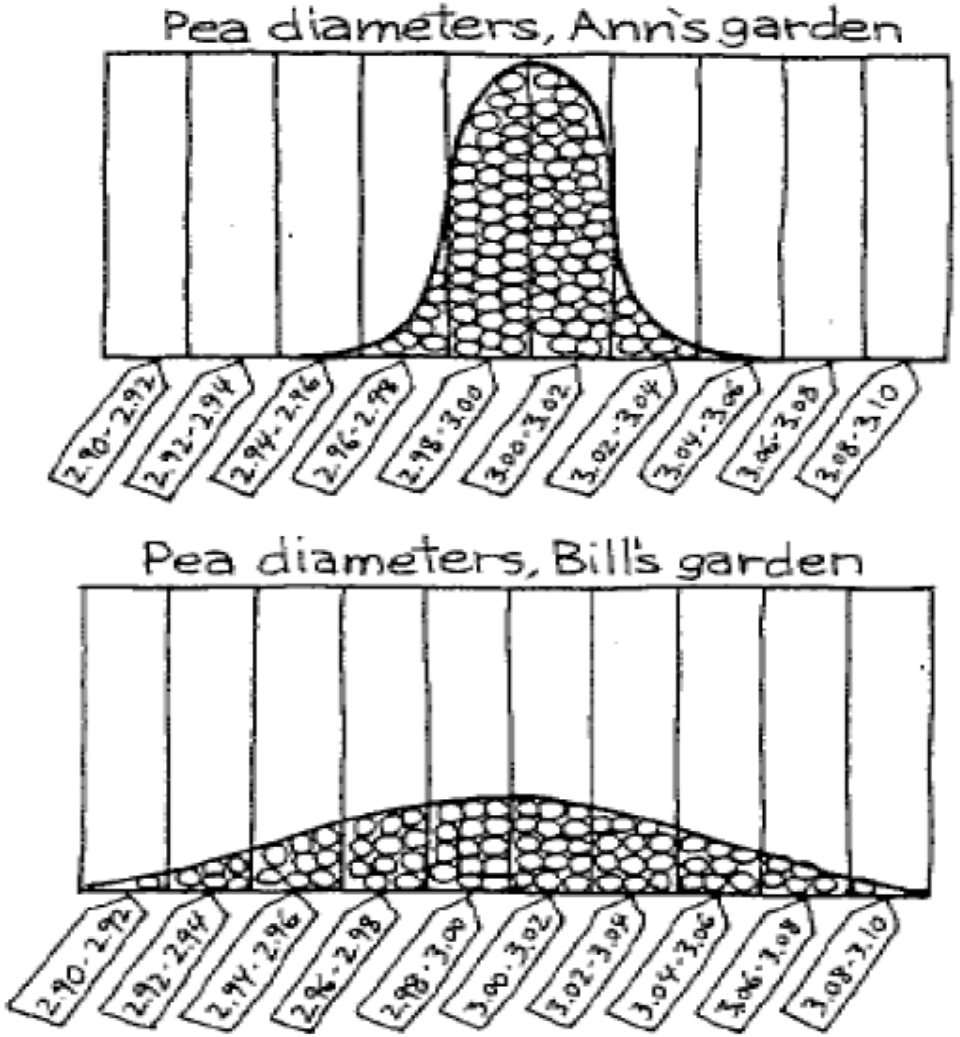
- **Dispersion** (variation)
  - range
  - standard deviation – σ



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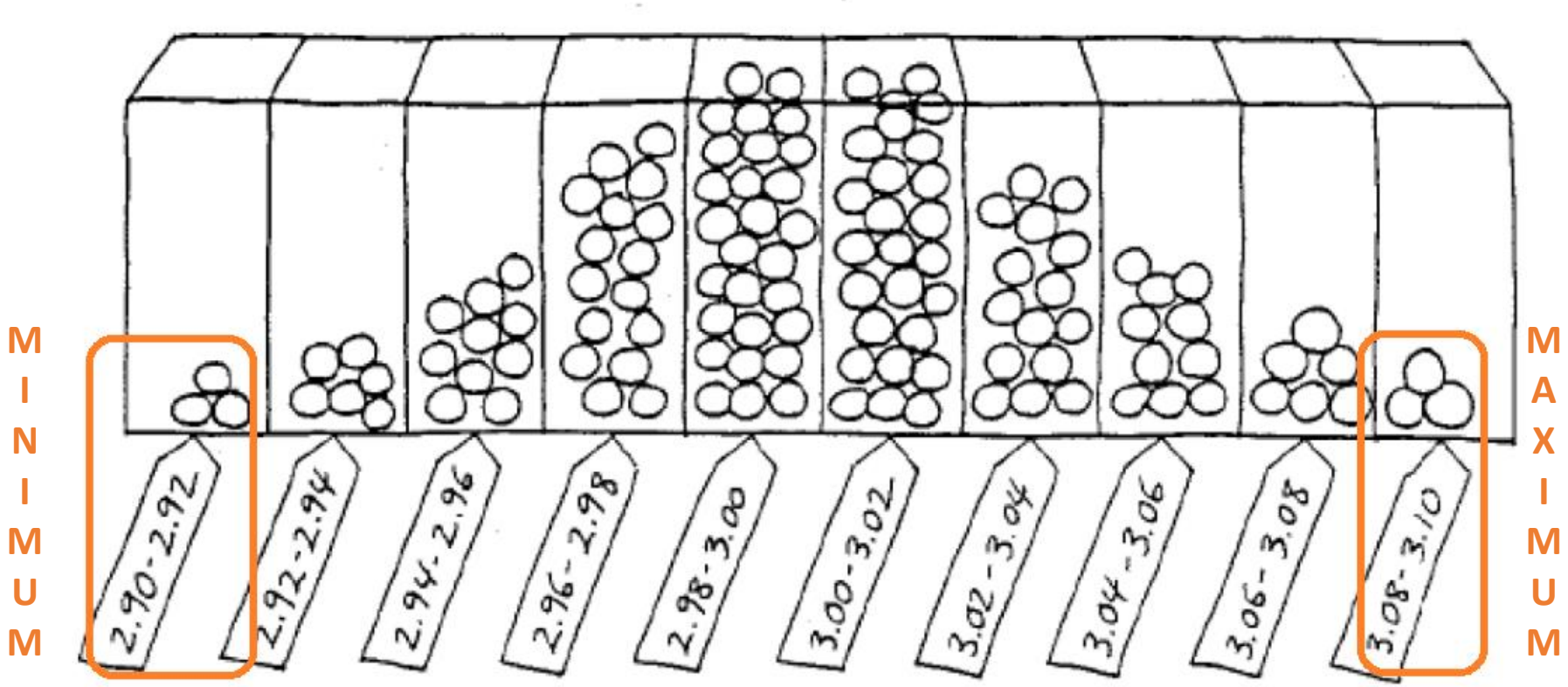
- **Dispersion** (variation)
  - range (maximum minus minimum)



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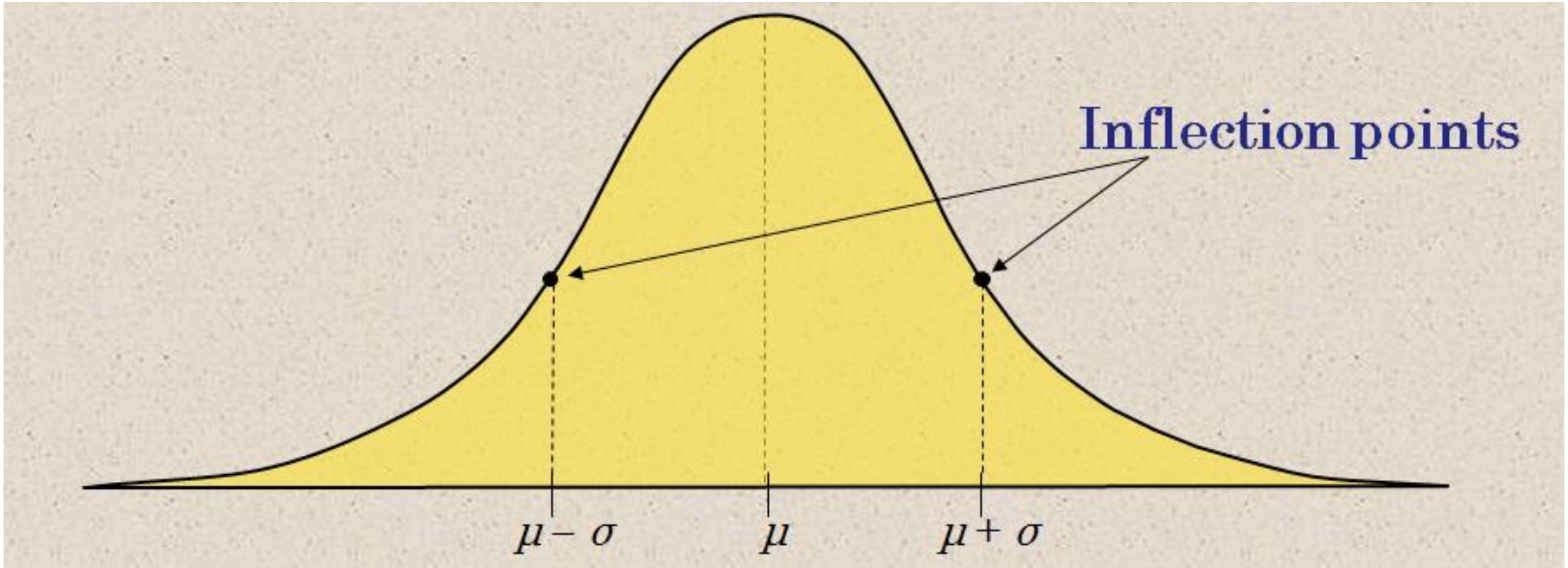
Our Quality Message

- **Dispersion** (variation)
  - standard deviation – σ



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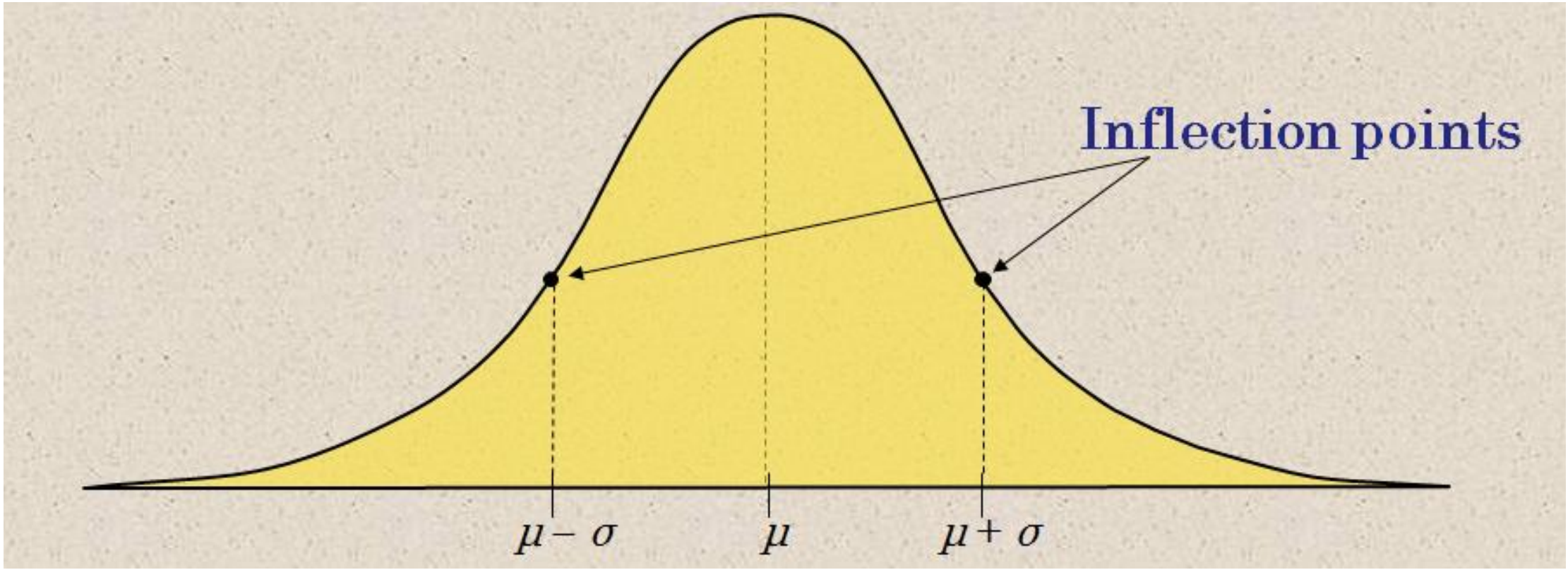
- **Inflection points – slope changes direction – upward vs. downward**
  - positioned one standard deviation (σ) away from mean (μ)



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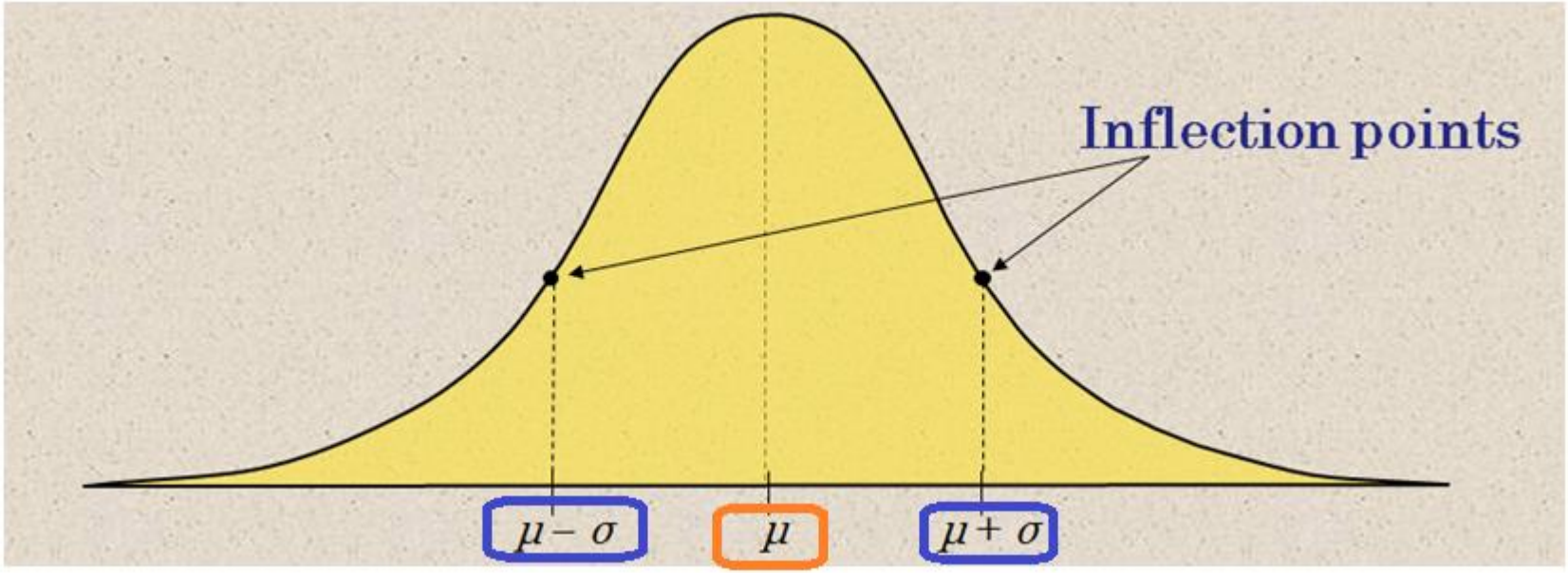
- **Distributions**
  Central tendency
  Dispersion



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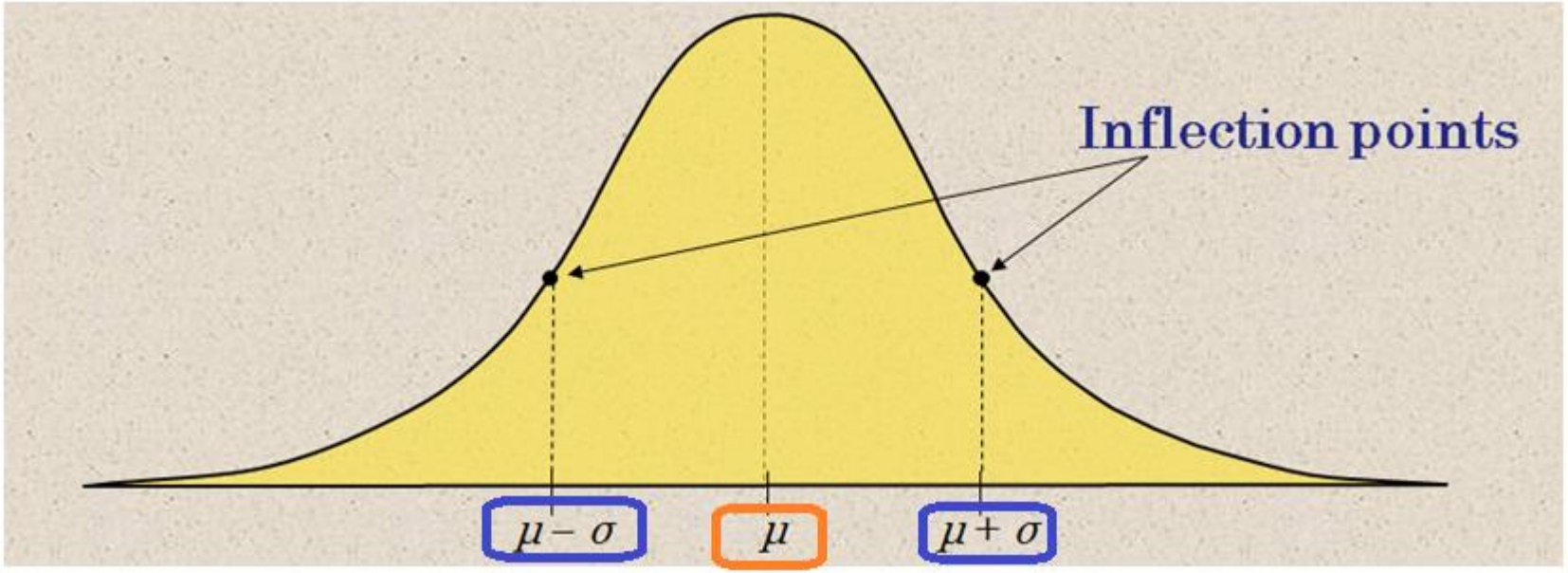
- **Distributions**
  Central tendency – accuracy
  Dispersion - precision



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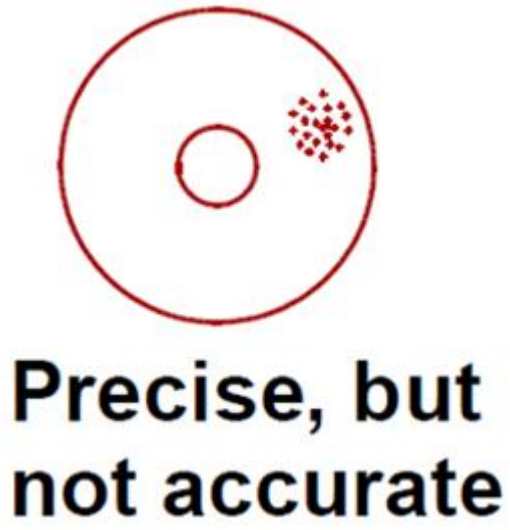
- **Distributions**
  Central tendency – accuracy
  Dispersion - precision



Quality Council of Indiana

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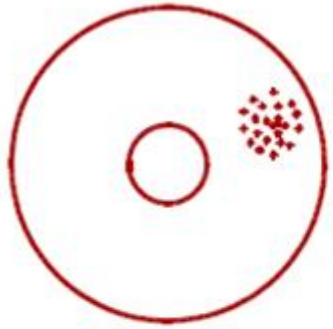
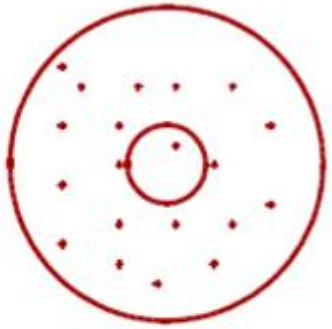
Our Quality Message

- **Distributions**
  Central tendency – accuracy
  Dispersion - precision



Precise, but not accurate



Accurate, but not precise

Quality Council of Indiana

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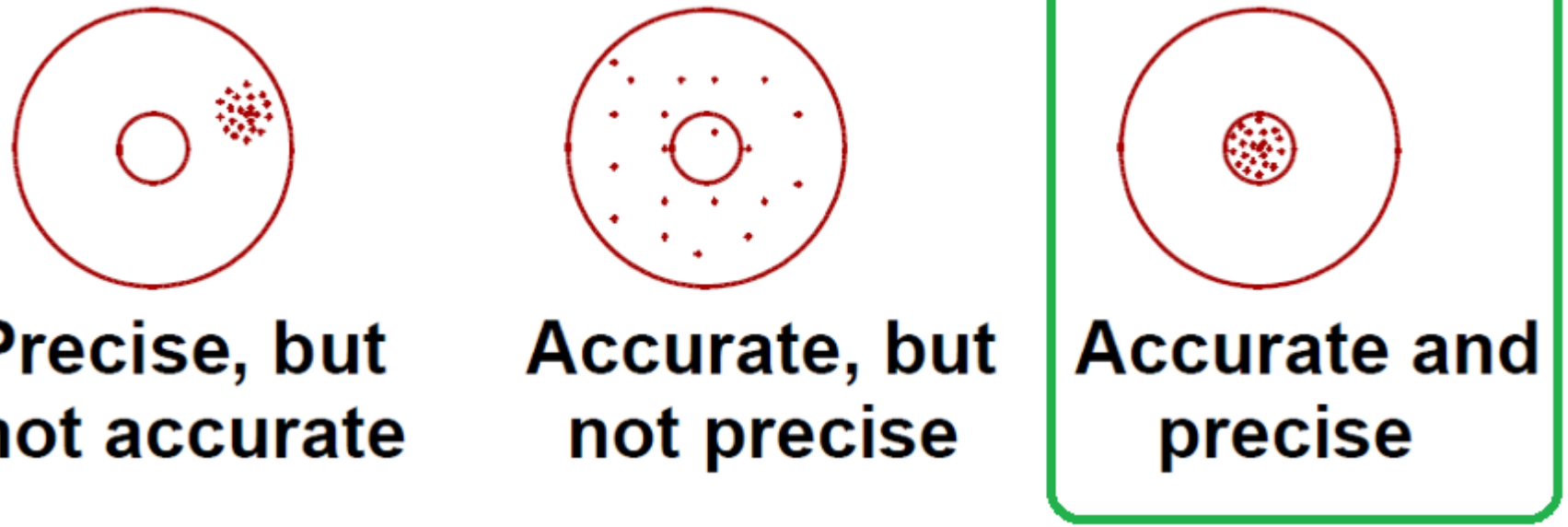
Our Quality Message

- **Distributions**
  Central tendency – accuracy
  Dispersion - precision



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Accurate and precise

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Our Quality Message

Accurate and precise

- ***Quality: On-target with minimum variation***

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- **Common alternative*:***

  ‘Conformance to requirements’

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Our Quality Message

- **Common alternative*:***

  ‘Conformance to requirements’

  Is not good enough!


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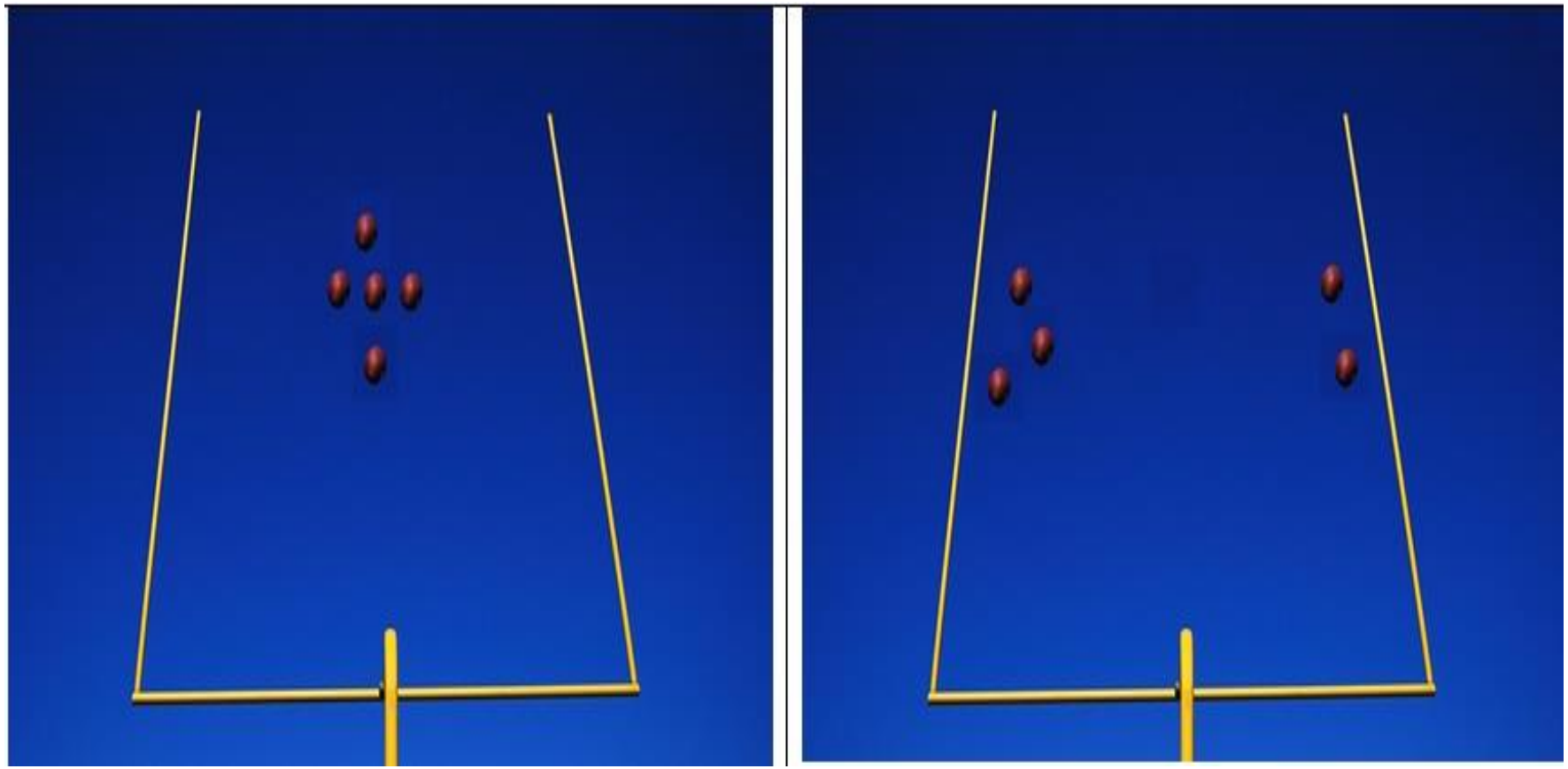
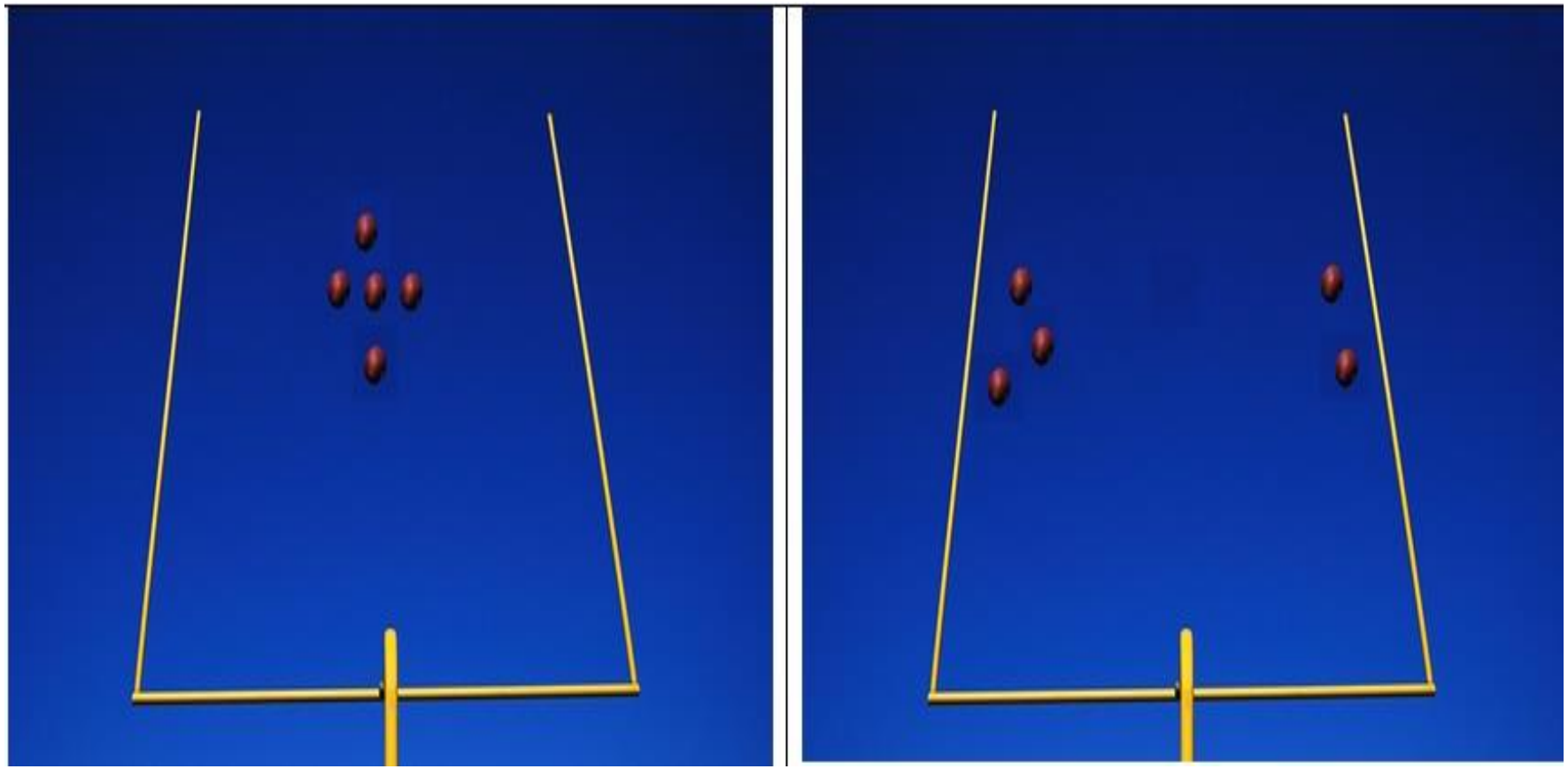
Quality defined

A **B**



Quality defined:
A: On-target with minimum variation
B: Conformance to requirements



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- **Genichi Taguchi**

Conformance to requirements is incomplete

On Target with Minimum Variation = Process Goal

ASQ North Jersey
Education Committee Information
Q&A

ASQ North Jersey Education Committee Mission Statement

Our Mission is to help Knowledge Workers increase their Productivity!

ASQ North Jersey
Spring Quality Conference
Thursday, April 18, 2024

Process Performance Determined by Distributions

The Last Slide

Created by Carl Perini

Presented by Ed May