Mar. 25 Statistic for the day:
Number of years before the sequence of Easter dates repeats itself: 5,700,000

Assignment:
Reread chapters 19 and 20
Exercises pp. 368-369: 5, 10, 11

Imagine that someone in your family has just handed a baby to you. Imagine yourself holding the baby.

With which arm are you holding the baby?

Research question: Do mothers tend to hold their babies on the left side (over their hearts)?

Rationale: the sound of the human heart is soothing to the new born baby and the mother instinctually knows this.

Can we find support for this hypothesis in data?

Lee Salk in a 1973 Scientific American article describes a series of observations and experiments to investigate this hypothesis.

See pages 4-5 of the textbook.

Formula for estimating the standard deviation of a sample proportion:

$$\sqrt{\frac{\text{sample proportion} \times (1 - \text{sample proportion})}{\text{sample size}}}$$

95% Confidence interval for true proportion:

sample proportion ± (2 × st dev)

Study 1: monkeys

Salk observed 42 rhesus monkeys in Bronx Zoo holding babies. 40 held the baby on left.

Suppose this is a sample of Rhesus monkeys. Find a 90% confidence interval for the population proportion of monkey mothers who hold baby on left.

1. sample proportion: 40/42 = .95
2. sample size: 42
3. standard deviation of sample proportion: .034
4. number of standard deviations for 90%: 1.64
5. 90% confidence interval: .95 ± 1.64×(.034)

.95 ± .055
.895 to 1.005
.895 to 1

Study 2: mothers both right and left handed

Of 255 right handed mothers, 83% held baby on left.
They said it was more natural since it frees the right hand for doing things.

Of 32 left handed mothers, 78% held baby on left.
They said it was better to hold baby in dominant arm.

Right handed: 98% confidence interval
1. sample proportion: .83
2. sample size: 255
3. standard deviation of the sample proportion: .024
4. number of standard deviations for 98%: 2.33
5. 98% confidence interval: .83 ± 2.33×(.024)

.83 ± .056
.774 to .886

Left handed mothers 90% confidence interval:

1. sample proportion: .78
2. sample size: 32
3. standard deviation: .073
4. number of standard deviations for 90%: 1.64
5. 90% confidence interval: .78 ± 1.64×(.073)

.78 ± .12

.66 to .90

Study 3: shoppers

Researchers loitered around a supermarket parking lot and recorded in which arm the shoppers carried their grocery bags.

Of 438 shoppers, 50% carried bags on left.

95% confidence interval:

1. sample proportion: .50
2. sample size: 483
3. standard deviation of sample proportion: .024
4. number of standard deviations for 95%: 2
5. 95% confidence interval: .50 ± 2×(.024)

.50 ± .048

.452 to .548

Study 4: paintings and sculpture

Of 466 paintings and sculpture of the Madonna and child, 80% held baby on left.

98% confidence interval:

1. sample proportion: .80
2. sample size: 466
3. standard deviation of sample proportion: .019
4. number of standard deviation for 98%: 2.33
5. 98% confidence interval: .80 ± 2.33×(.019)

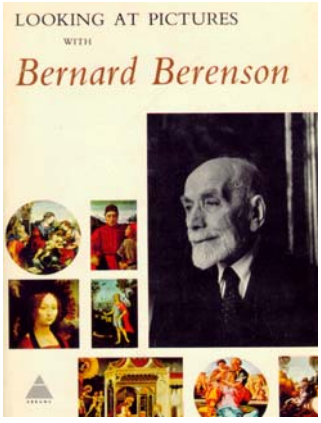
.80 ± .044

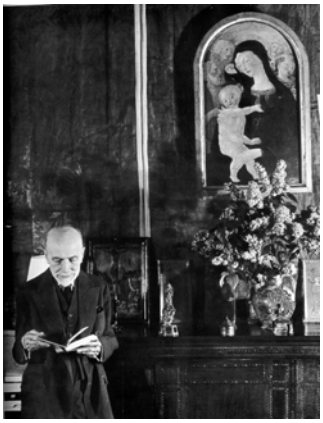
.756 to .844

Bernard Berenson

Died 1959.

One of the world's greatest authorities on Italian painting.





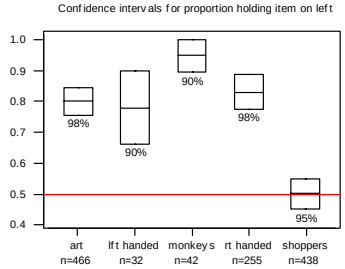
From Berenson's book:

17 paintings of Madonna and Child

13 holding baby on left: 76%

Exercise: find a 98% confidence interval

Summary



What makes for wider intervals? Smaller samples, larger confidence coefficients